ИНСТИТУТ ЗА ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ НА БЪЛГАРСКАТА АКАДЕМИЯ НА НАУКИТЕ

Икономически Изследвания

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CONTENTS

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CHINA AND GLOBALIZATION: INTERNATIONALIZATION OF FIRMS AND TRADE IN SERVICES

Our contribution focuses on the transformations of the Chinese economy, on its growth trajectories, notably its internationalization, which was made possible by the adoption of an export-led growth model followed by a catch-up and export of good to higher value-added.
Foreign direct investment played a decisive role in this process. Inbound capital has contributed to the development of new sectors (automotive, information technology) and new specializations. Financial resources accumulated by China, then, fueled the outflows of capital in the form of acquisitions and greenfield investments around the world, especially towards developed market economies.
After recalling the phases of the transformation of the Chinese economy, the importance of Chinese outgoing FDI and their contribution to the evolution of trade in services between China and the rest of the world, the recent development of trade in services, which are heavily dependent on FDI is analyzed.
JEL: F21; F43; O1; O4; 053

The great Chinese growth that has been going on continuously and regularly for more than four decades is constantly calling on specialists, economists, political scientists, and historians. China, a "developing" economy, the most populous in the world, which introduced a Marxist-Leninist-type political system after a long civil war, went through contrasted experiences of socialism to forge, ultimately, a model of "market socialism with Chinese characteristics" a mix of pro-market reforms with the maintenance of an important state sector, the absence of "pro-Western" political reforms (rule of law, democracy).

Several factors explain this success. Among these, one should emphasize the opening of the Chinese economy and the strategy of specialization that supported it. On the one hand, economic decentralization and the mode of governance, notably the state sector, on the other, the pursuit of an export-led growth model. This has led to rapid economic growth, leading to the specialization of the Chinese economy in the production of low value-added goods ("the world's workshop"). At the same time, in the context of openness, China has attracted foreign direct investment in order to accelerate its economic catch-up in many sectors, leading the country to become an exporter of more higher value-added products

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and services. Over the past four decades, the strategy of openness has borne fruits. China has become the world's largest exporter, changing the structure of its exports in terms of added value, in sectoral terms (from industry to services). Foreign direct investment, both inward and outward, contributed greatly to these changes. The growing importance of trade in services illustrates the development of China's specialization.

After recalling the phases of the transformation of the Chinese economy (Section 1), the importance of Chinese outgoing FDI and their contribution to the evolution of trade in services between China and the rest of the world (Section 2). The recent development of trade in services, which are heavily dependent on FDI is then analysed (Section 3).

1. Reform and New Growth Model

Outward opening of the Chinse economy which has gradually taking place in the early 80s of the last century has had two consequences: the reception of foreign direct investment in priority sectors through the creation of joint ventures with mixed capital in order to favor technological catch-up (electronic, automotive, telecommunication) with a strong impact in terms of diffusion and spin-off in the industrial environment. The export-led growth strategy initially favored low value-added products, using unskilled and heavily exploited labor, gradually replaced by more sophisticated products. The undervaluation of the national currency (Renminbi) has helped to maintain a competitive exchange rate and stimulate export growth, it has encouraged the accumulation of large financial reserves and the creation of sovereign wealth funds, instruments today supporting and financing the strategy of acquiring foreign assets. At the domestic level, these reserves have enabled the financing of overinvestment policies in infrastructure, transport (railways), construction, steel plants.

These policies have had many positive effects. The high and sustained growth rate of about 10% per year over the last forty years has led to a clear increase in the country and in the general population with a significant reduction in the poverty line, particularly in the countryside. It spread unevenly between coastal cities and the interior, between urban and peasant. An urban middle class appears with its consumption requirements, access to new types of goods, which fuels the activity of many new areas. New problems arise concerning social policy (protection system, retirement), the sedentarisation of the mobile workforce (*hukou*). Economic activity regularly produces bubbles (real estate) and macroeconomic regulation must regularly arbitrate between stimulating activity, controlling inflation and halting sectoral imbalances. The informal sector is still deployed and continues to circumvent government regulations (shadow banking), corruption is endemic.

At the international level, the policy of openness and specialization has greatly changed the flow and structure of trade. In just three decades, China has become the world's second-largest economy; It is on the verge of overcoming the United States. It has become the leading producer of cars; It is in the process of acquiring dominant positions in the electronics and telecommunications sectors in terms of market share. Today, Chinese firms are launching the onslaught of the global market both to acquire resources (materials, technologies) to conquer new markets. Workshop of the world (production with low added

value) China intends to become also the office and the financier of the world. China is now present in many markets and is in a position to control and acquire strategic firms in major market economies, commodities in southern economies. Its financial reserves and the importance of its foreign trade allow it to take a growing place in the international capital markets.

Can this growth model continue at this rate? Can China maintain an export-led growth strategy as wage increases increase the cost of exports, as global demand stagnates? Does the ongoing technological catch-up (R & D spending increases) help to reduce the remaining gap and in some cases continues to increase with the most developed economies? Can Chinese leaders support economic activity only by injecting massive amounts of money into infrastructure financing to support growth? Will the necessary pro-market reforms announced by the leaders (interest rate liberalization, capital account liberalization, land reform, capital allocation mechanism, elimination of subsidies, privatization) be applied in whole or in part at a homeopathic dose? These are some questions that arise as the Chinese economy has reached a stage of its development which requires an adaptation of the model that has ensured this great and long economic growth, leading China to become, in volume of production, the first world economy .

To explain the dynamics of Chinese growth, one must look at the "mix" of the reform, both economic and political. Economic first of all by using an abundant and underpaid labor, taking advantage of undervalued prices of products exported through the manipulation of exchange rates. The prevailing social system constrains the workers, a large part of them are exploited workers who have no status, come from the countryside (the *Hukou*), do not benefit from social protection. On the other hand, there are plenty of specialized workers shortage leading to wage increases in many regions, pushing labor-intensive industries to relocate to countries with lower labor costs.

The counterpart of selling low-cost products leads to financial surpluses that are not firstly redistributed into the economy (social protection financing). They provide funds to sovereign wealth funds to invest in the economic priorities set by the government. If redistribution occurs, it takes place at the margins, it takes the form of corruption (transition from the state sector to the private sector). It is therefore the State Party that is at the heart of the redistribution of resources, which decides which priority sectors to develop, the technologies to be acquired to ensure the catching-up and upgrading of domestic firms. The Chinese financial sector, which is little open (in spite of commitments resulting from WTO accession) and in the hands of the government, facilitates the financing of the big industrial groups in which the economic elite exercises control. Most of the large Chinese firms that invest abroad, especially in the commodity sectors, receive preferential financing.

Over the last decades, China has acquired a hegemonic position in various economic and political fields. Its growing raw material needs translate into foreign direct investment in developing or semi-developed countries (south-south relations), massive purchases of products, which have resulted in some countries in Latin America to reprimarization (Brazil). The non-binding regulation of trade (WTO) favors the entry of Chinese products at lower prices and upsets the specialization of many countries including developed countries. In this context, China has been a great beneficiary at the same time as an active participant in globalization.

2. China and the globalization process

Globalization has led to a new phenomenon which attracts the attention of scholars, namely the internationalization of firms from emerging countries such as China. These firms are still limited in number and the volume of capital invested. But they are entering different markets in the North and the South, in search for production factors (material resources, technology and human capital), as well as sales outlets. The accumulation of financial resources, along with technical and managerial know-how through industrial cooperation with foreign companies operating in these emerging countries and the spin-offs this creates, all favour the investment in greenfield sites, as well as the acquisition abroad of assets that are sometimes prestigious (see for example the purchase of Volvo by the Chinese car producer Geely).

The mainstream press views these trends as a threat. Western firms are seeking to protect their technology, and governments are putting into place rules limiting the entry of foreign capital (the United States). According to the BCG *New Global Challengers* inventory, there are no less than 43 Chinese firms among the top 100 companies from the most dynamic emerging countries, which are operating in several sectors, running from energy to information technology and financial services. These firms are directly or indirectly controlled by States, and some are associated with inter-governmental contracts, especially in Africa which helps their entry into markets.

The internationalization of Chinese firms and the development of their operations in various continents is a new phenomenon which has arisen during the last two decades. This rapid progress is linked to the strong GDP growth recorded by China over several decades, and which has followed its economic reforms and opening. Having been the main recipient of FDI, China is today one of the main new sources of FDI in the South). Outward FDI growth rates from China in recent years have converged on rates of inward (Figure 1)

It must be stressed that this move to internationalization is not unique to China. The BRICs, which are among the main emerging market economies, have a certain number of companies that are spreading internationally, both into the developed economies (South-North), as well as into the developing economies (South-South), via greenfield investments and acquisitions. Most of the Chinese firms are "national champions". They have expanded thanks to a number of factors: innovation, and specialization in protected markets, the development of internal competencies, market size, favored access to finance from banks that have monopoly positions, the nature of regulation, the exchange rate, specific industrial policies that target certain sectors, research and development (R&D) policies. Furthermore, the continued appreciation of the Chinese Yuan – the Renminbi (RMB) – in recent years, against the US dollar and the euro, before falling back recently has cut the costs of buying up western companies, just as it raises domestic costs which today push Chinese firms that are labor intensive to locate to offshore production (e.g., to Vietnam, and Cambodia).

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Figure 1

Chinese inward and outward FDI flows (in $ billions)

Source: UNCTAD.
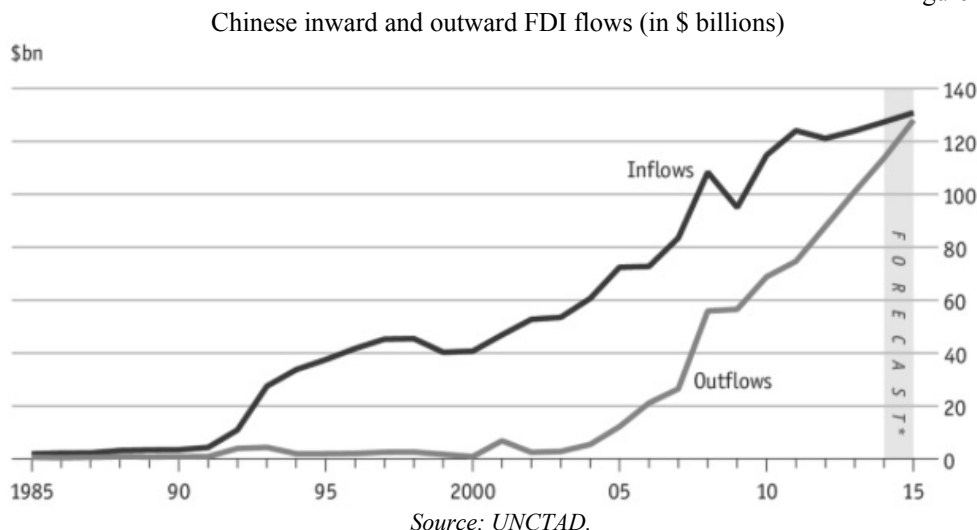
To be sure, in terms of the numbers of companies and volumes of flows, FDI from emerging countries, including China, are still modest (UNCTAD, 2016). But China accounts for the lion's share today, and outperforms other emerging nations both in the number of new (greenfield investments) and acquisitions: this is true for the sectoral distribution of FDI as well as its location across the five world continents. The *Fortune Global 500* ranking of major global companies includes 61 Chinese firms (including 4 from Hong Kong), 8 Indian companies, as well as 7 firms from Russia and Brazil. The Chinese firms, of which nearly 80% are state enterprises, belong to nearly all sectors, ranging from mining and oil extraction to banking, passing via electronics, capital equipment and transport.

How is this strong growth to be explained? Is there a link to the massive inflow of FDI into China, which played a vital role in technological catch-up and the appropriation of know-how, followed by the rise of Chinese outward FDI? What are the specificities of China's industrial model that favored this expansion, and which allowed the emergence of such a large number of companies capable of competing in certain niches with the major multinationals from the developed world? What are the specificities of these countries in comparison with their counterparts in the developed market economies?

A few Chinese companies today hold dominating market shares in developed world markets (Haier, Huawei). Others are undertaking technological breakthroughs via acquisition strategies, which allow them both to obtain technology and to position themselves in new, competitive market segments that are more profitable, including within China itself (Geely). Other firms, however, have failed or have run into difficulties integrating their acquisitions or greenfield investments within their global strategies.

FDI in China as a vector of modernization

China's hosting of FDI has played a role in accelerating its economic development, even if it has at times been viewed negatively by certain observers (Huang, 2003). In contrast to Eastern Europe, FDI into China has been strongly regulated (in terms of volume, ownership and the control of joint ventures, regional distribution, the search for agglomeration effects, and links with local government industrial policies).

In contrast to Japan and South Korea, China initially based its modernization strategy on welcoming western FDI (from the United States, Europe and other Asian countries), in the hope of acquiring technology it did not have. In Japan and South Korea, company upgrading took place through a process of "reverse engineering", a process based on first mastering, then enriching and developing standard technologies, sometimes by achieving significant technological leaps. This process was also supported by adopting strategic industrial policies, that were targeted and cooperative (State-Enterprises), aimed at growth technologies (electronics). In China, domestic firms were only able to benefit from the spin-offs derived from the presence of western firms, in a second phase, once these firms had been established in the country and had created networks with suppliers. Only then could Chinese firms gain new skills and enter domestic markets which had been dominated by foreign companies. Low entry barriers in many areas, as well as the industrial policies conducted by central, provincial and municipal governments, helped with the process of benefiting from spin-offs, company acquisition and the upgrading of local firms. Lastly and most recently, innovation policies and a significant rise in R&D have sought to accelerate the catch-up of Chinese firms through access to technology, to achieve an increase in their performance in both domestic and international markets.

In the automotive industry, for example, Chinese partner firms have often played a passive role, acting as mere (neutral) platforms, providing grounds, plant, and labour to foreign operators. The foreign partners acted in the market (developing sub-contracting and distribution networks), while the Chinese partners took care of the bureaucracy (relations with authorities). Strongly competitive environments (low entry barriers) and strong market growth facilitated the entry of numerous competitors – public, semi-public and private – into the sector, helping raise supply and reduce costs (Richet & Ruet, 2008).

Inward FDI has played an important role in the adjustment of firms and of trade. It generates more than half of Chinese exports and imports, accounting for 30% of industrial output and creates 22% of profits in the industrial sector, while only employing 10% of labour, given its high level of productivity. Though it is hard to evaluate spin-off effects on other sectors, which are indeed real, industries receiving FDI do have higher levels of productivity. Inward FDI has contributed positively to the strong growth of GDP. The central government has been able to combine a strong policy of regulating FDI, with a certain level of decentralization regarding hosting, attraction, and the adoption of local industrial policies at the regional and municipal level, as shown by the car industry.

It may therefore be asked whether FDI has allowed China to bridge the gap with the developed market economies. It is hard to reach a clear and unequivocal view on this, due to the differences between sectors in terms of their foreign presence, the nature of markets, technologies and the degree of competition.

The impact of industrial cooperation is appreciated in a qualified way by the Chinese authorities. They view it as an essential contribution to the modernization of their economy, while underlining its limited impact on the shift to high value-added production, the appropriation of know-how, and specialization in numerous sectors.

Sino-foreign cooperation through the creation of joint-ventures has not induced a rapid transfer of technology, despite agreements concluded between operators.[3] Chinese firms file less patents than their counterparts and innovate less. A large share of Chinese exports, be they upstream or downstream in the production process, are of low value-added products, even though companies with foreign capital account for nearly three-quarters of high value-added exports (OECD, 2012).

There are several causes of this limited transfer:

- The protection of intellectual property (one of the main points of disagreement between China and its western partners, along with the undervaluation of the RMB). It is notoriously deficient and pushes western firms to limit transfers.

- The nature of agreements and the behavior of Chinese partners. In many cases, Chinese partners have acted passively during the launch phase of cooperation. This reduces internal and external spin-offs (the transfer of knowledge, the appropriation of know-how).

- China's entry into the WTO has allowed foreign firms to protect their know-how better, especially by creating subsidiaries which are 100% foreign owned.

Nearly half of all Chinese exports are of low value-added. Exports also contain a high level of imports: more than 25% for automotive engines and more than 45% in information technology (OECD, 2012). The decision by the government to raise R&D spending substantially (which accounted for 1.83% of GDP in 2011), is aimed at accelerating the acquisition of technologies that China still lacks.

These facts explain why the Chinese government has a selective policy concerning FDI inflows, which focuses on the impact they could have in terms of providing technology to host companies. The Catalogue of Foreign Investments published by the Council of State Affairs sets out sectors targeted by the authorities. Such targeting reveals the level of technical competence reached by Chinese firms in several sectors (chemicals, pharmaceuticals, metallurgy, green technologies, textiles, high-voltage electricity distribution, etc.). It shows the threshold effects concerning technological improvements achieved and the volumes of production envisaged in targeted sectors. Today, FDI constitutes a certain form of subsidiarity in the eyes of the government: how is technology integrated into the capacities of Chinese firms?

These choices draw on the priority of the 12th five-year plan, which sets out seven emerging strategies: alternative energies, new materials, biotechnologies, new generations in the field

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[3] The joint-venture format has evolved, especially in less strategic sectors. Thus, in the automobile industry, firms producing component parts may be 100% owned by foreign investors, though for final assemblers the limit is 49%.

of new technologies, environmental industries, and alternative automobiles (electric cars). Today, these sectors account for only 4% of output, but are planned to rise to 15% by 2020 (BBVA, 2012).

Chinese OFDI: its Growth, Origin, Sectoral and Geographic Distribution

The Chinese economic model which has developed over the last three decades is different to those of Japan and South Korea, at least as far as its first phase is concerned in terms of access to technologies, the accumulation of competencies, the role of the State and the implementation of catch-up policies.

China has specialized in the production of low value-added goods, and has applied a mercantilist policy. As a result, it has been able to accumulate in a few decades financial and monetary surpluses which it can use to achieve other objectives. These surpluses include sovereign wealth funds, the purchase of foreign securities, and FDI. The latter still only accounts for a small share of these assets (Figure2)

Figure 2

China's International Investment Position, 2004-2014
USD billion, total stock (+) and liabilities (-)

Source: PBOC, SAFE, RHG. *Other Investment category includes trade credit, loans, currency and deposits and other investment.

Source: Rhodium Group

Despite the strong growth of OFDI in the developed economies, levels still remain low. In contrast, the rise of China's OFDI has led to worries about its control of strategic assets, which are often considered as national, industrial jewels in some countries, such as the purchase of Volvo by the Chinese car firm Geely (Balcet, Wang, Richet 2012), and worries about China's growing influence in the major developed. The acceleration of the pace of Chinese OFDI is due to a number of factors including the strong growth of the Chinese economy which requires increasing raw materials and fossil fuels (oil and gas).

Over the last twenty years, inward FDI for the developed market economies (DMEs) has continued to rise, accounting for 69.9% of the global IFDI stock ($12,501 billion), compared to 27.9% for the developing economies. The Asian economies account for 16.3% of this total, and China alone for 2.7%. For OFDI, the DME's share fell from 93% to 82.3%, whereas the developing countries' share rose strongly from 6.9% to 15.3%, with Asia's share of the world stock rising from 3.2% to 11.5%, and China's from 1.1% to 4.5% (UNCTAD).

Figure 3

The Evolution of Chinese FDI Abroad
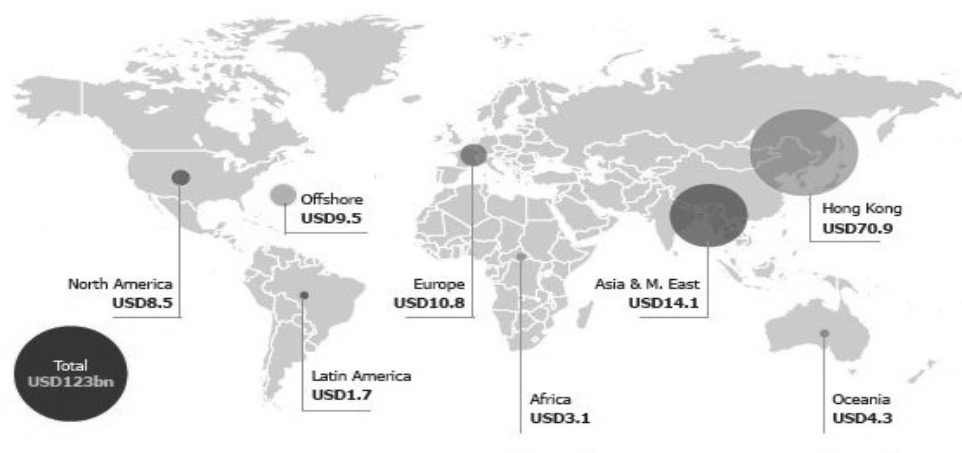
Source: Ernst & Young, China Outlook, 2015.

The growth of Chinese outward FDI has been marked by several phases (Hanemaan & Rosen, 2012) (Figure 4). Each phase has been linked to political choices and central government incentives ranging from strict control, to gradual relaxation and then encouragement with adoption. At the start of the 2000s, proactive policies known as "going global" were adopted as part of the 10th development plan. In the second half of the last decade, these policies contributed to accelerating the internationalization of Chinese companies across all continents.

Box 1

Chinese Round Tripping Investments

There is a statistical bias when analyzing the flow of Chinese outward foreign investments and assessing the reality and importance of round tripping investments (Sutherland and Matthews, 2009). An important part of Chinese outward FDI is located in tax heavens. Chinese investors use these locations (Hong Kong, Cayman Islands, British Virgin Islands) in order to take advantage of either of local taxation policies, to escape capital control on the home market. Reintroducing capital in China favours the change of original companies into foreign-invested firms with tax advantages.

The location abroad can also enjoy several financial benefits: valuation of assets, access to external financial markets, greater facilities for raising capital in other financial centers.

63% of the total Chinese FDI in 2010 went to Hong Kong (87% of Chinese FDI in Asia). The second largest regional stock is Latin America and the Caribbean (14%) with both tax havens mentioned hosting for 92% share of the Chinese FDI in this region.

Figure 4

The liberalization of the capital export regime and outward FDI, 1980-2011
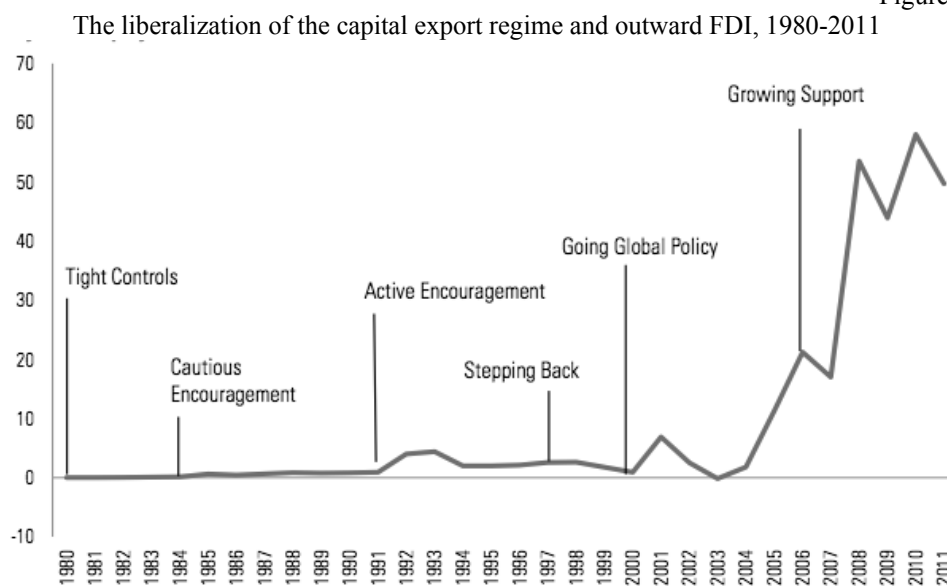
Source: Hanemaan & Rosen, 2012.

Table 1 illustrates the recent sectoral growth, and Figure 3 shows the geographical distribution of Chinese outward FDI. These figures raise a few points. The first concerns the two types of investments, notably *round tripping investments* from Hong Kong made by Chinese firms. These concern capital flows which are not repatriated to China, but which stays in Hong Kong to avoid foreign currency controls by the central government. Such

Hong Kong investments are largely understated in official Chinese statistics, only 4.9% (*China Daily*, 31/9/2012). Subsequently, the search for tax havens in the Caribbean (the British Virgin Islands and the Cayman Islands) has led to the creation of platforms for investments in third countries, notably in Latin America, which is a favored destination of Chinese outward FDI, especially in the raw materials sector, as well as in agriculture.

Table 1

Growth of Chinese Outward FDI by Sector

	2014 YoY	CAGR (2011-2014)
Secondary industry		
Mining	- 33.3%	4.6%
Manufacturing	33.2%	10.8%
Construction	-22.2%	27.2%
Supply of electricity, gas and water	159.3%	-2.0%
Tertiary industry		
Wholesale and retail	24.9%	21.0%
Transport, storage and post	3rd 26.2%	17.6%
Hotels and catering services	197.9%	27.9%
Financial intermediation	5.4%	37.9%
Real estate	67.1%	49.6%
Leasing and business	1st 36.1%	1st 12.9%
Health, social security and social welfare	800.6%	188.5%
Culture, sports and entertainment	67.0%	2nd 70.4%
Information transmission, computer services and software	126.3%	3rd 59.8%
Scientific research, technical service and geologic prospecting	2nd -6.9%	33.2%
Management of water conservancy, environment public facilities	280.6%	29.3%
Other services	68.4%	43.0%

Source: KPMG, China Outlook 2016.

The sectoral distribution of Chinese OFDI involves a large variety of sectors, with four leading sectors accounting for 75% of all investments and the importance of the recent shifting toward the tertiary sector.

Part of China's outward FDI is directly linked to the expansion of commercial activities related to exports (transport, insurance and financial services). The search for raw materials,

especially hydrocarbons, is also important. China's top multinational firms in terms of capitalization and turnover are operating in these sectors. They are present in Asian markets, the Middle East and Canada. The search for strategic assets is being carried out to meet the supposed limits, as far as China is concerned, of the transfer of technology and appropriation of know-how provided by foreign multinationals based in China. This seems to have slowed down since China's accession to the WTO, because of the greater possibilities of protecting intellectual property.

Lastly, as far as the legal form of companies is concerned, they are mostly State-owned enterprises (nearly 70%), or publicly listed companies in which the State has a share, influencing the internationalization strategy of these firms.

The Motives of Chinese Companies' Internationalization

The internationalization of Chinese firms as part of a slow process, linked to the phases of economic reform and openness, two choices by the central government and to incentives that have been introduced regularly. There is a strong correlation between institutional reforms, political liberalization and the development of outward FDI as shown in Figure 4.

Four major motives have pushed Chinese firms to internationalize

- *Access to markets*

Access to markets, especially when nearby, follows trade flows and the penetration of markets by Chinese exports. Entering a market is made easier thanks to accumulated know-how. It is a way of circumventing tariff barriers, creating local or regional distribution networks, and getting close to regional markets which are expanding strongly. Another motivation is linked to strengthening competition and the rise in domestic overcapacity, which reduces firms' profit margins. Through local investments, Chinese firms acquire new know-how (which is produced outside the domestic market) and can experiment with their internationalization strategies by limiting risks and costs in case of failure. The accumulation of competencies acquired in the market in areas of medium technology (consumer goods) or high-technology (ICT) has acted as a springboard for the internationalization of certain firms, some of which have become world leaders in their field, such as Haier, Huawei and Lenovo, which are amongst the best known. In contrast, other companies which had the same levels of competence domestically, sometimes with government help, partly failed in their internationalization strategy via acquisition (TCL, and SAIC in Korea). Such failures have been due to the fact that acquisitions have been difficult to integrate into groups' strategies, or because the acquiring company pursued and an asset stripping strategy (acquiring firms with the aim of only controlling a part of them).

- *The search for efficiency*

This factor was less important at the start of the internationalization process, given China's low production costs. The rise in domestic costs in recent years, however, has led to firms relocating to other Asian countries (Vietnam and North Korea), in labour-intensive industries (textiles). Today, in the province of Guangdong, the rapid and consequential rise

in wages (up more than 20% within 2 to 3 years) has contributed to offshoring to neighbouring economies with lower labor costs.

- *The Access to resources*

This is certainly a leading motive of internationalization by Chinese firms. The Chinese economy has to ensure the availability of resources needed for double-digit growth, taking into account both the limits and depletion of national resources (with the exception of coal) and its plant and equipment, which are largely run down and which consume high levels of raw materials. The technological choices set out within the framework of the 12th plan (2011 to 2015) stress the use of substitutable energies, but the energy transition risks taking a long time. There are several State-owned enterprises among all the top internationalized firms, which are actively supported by the central government, and which operate in oil and natural gas extraction. The access to resources is not constrained by proximity. Chinese companies are working at a global level: in the Americas, Africa, the Pacific, and Central Asia. Nationalist conflicts in the China Sea, between China, Vietnam, the Philippines and Japan have been sharpened by the discovery of oil reserves under the seabed.

- *The search for strategic assets*

The search for strategic assets has become one of the leading preoccupations of Chinese firms, both to consolidate their strengths in foreign markets as well as to acquire technologies they have not been able to obtain through cooperation with foreign MNCs present in China, or due to the weaknesses of China's innovation system. The financial reserves which China has accumulated, along with the liberalization of regulations on outward FDI (reductions in controls on capital exports) on the one hand, and the fall in foreign asset values due to the international financial crisis on the other hand, have greatly increased opportunities for acquiring firms abroad. Accordingly, the "shopping list" of Chinese investments has lengthened, especially in Europe and the United States, which in turn has led to protectionist policies concerning certain sensitive assets (telecommunications). The acquisition of technology and of foreign brands has been a means to accelerate the rise of Chinese companies and improve their foreign reputation. Chinese firms have been able to obtain assets entirely in this way (companies and their networks), or just segments, which often have a technology content and which can be repatriated and integrated into production in China (sometimes accompanied by the temptation of asset stripping). This is an advantageous means of entering markets, allowing Chinese firms to acquire reputation and accede to technologies they do not have. Through mergers and acquisitions, Chinese companies have thus been able to acquire assets they seek to integrate in their global strategy.

By compiling data on outward FDI undertaken over a number of years, Chinese economists have highlighted the motives of Chinese firms. Two motivations standout in particular: the search for resources, and the search for strategic assets.

Some theoretical interpretations of the internationalization strategies by Chinese firms

For many specialists, the internationalization of Chinese firms can be explained by the

domestic institutional context in which it is occurring. This process seems to confirm the "international investment path" paradigm of Dunning, who established a link between domestic growth and increasing FDI. The other explanatory factor follows from technological and managerial spin-offs introduced by the presence of numerous Western foreign direct investments in China over the last three decades.

The internationalization of companies can be understood within a threefold context:

i)the profound reform of the Chinese economy, ii) the internationalisation strategy expected and encouraged by the state and applied to companies, and lastly iii) the importance of institutional changes, the interactions they have provoked by providing actors with greater room for manoeuvre. Companies which internationalize benefit from direct support, profit from opportunities, and know how to use their autonomy by drawing on experience accumulated over the years, within a competitive environment created by economic reforms.

The growth of Chinese FDI is very recent. It only really took off in volume terms, both in the number of acquisitions as well as greenfield investments, when China joined the WTO in 2001. This phase of acceleration was preceded by the accumulation of competencies within the framework of successive reforms concerning Chinese regulations governing foreign investment. State policy has changed considerably in recent years. It has created a favourable environment, rather than fixing strict rules to guide firms wishing to internationalize.

A distinctive characteristic of Chinese MNCs lies in the way firms acquire skills, as the necessary prerequisite to undertaking internationalization. To Dunning's OLI paradigm (*Organisation, Localisation, Internalization*) should be added to the LLL model (*Linkage, Leverage, Learning*) by Mathews (2002), to account for this process. The latter shows how cooperation with high value-added firms, on a contractual basis stretching out over time, has allowed Chinese firms to take advantage of leverage and accelerate their apprenticeship and skills' development.

In the context of globalization, which is characterized by the globalization and disintegration of the international value chain, the apprenticeship and accumulation of competencies have become easier. Despite their lack of resources compared to Western multinational companies, Chinese firms have accomplished their internationalization successfully.

Williamson and Yin (2010) complete the analysis of institutional factors favouring the internationalization of these firms. The authors integrate two dimensions: positioning in the market and the mobilization of resources to explain how firms generate their competitive advantage. Companies which internationalize mobilize three types of capacities:

- cost innovations by using cost advantages of domestic firms (i.e., the capacity to produce while cutting production costs), yet still maintaining quality;

- combined capacities in offering markets redefined products to integrate technology, leading to low costs;

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- dynamic capacities in terms of adjustment in the face of uncertainty by drawing on the high levels of flexibility, a quick learning curve.

3. Evolution of China's trade of services

China's participation in the world trade of services has seen rapid growth in the past few years, making China now the second largest economy in terms of total services imported and exported. According to the MOFCOM[4] (Ministry of Commerce of China), China's services trade reached $770 billion in 2016, with an annual growth rate of 14.2%. However, the deficit on its services trade balance has also grown significantly, as an increase in imports continued to exceed the increase in exports (Figure 5). In 2015 China's services deficit was 1/3 of the size of the trade surplus, up from less than 1% in the early 2000s, making it an increasingly important component of the current account balance. As an example, the services trade deficit between China and the US, China's first trade partner, reached $52.3 billion in 2016. The services trade deficit between China and the US has existed since years, which in fact contra-balanced the goods trade surplus between the two countries.

Figure 5

Evolution of China's trade of services (1998-2015)
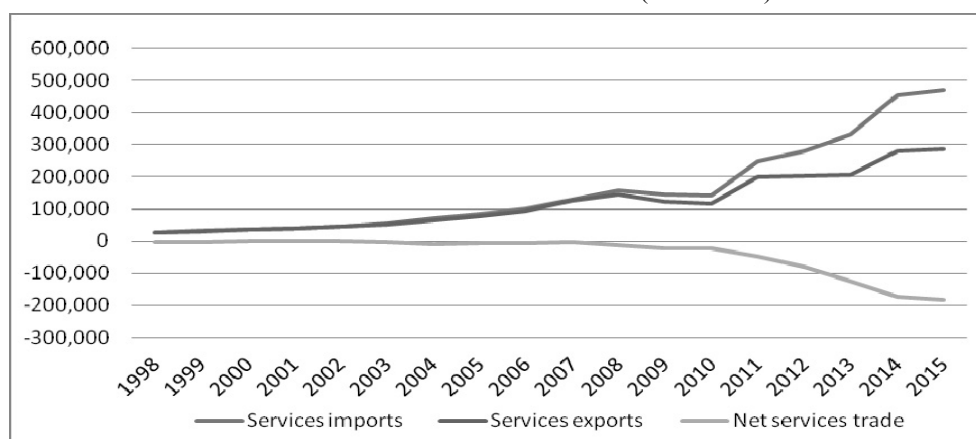
Source: OECD.

For the year 2015, according to the MOFCOM[5], China's total import and export services amounted to $713 billion, with an increase of 14.6% over 2014; of which services exports amounted to $288 billion, with an increase of 9.2% compared to 2014; services imports were $425 billion, 18.6% higher than 2014; services deficit was still considerable, at $136 billion. In terms of proportion, services accounted for 15.3% of the total trade (import and

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[4] http://tradeinservices.mofcom.gov.cn/g/2017-03-01/295405.shtml
[5] http://zhs.mofcom.gov.cn/article/Nocategory/201605/20160501314855.shtml

export of goods and services), 3% higher than in 2014. Exports of services contributed to 11.2% of total exports and imports of services to 20.2% of total imports, both higher than in 2014. In 2015, China ranked the world 2nd after the US regarding the services imports and the world 3rd for services exports after the US and the UK (Table 2).

Table 2

Global trade of services in 2015

	Export ($ bn)	Share (%)	Import ($ bn)	Share (%)
World	4675	100.0	4570	100.0
USA	690	14.8	469	10.3
UK	341	7.3	205	4.5
China	288	6.1	425	9.6
Germany	246	5.3	292	6.4
France	239	5.1	224	4.9
Japan	158	3.4	174	3.8

Source: WTO, MOFCOM.

China's trade in services is mainly concentrated in the US, the EU, Japan, Hong Kong and ASEAN. Hong Kong is the largest services export destination for China, accounting for 10% of the total in 2015, followed by South Korea and the US (both around 6%). Tourism is the largest sector of services exports to Hong Kong and the US, accounting for nearly 50% and around 30% respectively. It is followed by transport services, owing to China's strong goods trade linkages with both. In general, at present, China's service industry is concentrated in the transportation, tourism, construction and other labor-intensive and resource-intensive traditional sectors. The technology-intensive modern service industry in China has started not long ago. Therefore the relative weight of services in information technology, R&D design, process management, finance and insurance, technical advice outsourcing is still very limited in China's services exports. Meanwhile, since the last five years, the weight of China's offshore service outsourcing in total exports has begun to rise slowly, thanks to the strong promotion at all levels of government.

Table 3 shows the sector distribution of China's services imports and exports in 2015. Travel and tourism present the largest services exports sector in China, taking up to 40% of the total services exports in 2015, with an average growth rate of 14% since 2000; arrivals from Hong Kong accounted for 60% of overall visitor arrivals in 2015 (HSBC). Given its geographic dimension, ethnic diversity, history and cultural heritage, and the fast modernization of its society and the development of some of the world's biggest mega metropolitans, China has been attracting more and more foreign tourists and businessmen. However, travel services imports more than doubled the exports in 2015 compared to 2014, taking up to 62.5% of total services imports and contributing significantly to the services trade deficits. From 2000 to 2015, China's tourism and travel imports have risen on average by 23% a year; over this period, China accounted for 25% of the expansion in global outbound tourism and travel spending (HSBC). Having been the 8th for the size of its tourism industry in 2000, China is now the world's biggest market. Travel services imports

are mainly concentrated in Hong Kong, China Taiwan, Japan and South Korea, accounting for 60% of the total volume.

Sector distribution of China's trade of services in 2015 ($100 million)

	Import		Export	
	Amount	Growth %	Amount	Growth %
Total	4248,1	18,6	2881,9	9,2
Transportation	873	-9,3	385	0,5
Travel and tourism	2386,4	26	1149	8,1
Management and consulting	139,4	1,3	291,3	13,6
Construction	101	99,9	163	5,7
Insurance	80	-64,4	50	9,1
Financial	26	-52,7	22	-52,2
Computer and information	114	15,6	269,9	25,1
Royalties and license fees	219,9	-2,2	10,8	64,9
Technical	114,3	6,7	123,7	-4,5
Cultural	170,6	14,1	200,2	37,2
Other business	23,5	-22,5	217	-2

Source: MOFCOM

The second largest services export sector in China is transportation, accounting for over 13% of overall services exports in 2015, up from below 5% in 2000, with an annual growth rate at 17%. Transport service exports have grown fast since China's entry into the WTO which boosted both goods trade and transport sector. Since a decade ago, the Chinese government has put strong support to the building of its national transport expertise, especially through the construction of the Chinese high-speed railways. Chinese SOEs in transportation have benefited from technology transfers and working experiences along with some of the world's leading infrastructure constructers and transport manufacturers. Business management and consulting services account also for a significant share in services exports, representing 10% of total services exports, as Chinese firms are increasingly looking abroad for business opportunities and take a more active part in the global economy. Computer and information services exports contribute to a solid 9.4% of the total services exports in 2015, accompanying the huge material export in the sector from Chinese firms to the world. It is interesting to notice the weight and fast increase of services exports in the cultural sector, which is a positive confirmation of China's growing "soft power". The sector of intellectual property, although still relatively insignificant, shows the strongest growth potential. According to the 2016 HSBC China Trade Report, China's financial services exports have seen the fastest growth since 2000, rising by 28% a year, and the total assets of Chinese banks have more than six-folded since the early-2000s (HSBC, 2016). MOFCOM's data, however, show that both exports and imports of financial services in 2015 were less than the half of their size in 2014[6]. In fact, the size of financial

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[6] http://zhs.mofcom.gov.cn/article/Nocategory/201605/20160501314855.shtml

services exports is still very limited as China's capital account remains relatively closed and the capital outflows are highly controlled.

HSBC's latest Global Trade Outlook survey in December 2016 shows that benefiting from the transformation and upgrading of China's economy, service trade contribution to the Mainland's economic growth will keep increasing and China's position in the global service trade will also advance. The report predicts that by 2030, China's service exports will grow to $818 billion, nearly 3 times the current volume, still ranking the world's 3rd service exporting countries after the US and the UK. At the same time, China's service imports will keep the sustained growth with the development of a middle-class consumer-driven economy and the increasing internationalization of the demand for services. According to its prediction, by 2030 China will become the world's largest importer of services, with a global share of 13.4%, ahead of the US (7.7%) and Germany (5.8%).

While the services deficit is still considerable, China's service trade environment is constantly improving and its development potential is huge. The rapid growth of the service industry in the domestic market, especially technology-driven modern services, will provide a strong basis for service export. In 2015, China's service sector accounted for 50.2% of GDP and in the first quarter of 2016 56.9% of GDP. China is in the critical stage of economic restructuring and industrial upgrading. With Chinese firms working up in the global value chain through technology innovation and strategic investment, the industrial base of service trade is also growing. Besides, new forms of business models based on the internet, telecommunications and cloud technology are emerging in China and they quickly integrate with traditional sectors, offering more efficient and high-quality services and solutions. In particular, the offshore service outsourcing business and cross-border e-commerce are developing very fast.

The Chinese government, at both central and local levels, has recently adopted a more proactive attitude in the promotion of new initiatives to boost the expansion of the service industry and the export of services. In February 2016, the Chinese State Council started a two-year services trade innovation pilot program in ten provinces and cities, including Tianjin, Shanghai, Hainan, Shenzhen, Hangzhou, Wuhan, Guangzhou, Chengdu, Suzhou, Weihai, and five state-level new development zones in Harbin, Chongqing, Guizhou and Shaanxi. Under this pilot program, the government has envisaged policy guidance and favorable conditions to increase the central financial support, improve the preferential taxation (tax abatement from 25% to 15% for eight business categories), strengthen financial services innovation and sustain services trade through the development of guiding funds. The relevant policies will enhance both the scale and quality of China's trade in services and help reduce the services deficit. Results communicated by MOFCOM seemed to confirm the program's efficiency: the total size of services trade in the 15 pilot cities and regions in 2016 took up 50.8% of the national level, with an average growth rate of over 20%.

Furthermore, with the implementation of the "One Belt One Road" (OBOR) initiative started in 2013 and through the recent active development of China-EU railways and maritime roads, Chinese firms are offering more and more technical advice, engineering assistance, business consultancy and financial services to related projects in countries involved. China's market share in construction service outsourcing has already seen a fast

rising. Newest data from MOFCOM show that in 2016 China's services trade with countries concerned by the OBOR initiative totaled $122.2 billion, increasing 3.4% from 2015; among which 21.5% were services exports, 11% higher than in 2015[7]. At the same time, the global services exports have been slowing down: during 2012-2015, the average growth rate was only 2.2%. There is great growth potential given the huge infrastructure and financing needs in the region. Therefore, it is obvious that in order to compete with the US and Western Europe, in the next step of the evolution of its services trade, China will focus on its neighbors, especially the two strategic core areas of the OBOR – ASEAN economies and the Central East European countries. China will further promote cooperation with OBOR countries in international production and equipment manufacturing and deepen its services offering in project contracting, R&D design, operation and maintenance, as well as third-party consulting and certification, financial services and insurance, logistics services. This will help to build the China-led regional industrial and services value chains.

Conclusion

Today, the Chinese economy is confronted with important choices concerning the inflexion of its growth model, the search for new specialization and its increasing integration into international value chains. Over the last few years, it has accumulated skills and has been able to develop strategies that enable it to both upgrade its product range, modify the structure of its exports, and move, at a domestic level, toward a service economy and to significantly increase its trade in services. The growth of this sector in both Chinese GDP and foreign trade is expected to grow strongly in the future.

In this contribution, the importance of China's integration into world trade, in particular, the internationalization of its firms, was assessed. Chinese MNC are vectors of the growth of services in trade. The strong growth in Chinese FDI in Europe and the United States is reflected in the services sector. Moreover, China's recent commitments to open the services sector to foreign investor should contribute to the strong growth of trade in this between China and the rest of the world.

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DOES FISCAL SPENDING PROMOTE ECONOMIC GROWTH IN INDIA? AN APPLICATION OF TODA-YAMAMOTO CAUSAL APPROACH

After the 25 years of economic reform, a restless debate is still going on that is fiscal policy still has a major role to play in Indian economy or not ? This paper tries to find out the short run and long run relationship of fiscal spending with the growth of India. For estimation, we have applied Auto Regressive Distributed Lag (ARDL) model and augmented causality test of Toda-Yamamoto. Results reveal that Gross Fixed Capital Formation is positively related to growth in the long run. In the short run, military expenditure, tax revenue and inflation are negatively associated. The Causal analysis reveals that (i) Growth causes gross fixed capital formation, (ii) Military expenditure causes growth, (iii) Growth causes tax revenues and (iv) Inflation causes growth. Based on the results, suitable policy measures also discussed in the last section of the paper.
JEL: E62; O4

1. Introduction

Monetary and fiscal policies are the two major tool for the authorities and policy makers to regulate the economy. After the 25 years of economic reform, a restless debate is still going on that is fiscal policy still has a major role to play in Indian economy. The justification for fiscal regulation and policies are- the efficient allocation and proper distribution of resources. The role may be in relative or absolute term depending upon characteristics of economies (Asajwk et al., 2014). In stabilizing the economy, fiscal spending has become the pioneer instrument. But applicability only valid if the fiscal spending has any real effects and these effects Keynesian or non-Keynesian (Carmignani, 2010). Another prospect may be these spending are pro-cyclical (Abbott & Jones, 2011; Woo, 2009; Talvi & Vegh, Kaminsky et al., 2004; Lane 2003). According to Jha (2007), despite low tax-GDP ratio, developing countries should expand fiscal expenditure to enhance growth. Some opponents state that government policies are bureaucratic, biased and inefficient which hinder economic performance (M'amanja & Morrissey, 2005). Trending justification for negative impact is that government spending will lead to a rise in taxes and also borrowings (Landau, 1983; Easterly, 1993).

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Growth impacts and the particular mix of policies mostly depends upon country-specific conditions, nation's preferences and internal capacities. Level of development can also be a determinant factor in determining the association between fiscal measurements and growth (Easterly & Rebelo, 1993). On theoretical font, the development of endogenous growth theories laid down the foundation for policy variables to regulate the economic performance of a country. Fiscal and monetary Policy changes can affect the rate of capital accumulation (physical and human), research and innovation, government expenditure, the trade-off between labor-leisure and by that the growth (Romer, 1986; Lucas, 1988; Barro, 1990; King & Rebelo, 1990).

In the empirical literature, there is a large number of studies can be found in discussing the relationship between fiscal policies and growth. Long- term growth of government policy with growth is well studies by Dar and Amirkhal (1999). According to them, the government has three instruments- taxation, expenditure and budgetary balances to regulate the economy. Impact of fiscal policies can be studied in allocative efficiency and distributive efficiency perspective (Zee and Tanzi, 1999). Empirical studies of Ram (1986), Knight et al. (1993), Brasoveanu & Braso (2008), Ogbole et al. (2011), Abata et al. (2012), Gonder & Ozpence (2014) and Okafor & Shaibu (2016) have studied impact of fiscal variables on growth performance on various dimensions. In an aggregate macroeconomic and microeconomic picture, there is a general convention that government spending[2] leads to output expansion, employment creation and welfare generation (through increase efficiency and infrastructure). But theoretical and empirical debates stand in two banks. One line of studies shows that positive impact exists in fiscal spending, where other line argued that spending behaves negatively to the growth performance. Though this mix results solely correspond to the spending categorizations, context-specific and country-specific. Studies of Landau (1983), Grier & Tullock (1989) and Engen & Skiner (1992) have found a negative association of government spending with growth. Benos (2009a,b) in his disaggregate study found that spending on human capital and social welfare has not any significant impact on growth. But Kneller (1998) paper for OECD countries, reveals that productive spending enhances growth performance. A recent study of Rosoiu (2015) stated that government spending is more capable of explaining growth than to government revenue. Military expenditure also comes under productive spending and scholars like Abdullah (2000), Al-Yousif (2000) and Ranjan & Sharma (2008) studied this expenditure as protective functions of the government. Fiscal spending shocks also exhibit an impact on output growth. The seminal paper of Blanchard & Perotti (1999) with the SVAR approach has proved that positive fiscal spending shocks have positive effects on output growth. In the same line study, Fernandez and Cos (2006) also found similar results.

Few studies for the case of India also have been found. According to Lahiri et al. (2016), fiscal policies in India are boosting the problem of macro-economic instability. Among the fiscal variables, fiscal deficit comes out to be contradictory variable for the growth of India (Trivedi and Rajmal, 2011) but capital expenditure affects differently for various Indian states but overall, it promotes the growth. Arguments of Kaushik Basu (2012) stated that higher efficiency in bureaucratic and governance can lead India to stable and long-run

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[2] IMF Policy Paper, 2015.

growth. Our study will be a contribution to the existing literature in two ways (a) we have taken five fiscal spending dimensions – Military Expenditure (MEXPD), Final Consumption expenditure (CEXPD), Gross Fixed Capital Formation (GFCF), Net Lending (Lending) and Tax Revenue (TAX) in our study. And (b) Departure from usual Granger causality testing, we have applied Toda-Yamamoto (1995) augmented causality test for robust and reliable results.

Stylized Facts of Indian Economy

India becomes the fastest growing emerging market in the world. The transition of the Indian economy can be seen from a state dominated and industrialized oriented policies to market regulated economy. This transition mainly takes place after the economic reform of 1991. Growth rate and growth rate for different sectors of the economy has been increases after the reform (Neog, 2017a, 2017b). The foremost reason for India's economic reform was the fiscal crisis and balance of payment crisis. Therefore adoption liberalization policies become the last option rather than to a choice. These reforms are very much similar to the other reform that took place in other socialist countries (Ahluwalia, 1994).[3] But India follows a more gradual transitions process rather than implementing sudden shock to the economy. Many economist and policymakers still criticize this approach of transition. But this reform is not the only reform of Indian history that has to reclaim all the changes. Changed political attitude and policies in mid-1970 were providing a helpful hand to the reform of 1991. According to Bird (1993), every fiscal crisis is a detrimental factor in giving birth to new tax reforms. India is not an exceptional one. Tax Enquiry Committee (TEC) report of 1991 was the pioneer of changes in the Indian tax structure. Rao & Rao (2006) rightly said that more structured and sustainable tax reforms were implemented after the economic reform. Tax policies that were adopted in India after independence were ad-hoc in nature and contained short-run goals rather sustainable goals. Fruitful results can be seen in direct and indirect tax collections. Due to open up of the economy, Indian markets also become more volatile. Rapid expansion market economy, infrastructure, science and technology and population boost India's capital formations. As a democratic country, the government has to incur a huge welfare oriented expenditures. Data reveals that, despite the transformation of the economy, the government role is not eliminated at all. In appendix (A), I have presented a line graph of the studied variables. These graphs are helpful in knowing the historical trend of the data series. As discussed above, the GDP growth rate has experienced the worst growth in the period of 1978-1979 and then 1990's. The fluctuating trend can be seen after the 1990's also, but it is to be noted that India reaches to 7%-8% annual growth rate in the period of 2007-2008 and averaging around 6-7%. In a sectorial scenario, the expansion of the economy is mostly service sector driven. The service sector contributes around 53.66% to the nation's economy which was 39.6% during 1990-1991.[4] Tremendous performance of real state sector, finance and hotel & transport are the drivers of service sector expansions. In 2017, industry sector contributes 29.02% and

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[3] Retrieved from his speech on, 'India's Economic Reforms'.

[4] See, Ministry of Statistics and Programme Implementation and Planning Commission, Government of India.

agriculture & allied activities contribute 17.32% to national income. If we look at the 2011-2012 prices, the composition of Agriculture & allied, Industry and Services sector are 15.11, 31.12, and 53.77%, respectively. Government current expenditure can be seen to gradually decline after the 2001-2002 period. Market domination and disinvestment of the government may be one of the reasons which reduce the government current expenditure.

Gross Fixed Capital Formation representing the domestic fixed investment. In the figure (A.1), the trend line shows that the fixed investment continuously increases, especially 2003-04. The high growth rate of the aggregate economy in the same period and escalation of urbanization leads to a rise in the fixed investment of the government. Service sector growth is also a vital factor in raising gross capital formation. But these share of capital formation to GDP is falling after 2012-13. Inflation is often termed as a measure of macroeconomic stability. It is clear from the figure that, in the early 1980s and in the early 1990s, there are spikes in the inflation rate. The economic crisis in both the periods may be explaining factors for these rise in inflation in India. Again the rise in inflation can be seen in the period of 2009-10. But as close to 2015, inflation tends to decrease. If we look at the trend of net lending in India, it is continuously declining. Net lending also indicating the outcome of the transaction in financial assets and liabilities. Somewhat spikes can be seen in the period of global financial crisis 2007-08. Military expenditure as a % of GDP is also showing decreasing trends. A high share of 3.9% is achieved in the period 1986-87, then decline till 1998. After the Kargil war, India's military expenditure again reached 3% of GDP. In the recent sphere of time, military expenditure ranging in between 2.8% to 2.5% to GDP. Due to several structured tax reforms, Indian tax revenues are showing very good performance especially after 1997-98. In this year, marginal tax rates are reduced to 10, 20 & 30%. Reduced marginal tax rates and more information technologies, India's tax compliance and tax base are drastically increased. Corporation tax rates are also reduced to 35% in the year 1997-98 from 50%. Therefore direct tax revenues were showing a very positive change after this period. The overall tax revenues as % of GDP also trend upward after 2002-2003. In the state level tax system, the introduction of Value Added Tax (VAT) in 2005 is known to be a major policy change. VAT eliminated many drawbacks related to the other sales tax adopted by the Indian States.

2. Data and Methodology

Data has been taken from the World Development Indicators for the period 1974 to 2015. We have taken Military Expenditure (MEXPD), Final Consumption expenditure (CEXPD), Gross Fixed Capital Formation (GFCF), Net Lending (Lending) and Tax Revenue (TAX) as fiscal expenditure variable. Inflation (INF) is taken as an additional variable in the study as a proxy for economic stability. Based on the recent debates, Inflation is very much influencing other macroeconomic activity. All variables are as % of GDP. Our dependent variable is the Average Annual Growth Rate of GDP. In order to investigate the short run and long-run relationships between government spending and growth, we have developed the following model.

Growth= $\alpha_0 + \alpha_1$ CEXPD + α_2 GFCF + α_3 Lending + α_4 MEXPD + α_5 TAX + α_6 INF (1)

Descriptive Statistics

Before going for any econometrical treatment with our variables, we have calculated the descriptive statistics. Results are presented in the table (1) in appendix (A). Mean values are maximum for GFCF (25.62), CEXPD (10.84) and TAX (9.79). Maximum values represent the maximum values that each variable have taken. The maximum values for GFCF (35.57) and CEXPD (12.45). The Maximum inflation rate for India is recorded at 16.66% and the minimum inflation rate was 1.64%. As on the same notation, minimum values are also noted in the table. Top minimum values are seen for LENDING (-5.5), GDP growth (-5.23). Standard deviation indicating the variance in the data series. The maximum deviation can be found for GDFCF (5.42), INF (3.56) and GDP (2.90). On the other hand, the minimum deviation is found for MEXPD (0.35), CEXPD (.85) and TAX (0.94).

As our data series are in annual form, so we have applied time series methodologies for checking unit root in the data.

2.1 Unit Root Test: for checking unit root in the data series, we have applied Augmented Dicky-Fuller (ADF) (1979, 1981) and Phillips-Perron (P-P) (1990) test. ADF test assumes that the error term may be correlated to each other. Based on the τ (tau) statistics and its probability, we have tested unit root in data. ADF is the extended version of Dicky Fuller (DF) test by augmenting lag dependent variable in the explanatory variables. The null hypothesis is made for ADF test is that the series has a unit root. With respect to the tau statistics, if series become stationary at the level then we call it integrated at order 0, i.e. I (0). On the other hand, if series become stationary at the level then we call it an order of integration is 1, i.e. I (1).

$$\Delta Y_t = \beta 1 + \beta 2t + \delta Y_{t-1} + \Sigma \ \alpha_i \Delta Y_{t-I} + u_t \tag{2}$$

Phillips and Perron (1988) proposed an alternative unit root test by controlling the serial correlation in the error terms. In the empirical literature, the Phillips-Perron (PP) test is known to be a non-parametric test. Tau statistics are adjusted and serial correlation does not affect the asymptotic distribution of the data series.

$$T_a{}^\wedge = t_a \left(\frac{\lambda 0}{f\ 0}\right)^{1/2} \frac{T(\int 0 - \lambda 0)(s_{\scriptscriptstyle F}(\alpha^{\wedge}))}{2\int 0 \frac{1}{2}s} \tag{3}$$

Here aˆ is the estimate and *t*a the t-ratio of α. coefficient standard error represented with the term se (αˆ) and *s* is the standard error of the regression. In addition, λ0 is a consistent estimate of the error variance that we will get from equation (2). At frequency zero, the residual spectrum term presented through f0. The testing procedure is the same as the ADF test.

2.2 ARDL Cointegration: classical cointegration and Vector Error Correction model for evaluating long run and short run relationship require data series to be I(0) or I(1). Development of Auto-Regressive Distributed Lag (ARDL) model break this restriction and providing us with a very essential tool in the study I(0) and I(1) series jointly. This model mainly developed by Pearson & Pearson (1997) and Pearson et al. (2001). Another issue with our analysis that, our data are in the annual series which is not a very big sample in size. Another argument provided by Pearson and Shin (1999) that the ARDL model is most

suitable when data size is small. Therefore, we have developed following the ARDL model for our study.

$$\Delta Growth = \alpha_0 + \sum_{i=1}^{p} \alpha1 \Delta Growth_{t-i} + \sum_{i=1}^{p} \alpha2 \Delta CEXPD_{t-i} + \sum_{i=1}^{p} \alpha3 \Delta GFCF_{t-i} + \sum_{i=1}^{p} \alpha4 \Delta Lending_{t-i} +$$

$$\sum_{i=1}^{p} \alpha5 \Delta TAX_{t-i} + \sum_{i=1}^{p} \alpha6 \Delta INF_{t-i} + \beta1 Growth_{t-1} + \beta2\ CEXPD_{t-1} + \beta3 GFCF_{t-1} +$$

$$\beta4 Lending_{t-1} + \beta5 TAX_{t-1} + \beta6 INF_{t-1} \tag{4}$$

Here Δ is the difference operator. Difference variables capture the short-run dynamics and other variables capture the long run dynamics. The null hypothesis for the non-existence of long-run relationship in equation (3) is $\beta1 = \beta2 = \beta3 = \beta4 = \beta5 = \beta6 = 0$. P is the optimal number of lag which will be selected on the basis of on Akaike Information Criterion (AIC) (Akaike 1974). Secondly, F bound test is employed to test the existence of a long-run relation given by Pearson et al. (2001).

2.3 Causality Analysis: We have used modified Wald statistics (MWALD) of Toda-Yamamoto (TDYM) (1995), popularly known to be augmented Granger causality (1969) test in our study to check the direction of causality. Augmented in the sense that it incorporates data series without considering its possible non-stationarity and cointegration. Traditional Granger causality test suffers from misspecification in identifying the order of integration which can be minimized through TDYM approach. Also, Granger test may provide incorrect regression result which has time lags on integrated variables (see, Dritsaki 2017). Therefore TDYM causality test has certain advantages over the traditional Granger causality test procedure.

Testing requires to develop a VAR with lag (k) plus the maximum order of integration (d*max*). According to Mavrotas & Kelly (2001), the new VAR model k+d*max* order will have an asymptotic 2 distribution of Wald-statistics and it will minimize the risk of wrong selection of the order of integration. But in final Wald test requires not to include additional lag variables in the test (Zapata & Rambaldi 1997). Following system is the representation of Toda- Yamamoto version of causality test.

$$\Omega t = \alpha_0 + \sum_{i=1}^{k} \alpha_{1i} \Omega_{t-i} + \sum_{j=k+1}^{dmax} \alpha_{2i} \Omega_{t-j} + \sum_{i=1}^{k} \beta_{1i} \Pi_{t-i} + \sum_{j=k+1}^{dmax} \beta_{2i} \Pi_{t-j} + u_{1t} \tag{5}$$

$$\Pi t = \gamma_0 + \sum_{i=1}^{k} \gamma_{1i} \Pi_{t-i} + \sum_{j=k+1}^{dmax} \gamma_{2i} \Pi_{t-j} + \sum_{i=1}^{k} \tau_{1i} \Omega_{t-i} + \sum_{j=k+1}^{dmax} \tau_{2i} \Omega_{t-j} + u_{2t} \tag{6}$$

Here Ωt represents growth and Πt represents fiscal spending variables. From the equation (5), if $\beta_{1i} \neq 0$, i= 1……k implies causality runs from Π_t to Ω_t. Similarly in equation (6), if $\tau_{1i} \neq 0$, i= 1…..k, then causality also runs from Ω_t to Π_t.

3. Empirical Results and Discussion

We have applied both ADF and P-P test for testing unit root in our variables. Amongst the variables, growth rate, lending and inflation are stationary at level. Their t statistics for the ADF test and adjusted t statistics for the P-P test are significant at 1% level. That means, their order on integration is 0, i.e. I (0). On the other hand consumption expenditure, Military expenditure, Gross Fixed Capital Formation and Tax Revenue are stationary at the 1st difference. Their order integration is I (1). In the table 1, we can see the summary statistics for unit root analysis. We have tested unit root for three models, i.e. at none, with intercept and with intercept and trend. We have taken the model with a constant term as this model is uniform for all the variables.

Table 1

Unit Root Test Summary
Panel (a) ADF Test Statistics

Variables	I(d)	None	Constant	Trend & Intercept
Growth	0	-0.991627	-6.640179*	-7.850032*
CEXP	1	-5.023338*	-4.944927*	-4.960130*
GFCF	1	-5.508024*	-5.690562*	-5.793087*
Lending	0	0.355884	-2.344609	-3.950465*
MEXPD	1	-4.882636*	-4.886381*	-4.807314*
TAX	1	-6.138184*	-6.106923*	-6.036050*
Inflation	0	-2.388824*	-5.476885*	-2.491660
Panel (b) Phillip- Perron Test Statistics				
Growth	0	-1.408455	-6.630300*	-8.769719*
CEXP	1	-5.032765*	-4.955864*	-4.965316*
GFCF	1	-5.632875*	-5.755560*	-5.850656*
Lending	0	0.058953	-2.036662	-3.803809*
MEXPD	1	-4.799788*	-4.800567*	-4.691748*
TAX	1	-6.138214*	-6.120068*	-6.045830*
Inflation	0	-2.355268*	-5.787131*	-5.896555*

* indicating significant at 1% level of significance.

Most of the macroeconomic indicators contain break point in their performance. It is a detrimental factor which may affect test results of traditional unit root tests. ADF and PP test is unable to capture the breakpoint in the data series in their tests. Therefore we have applied Minimize Diky-Fuller t-statistics in our study for more robust unit root results. Unit root has been checked in both Additive Outlier (AO) and Innovative Outlier (IO) assumptions. In the following table (3), we have only reported test results with AO assumptions as test results are consistent with IO procedure also.

Results are displayed in table 2. With the presence of a single break point, all the test results are consistent with the results of traditional ADF & PP test.

Table 2

Summary of Minimize Diky-Fuller t-statistics. (Based A-O assumption)

Variable	I(d)	t-stat(Intercept)	Break	t-stat(Intercept & Trend)	Break
Growth	I(0)	-8.503767*	1979	-9.260718*	1979
CEXPD	I(1)	-5.669545*	1998	-7.572324*	2004
GFCF	I(1)	-7.023646*	2007	-9.506621*	2003
Lending	I(0)	-5.030410	1990	-5.030410**	1990
MEXPD	I(1)	-5.895262*	1985	-6.004166*	1986
TAX	I(1)	-6.841174*	2009	-7.062800*	2007
Inflation	I(0)	-6.547871*	1998	-7.232054*	1996

*Note: *&** indicating statistically significant at 1% & 10% level.*

The selection of optimal lag for developing the ARDL model is a very crucial one. The selection of the optimal lag structure is very much affecting the long run relationship between variables (Bahmani-Oskooee and Bohal, 2000). For testing long-run relationship in between studied variables, we are testing F bound test. The critical values for F bound test are taken from Pesaran *et al.* (2001a).

Following table 3 showing the results of F bound test results. Our F-statistics if 4.75, and it is higher than critical values for upper bound I (1) at 2.5% and 5% level of significance. By rule of thumb, if the calculated F-statistics is higher than to critical values of upper bound i.e. I (1), we can say that there is a long run relationship in between the variables (Pesaran *et al.,* 2001b). Our results are also indicating that six explanatory variables with growth rate showing a long run relation in our studied period 1974 to 2015.

Table 3

F-Bound test Results

5%		2.5%		F-Statistics	k
I(0)	*I*(1)	*I*(0)	*I*(1)		
2.45	3.61	2.75	3.99	4.7591	6

Selection of optimal lag is sensitive issue ARDL modelling and various test are available for the selection of optimal lag. We have applied the Akaike Information Criteria (AIC) (Akaike 1974) for selecting the optimal lag structure. ARDL (3, 3, 1, 1, 1, 2, 1) has been selected on the basis of the AIC criterion. Every test should be tested further for its appropriateness, and we have also followed some diagnostic test for checking our model appropriateness.

Table 4

Diagnostic Tests

Diagnostic Test	Test Statistics	Prob. Value
Breaush-Godfrey LM (a)	3.022117	0.3882*
Jarque-Bera (b)	0.799562	0.670467*
Breaush-Pagan-Godfrey (c)	15.09143	0.6557*

*Note: Null Hypothesis (H0) for (a): No-serial Correlation. (b): Normally Distributed. & (c): Homoscedasticity. *Indicating non- rejection of Null hypotheses.*

For the stability test, we have employed CUSUM and CUSUM square test, and the following figure (1.a) & (1.b) showing that our model is stable.

Figure 1.a

OLS Based CUSUM Test

Figure 1.b

OLS based CUSUM square Test
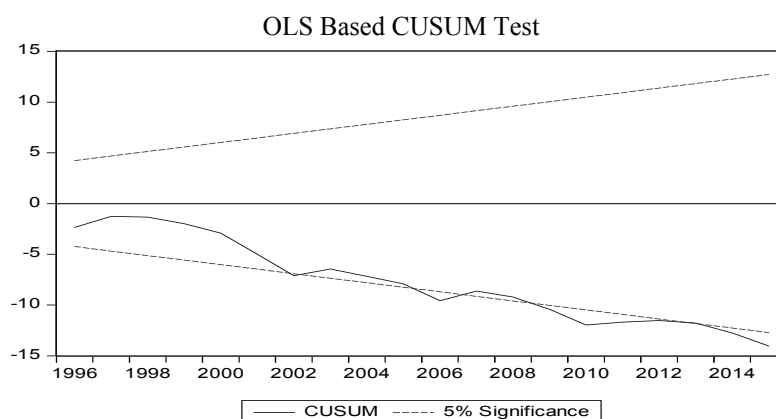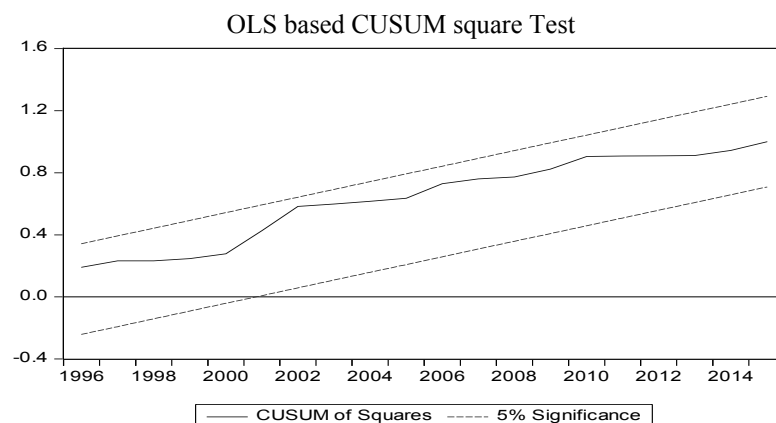
After checking all the traditional test for suitable ARDL model formulation, now we have extracted the long run statistics of the model. Table 5 represents our results. Only Gross Fixed Capital Formation is statistically significant at 1% level. It implies that, in long run dynamics, GFCF is positively related to the growth of India. As our variables are in % form, therefore 1% increase in GFCF will increase growth rate by 0.48 percent. All other long-run coefficients become statistically insignificant in our study. The speed of adjustment is very much high as our error correction term becomes significant at the 1% level. The sign of the ECT is negative and the value is 0.85, which indicates the speed of adjustment is very much drastic.

Table 5

ARDL Long Run Results with Error Correction Term, Dependent Variable *d*Growth

Variables	Coefficient	Standard Error	t-Statistics
CEXPD	-2.168598	1.538417	-1.409630
GFCF	0.350055	0.141850	2.467777**
Lending	-0.510170	0.761343	-0.670092
MEXPD	3.422571	2.477753	1.381320
TAX	-0.850762	0.849992	-1.000906
INF	-0.229212	0.140075	-1.636355
ECT (-1)	-0.850972	0.145170	-5.861900*

Note: * & **indicating statistically significant at 1% & 5% level.
d represents difference operator.

In the table 6, we have discussed the short run results of ARDL model. The positive short-run impact has been found between dGFCF, and dTAX (-1) with growth. Negative short-run impact has come from dgrowth(-2), dMEXPD, dTAX and dINF. Impact of GFCF on growth performance is consistent in both the short-run as well as long-run dynamics. Though other variables are not related to growth in the long run, we have found several short-run relationships. The difference in tax revenue showing a negative relationship. As it is the burden for the people, which reduces present consumption and investments. But lag tax revenues are showing a positive relation to growth. Lag tax revenue is used to finance the present expenditure of the government. Expenditure is useful in creating output and employment in the economy. In our study coefficient value for dTAX(-1) is 0.92.

Table 6

Short Run Results, Dependent Variable d(growth)

Variables	Coefficient	Standard Error	t-Statistics
Constant	16.06723	2.741651	5.860422*
dgrowth(-1)	0.146979	0.113790	1.291666
dgrowth (-2)	-0.130944	0.067269	-1.946581**
dCEXPD	-1.312658	0.737416	-1.780078
dCEXPD(-1)	4.170084	0.642454	6.490865*
dCEXPD(-2)	-1.373102	0.497279	-2.761231*
dGFCF	0.820163	0.175638	4.669633*
dLending	0.484241	0.302175	1.602519
dMEXPD	-5.109561	2.044685	-2.498948**
dTAX	-1.813254	0.448167	-4.045932*
dTAX(-1)	0.925473	0.393780	2.350228**
dINF	-0.781794	0.069389	-11.26689*

Note: *, ** & *** indicating statistically significant at 1%, 5% & 10% level of significance.
R^2=0.944525, Adj. R^2= 0.918922, DW=2.124733

On the other hand, the inflation variable is negatively associated with the growth. Inflation creates negative externalities in the economy and heavily impact investment decisions. Our works support the results of Barro (1995) & Ball & Romer (1993). In the Indian case,

military expenditure negatively affects growth performance in the short-run. According to Ahed & Dar (2017), by financing huge expenditure on defence, a country has fewer resources for other productive works which ultimately reduces growth performance. Similar kind of results also has been found by Tongur & Elveren (2017), Shahbaz et al. (2013) and Enimola & Akole (2011). CEXP (-1) and CEXP (-2) both are statistically significant and negatively associated with growth. Unproductive consumption expenditure in lag periods may become harmful for present growth performance.

Till now we have discussed the individual short-run impact of variables on growth. We have also applied the Wald coefficient test for examining short-run causality in between explanatory variables with growth. Only tax revenues (contemporaneous and lag jointly) has shown short-run causality to present growth rate.

The ARDL model dynamics is showing the long run and short run relationship between studied variables. But the ARDL model is not capable to study the directions causality in between dependent and independent variables. For the direction of causality, we have analysed the Toda-Yamamoto causality test results. Before the test, we have developed 6 VAR models for our study. Lag selection criteria for VAR's models are based on the Akaike Information Criterion (AIC). OLS based CUSUM test and Portmanteau Test has been applied for testing stability of the VAR's and the existence of autocorrelation. CUSUM test results are given in figure (2) in appendix (A), and all our VAR models are stable. Portmanteau Test for autocorrelation is showing that there is no autocorrelation in the error term in all models. CUSUM and Portmanteau test results are reported in appendix (A) and (B).

Table 7

Toda-Yamamoto Causality (MOWALD) Test Summary

H0	p (lag)	χ^2	Prob. Value	Decision
CEXPD – Growth	3	1.6	0.44	Accept
Growth – CEXPD	3	2.5	0.29	Accept
Lending – Growth	1	0.42	0.52	Accept
Growth – Lending	1	0.58	0.44	Accept
GFCF – Growth	2	1.2	0.28	Accept
Growth – GFCF	2	2.9	0.087	Reject
MEXPD – Growth	3	7.4	0.025	Reject
Growth –MEXPD	3	3.4	0.18	Accept
TAX – Growth	2	0.21	0.65	Accept
Growth – TAX	2	3.6	0.058	Reject
INF – Growth	1	4.3	0.038	Reject
Growth– INF	1	0.58	0.45	Accept

Form the above table, we have found four unidirectional causal relationships. They are- (i) Growth causes gross fixed capital formation, (ii) Military expenditure causes growth, (iii) growth causes tax revenues and (iv) inflation causes growth. The χ^2 values for all other variables are not significant at any level. Therefore their direction of causality cannot be explained.

4. Conclusions

This paper tries to investigate short run and long run relationship in between government spending and growth performance. ARDL cointegration test implies that there is a long run relationship between variables. In the long run, only Gross Fixed Capital Formation is positively related to the growth. Our results follow Solow (1956), Swan (1955) and Bond et al. (2011) arguments that capital accumulation is vital to growth. In the short run, analysis has shown a mixture of positive and negative impacts. Error correction term showing a very rapid speed of adjustment towards long-run equilibrium. The lag of tax revenue is positively related. As we have taken tax revenue with the assumption that these revenues are used to finance government expenditure. Revenue generated in the previous year is used in present expenditure through the budget process. Our significant positive lag tax revenue is proving the same thing. Negative relations of military expenditure to growth in the short run has two aspects - (a) heavy military expenditure creates an excessive burden to the government which ultimately increases debt requirements and (b) increase in the military budget may create negative externalities which can degrade foreign relations with other countries. Negative relation of inflation with growth is very much expected. Rising inflation creates an environment of negative externalities. In our short-run analysis, inflation is negatively associated with the growth rate. As to examine the causal relationship between variables, we have applied the Toda-Yamamoto non-linear model. We have found four unidirectional causal relationships. They are- (i) Growth causes gross fixed capital formation, (ii) Military expenditure causes growth, (iii) growth causes tax revenues and (iv) inflation causes growth. Unidirectional causality between growth to Gross Fixed Capital Formation and tax revenue exhibit positive enlighten for the policymakers. Because both these two variables are positively related to the growth of India. On the other side, other two unidirectional causalities termed a serious policy concern. In the short run, they negatively affect the growth.

Despite the necessities of defence expenditure, India should tighten its relationship with the other countries, especially with the neighbouring countries. Military and arms race will not push the Indian economy, without creating healthy trade and diplomatic relationships with other countries. Inflation targeting policies are much needed for the Indian economy. Central bank and government of India should take this issue seriously. The existence of high inequality in India, rapid inflation directly affect the poorer section of the society which in a way lower down the overall productivity of the economy.

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Appendix A

Table 1

Descriptive Statistics of the Variables (1974 to 2015)

Variable	Mean	Median	Maximum	Minimum	S.D.	Skewness	Kurtosis	Sum	Sum Square Dev.	Obs.
GDP	5.895029	6.095310	10.25996	-5.238183	2.904832	-1.353606	6.397311	247.5912	345.9601	42
GFCF	25.62151	24.89912	35.57031	16.16089	5.426588	0.281980	2.103185	1076.103	1207.362	42
CEXPD	10.84248	10.68005	12.45597	8.839228	0.854300	-0.025037	2.377579	455.3843	29.92299	42
Lending	-2.590806	-2.894491	0.187069	-5.588271	1.545764	0.289831	2.214050	-108.8139	97.96481	42
MEXPD	2.957109	2.933792	3.948814	2.405128	0.358495	0.857967	3.707050	124.1986	5.269266	42
TAX	9.798765	9.566288	12.26585	8.188687	0.949029	0.387859	2.619660	411.5481	36.92686	42
INF	7.321333	7.749126	16.66752	-1.648682	3.561272	0.283944	3.779471	307.4960	519.9889	42

Figure A.1

Trends in the Variables (1974 to 2015)
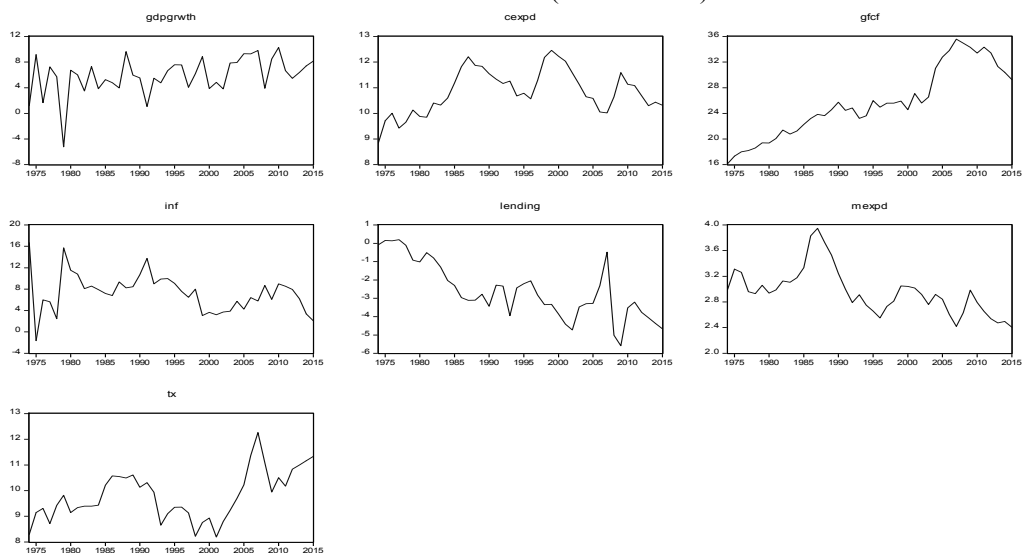
Figure A.2

OLS Based CUSUM Test

OLS-CUSUM of equation gdpgrwth

OLS-CUSUM of equation gfcf

OLS-CUSUM of equation gdpgrwth

OLS-CUSUM of equation mexpd

OLS-CUSUM of equation gdpgrwth

OLS-CUSUM of equation tx

OLS-CUSUM of equation gdpgrwth

OLS-CUSUM of equation inf
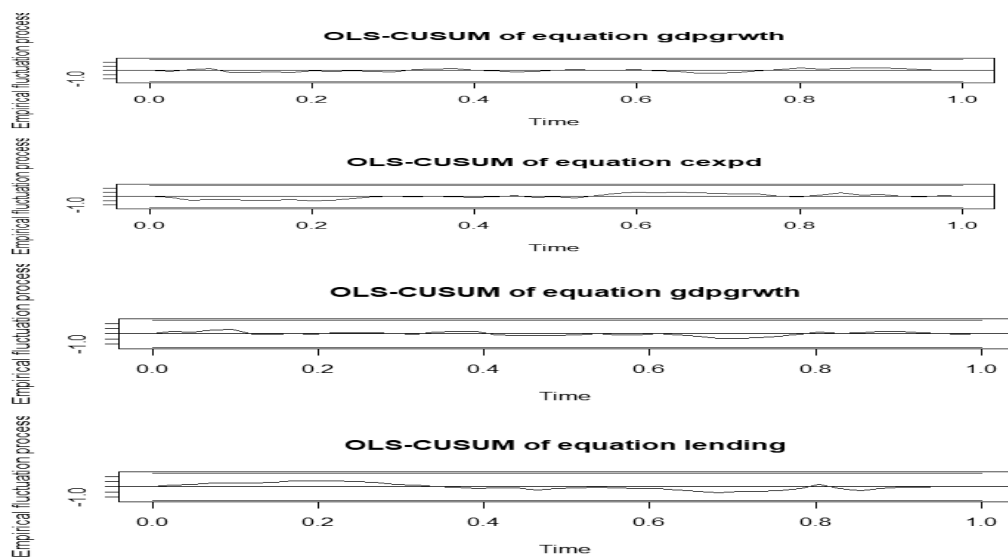
Appendix B

Table 8

Portmanteau Test (asymptotic) Summary

VAR Model	Chi-Square	Lag(p)	d	p-value
Grwoth-CEXPD	50.885	2	56	0.6684
Growth-Lending	40.635	1	60	0.9739
Growth-GFCF	40.222	1	60	0.9768
Grwoth-MEXPD	48.227	2	56	0.7604
Growth-TAX	42.082	1	60	0.9618
Grwoth-INF	41.845	1	60	0.964

Note: H0= No Serial Correlation. P-Value indicating acceptance of H0

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FINANCIAL WEALTH INEQUALITY DRIVERS IN A SMALL EU MEMBER COUNTRY: AN EXAMPLE FROM BULGARIA DURING THE PERIOD 2005-2017

In this scientific paper financial wealth inequality (FWI) in Bulgaria during the period of 2005:Q4-2017:Q4 has been analysed. Households' bank deposits are the best-known and most popular means for storing financial wealth (FW) among local individuals, assuming to be a relevant proxy for calculating FWI measures. By using real data on quarterly bank deposit's distribution, we calculate Gini coefficients, Top 1 percentile and Top 10 decile FWI indicators. Using these variables as dependent variables several econometric models have been developed using the ARDL bound testing approach of Pesaran and Shin (1999) and Pesaran et al. (2001). Long-term and short-term drivers of the FWI has been identified. Econometric results suggest that financial deepening, stock prices, interest rates and inflation contributes to FWI in the long run. Some of those variables help however decrease the wealthiest decile and percentile's financial wealth. House prices are having a limited negative impact on the FWI. In the short term higher FWI in the past is indicative for higher values of the FWI measures in the future. Also, a positive short-term relationship is maintained by the stock market performance. Higher financial deepening is in a negative association with the quarterly change of the FWI in the short-run. Amon the important short-term determinates of the FWI are also: interest rates on loans, general price level, introduction of a flat tax rate of 10%, the Great Recession, and Corporate commercial bank default on liabilities. Some of these factors have the opposite meaning for the FWI measured through the wealthiest percentile and wealthiest decile.
JEL: C32; D31; D63; E21

1. Introduction

Wealth and income inequalities' topic popularity has undergone a cyclical development in the past centuries, with peaks and troughs respectively. Influential economists and great thinkers like Karl Marx, Simon Kuznets, Anthony Atkinson, Thomas Piketty, Emannuel Saez, Angus Deaton and many other predecessors and successors of theirs have been trying to decipher the causes and consequences of wealth and income inequality.

Global data sets reveal that income and wealth inequality are steadily rising in the developed world since the 70s and 80s of the 20th century (see Salverda, 2015; Piketty & Saez, 2014; Wolff, 1998).[5] Perhaps statistical facts disagree with Kuznets' theory and even in the developed world many people are left without an access to stable employment, good education, medical and social support, eventually falling in the self–fulfilling vicious cycle of poverty (see Kuznets, 1955). Election results in the past decade in EU member states and the last presidential election results in the US are proving that voters are looking for non-systematic politicians, often elected for their populist views, which is a sign that people are looking for economic justice. The inequality has a price – social and economic. Stiglitz (2012) argues that the price for inequality is the consequences for the economic system that becomes less stable and less efficient, with lower growth, and a democracy that has been put into peril.

Figure 1

Google trends in search terms of "Wealth inequality", "Income inequality" and "Economic inequality"
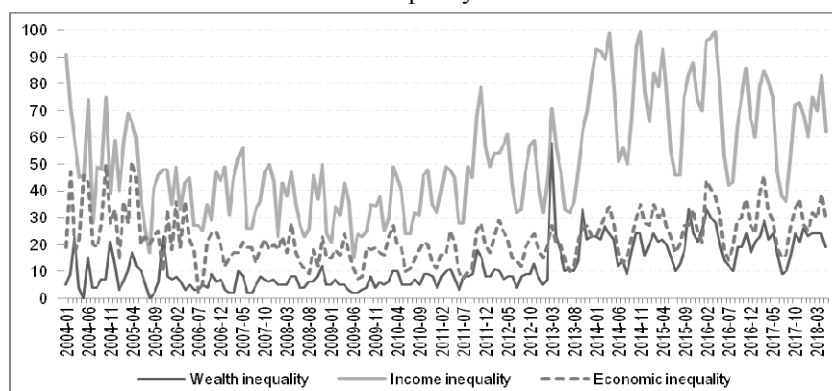
Note: Values between 0 to 100 reveal the term popularity with 100 being an all-time high. The numbers show the interest in the search with respect to the point with the maximum value in the chart for the region and time interval. With 100 means the maximum popularity of the term, 50 means that the popularity of the term is two times smaller and 0 means there is not enough data for it. Each data point is divided by the total searches of the geography and time range it represents to compare relative popularity.

Source: Google Trends.

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[5] In the period 1983-1995 wealth inequality in the US is in a steady UP-trend, but more worrying is the growing stratification between non-Hispanic whites and the rest, who are having lower access to good education, health services, inherited wealth (see Wolf, 1998).

After a reaching a trough around the Great recession Google trends data reveals that the popularity of terms "Income inequality, "Wealth inequality and "Economic inequality" is rising, with income inequality being more often entered into Google search engine queries (see Fig.1). This is yet different evidence for the topic popularity lately. The topic popularity is rising during times with positive growth for the economy, when stratification in the society is evolving and when the perception for inequality is sharpened.

Accumulated wealth in the family has an important impact on social outcomes as educational attainment level; life opportunities and place in the society regardless of the level of income (see Piketty, 2014; Grabka and Westermeier, 2014). As Grabka and Westermeier (2014) noted, in addition to their regular incomes, people's individual net wealth, the sum of all their assets, contributes separately to their individual economic welfare and their opportunities for self-realization. They define the security function of wealth as serving to stabilize consumption in the event of a lack of income.

The type of the accepted social model in a certain country affects the dependence on the level of personal wealth of the ability of individuals to handle with phases of economic insecurity and social risks due to illness, unemployment, etc. According to the general theoretical classification of social models or welfare regimes in Europe (see Esping-Andersen, 1990; Ferrera, 1996; Bonoli, 1997; Sapir, 2005) the model of Scandinavian countries shows the least dependence on the individual's income and wealth. Conversely, liberal welfare regimes are characterised by a weaker social security system.

Through empirical classification, Bulgaria is generally attached to the socio-economic model of the CEE countries (Fenger, 2007; Petrova, 2014). According to Giannetti and Nuti (2007) in the end the transition countries have embraced a hyper-liberal version of the market economy, very different from the model that dominates in the rest of Europe. Their model is characterized by higher dependence on the income and wealth in the process of overcoming social risks. Therefore, households' wealth represents a very important part of welfare especially in times of crisis in Bulgaria. According to Bogliacino and Maestri (2016) "when households face negative shocks, the availability of wealth-based assets provides an instrument for absorbing negative consequences without incurring abrupt lifestyle changes".

In this relation, it is important to investigate wealth inequality in Bulgaria and the determinants, which affect it. Financial wealth, measured by bank deposits, is taken into account because, compared to real assets, it consists of more liquid assets, which can be used from individuals to ensure unforeseen social risks. Kus (2012) argues that one of the major economic trends contributing to wealth concentration in recent decades is ownership of financial assets. This approach is applied additionally because, compared to real assets, it consists of more liquid assets, which can be used from individuals to ensure unforeseen social risks. Carroll et al. (2014) proved that housing assets are completely illiquid and are not used to smooth consumption. Using financial assets as a measurement of wealth inequality it will be possible to encompass also the possibility of households to meet unforeseen economic shocks. Inequality regarding financial wealth is a major social problem in Bulgaria, where the level of redistribution by the state is less compared to the developed social models and it is important to find the proper instruments to reduce it.

Other argument for taking into account financial wealth inequality is that real assets like housing assets are usually distributed more equally than financial assets (see Bogliacino and Maestri, 2014), especially in Bulgaria as a country of Eastern Europe, where traditionally house property is the main assets of each household and there are high housing ownership rates. Bogliacino and Maestri (2014) stated that whereas housing wealth is an important channel to explain differences in wealth inequality at the cross-country level, trends in financial inequality have significantly contributed to the change in within-country wealth trends. In the scope of this article are tendencies of wealth inequality and its determinants namely in a single country.

Financial wealth is one of the biggest contributors to wealth inequality, but also FW is very sensitive to war, economic slumps and to other structural breaks (see Lindert and Williamson, 2016). If not addressed properly deregulation in the financial sector, poor education and lack of proper taxation of heritable wealth are leading to large FWI, hence to overall wealth inequality (see ibid.). Financial wealth in Bulgaria has been steadily growing since the year 2000. Financial wealth surpasses the non-financial wealth for households in Bulgaria (see Credit Suisse Global Wealth Databook, 2016). However, the share of middle class in total net financial assets wealth is declining, according to the Allianz Global Wealth Report (2016).

Using Eurostat and NSI (National statistical institute of Bulgaria) data for the period of 2006-2016 total financial assets of households in Bulgaria rose by a hefty 203%, from EUR 22 bln. to EUR 66 bln. respectively, compared to 29.3% for the EU-28 and 28.1% for the Eurozone.[6] As of the end of 2016 currency and deposits comprise half of the financial wealth in Bulgaria if equity holdings are adjusted for equity of firms lower than the nominal (initial) capital of companies owned by households. Currency and deposits to GDP ratio stood at 52% compared, revealing the important meaning of this most liquid part of FW.

As of the end of 2017 wealthiest percentile holds around 31% of the deposit wealth of households in Bulgaria, while the richest decile is holding 79% of the deposit wealth. In addition, the value of the Gini coefficient is at 0.85 out of 1.00 for it can be concluded that the distribution of households' deposit is extremely skewed, leading to higher overall financial wealth and wealth inequality.

In this scientific paper financial wealth inequality has been analysed, following the assumption that FW represents well the FWI in Bulgaria and due its liquidity has more important implications to total wealth distribution. Households' bank deposits are assumed to be a fair proxy to overall FW and due to the correctness and completeness of the data are supposed to create a relevant picture for FW distribution. The purpose of this paper is to explain the determinants of financial wealth inequality in Bulgaria, which is a scientific challenge, but could have implications for policymakers.

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[6] See Households – statistics on financial assets and liabilities, Eurostat,
http://ec.europa.eu/eurostat/statistics-explained/index.php/Households_-_statistics_on_financial_assets_and_liabilities.

The paper is structured as follows: The next paragraph represents the data selection process. Paragraph III gives a brief overview of the dynamics and trends of dependent variables. In the fourth paragraph we have laid down the methodology we use. Paragraph V reveals the results from the conducted original empirical research. The last paragraph comprises the concluding remarks.

2. Data

Accounting for local economy characteristics, e.g. high housing ownership rates; low capital markets services penetration; low-financial literacy; lower equity holdings of households than the nominal value of the initial capital invested; at least half of the FW is stored in the form of bank deposits. Bank deposits comprise between 30-40% of total gross wealth of individuals, thus we assume they are a good proxy for the FW distribution.[7] Usually, the financial wealth is highly concentrated in the hands of the Top wealth groups (see Azpitarte, 2008), especially in the form of public-traded financial instruments, non-marketable equity, investment funds and life insurance.

$$W_t = FW_t + RW_t \tag{1}$$

$$W_t = W_{t-1} + DPI_t - C_t \tag{2}$$

$$FW_t = W_{t-1} + DPI_t - C_t - RW_t \tag{3}$$

Where:

W stands for wealth;

FW – financial wealth (e.g. deposits, money market accounts, listed and non-listed shares, mutual funds, life insurance policies, etc.);

RW – real wealth (all type of real assets, usually focusing only on real estate, mainly living real estate (e.g. houses, flats, etc.), and no matter whether they are acquired through a purchase or inheritance);

DPI – Disposable personal income comprise all income sources (net labour income, net social benefits, net investment income, inherited income, etc.)

C – individual consumption.

2.1. Variables

In order to explain the determinants of financial wealth inequality (FWI) in Bulgaria we use following dependent and explanatory variables for the period from the last quarter of 2005 to the last quarter of 2017 (inclusive). The source of dependent and explanatory variables

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[7] FWI is assumed to be skewed on the upside due the high housing ownership rate of households that would otherwise reveal more even distribution of total wealth.

has been publicly available data-sets, published by Bulgarian national bank, National statistical institute of Bulgaria and own calculations based on the raw data available.

Dependent variables:

Dependent variables have been calculated using publicly available data of Bulgarian National Bank. On a monthly basis, BNB publishes data about the number and the size of deposits in intervals.[8]

The time frame is a function of data availability and the aim one major economic downturn, as the one impacting the local economy heavily in 2009 due to the Global recession, to be included.

In selecting the dependent variables we've been following the common practice for calculating a Gini coefficient and/or calculating the share of wealthiest one-tenth of the wealthiest percentile, percentile, decile as suggested by Kuznets (1955), Piketty (2014), Saez and Zucman (2016), Smith (2008). In this regard following dependent variables have been selected:

GINID – Gini coefficient on households' bank deposits;

TOP10 – the Top 10%, which is the richest decile of households holding bank deposits, i.e. the wealthiest ten percent in terms of gross financial wealth, measured through households' deposits;

TOP1 – the Top 1%, which is the richest percentile of households holding bank deposits, i.e. the wealthiest one percent in terms of gross financial wealth, measured through households' deposits

Gini coefficient calculation

For calculating the Gini coefficient the approach laid out by Peshev (2015) is adopted. He is using BNB data to calculate Gini coefficients on households' bank deposits and loans, assuming these measures are very indicative for the FW distribution and inequality.[9]

The deposit Gini coefficient is calculated as the difference between the hypothetical area below an ideal equality curve (the 45° line) and the hypothetical area of the actual

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[8] Intervals of below BGN 1 000, between 1 000 and BGN 2 500, between 2 500 and BGN 5 000, between 5 000 and BGN 10 000, between 10 000 and BGN 20 000, between 20 000 and BGN 30 000, between 30 000 and BGN 40 000, between 40 000 and BGN 50 000, and above BGN 50 000. BNB ranges households' loans below BGN 1000, between 1 000 and BGN 2 500, between 2 500 and BGN 5 000, between 5 000 and BGN 10 000, between 10 000 and BGN 25 000, between 25 000 and BGN 50 000, and above BGN 50 000.

[9] Despite the fact that Gini coefficient on households' loans can be calculated as in the paper "Analysis of the Wealth Inequality Dynamics in Bulgaria" of Peshev (2015), the low penetration of households'' loans in the economy is going to draw inferences with low significance to WI and FWI.

inequality (denoted by the Lorenz curve, noted as Actual FWI cumulative distribution curve) divided by the area of ideal equality.

This area can be calculated by using the following definite integral:

$$B = \int\limits_{0}^{1} f(x)\,dx,$$ (4)

Where, $f(x)$ is a polynomial and B is the hypothetical area of the actual inequality, while f(x) is the function of cumulative deposit wealth distribution with x representing the cumulative share of deposit holders.

Top 1 and Top 10 shares calculation

Top 1 and Top 10, or the wealthiest percentile and wealthiest decile of deposit holders have been calculated as the sum of the proportion of the total wealth of 1 and 10 percent largest deposit holders.[10]

Explanatory variables:

In regards to the explanatory variables selection process we've performed a literature survey, cross-correlation analysis, general reasoning and also, we have accounted for data availability. The selection of independent variables depends also on the choice of dependent variables. Then follows the stationary check process, with which we've selected the appropriate time series analysis method.

Most of the selected explanatory variables are used in other similar researches. In his bestseller "Capital in the 21st Century" Piketty (2014) outlines three main factors for inequality: the higher return on capital then GDP growth rate; non-optimal progressive taxation (especially on inherited income) and higher wealth to income ratios. The higher return on capital compared to GDP growth rates contributes to higher wealth inequality (see ibid).

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[10] For calculating quarterly values of Top 1 and Top 10 dependent variables we first calculate the number of deposit holders, representing 1 and 10 % of the total. Then we continue with summing the proportionate wealth until the number of deposit holders is matched. Since BNB publishes its deposit data in notional amount intervals, there are some peculiarities of the calculation process. For example, in the last quarter of 2017, 1% of total deposit holders equals 100 148, also 833 deposit holders own 4.25% of total deposit wealth (falling in the above 1 mln. BGN interval), 1386 deposit holders own 2% of total deposit wealth (falling int the 0.5 to 1 mln. BGN interval), 8456 people from the 0.2 to 0.5 mln. BGN interval own 4.87% of total deposit wealth, 45 431 deposit holders from the 0.1 to 0.2 mln. BGN group own 13.28% of total deposit wealth, and 44 042 (the difference to 100 148 which is 1% of the TOP percentile) owns the 40% (44 042 of 109 952 deposit holders) of the 15.71% total wealth of the 0.05-0.1 mln. BGN interval. Following such an approach we find that wealthiest 100 148 (one percent of total deposit holders) own 30.7% of total deposit wealth in the last quarter of 2017.

Regarding the selection of GDP as an explanatory variable it should be noted that the inequality-growth relationship is a common research topic, especially in income inequality literature (see Kuznets, 1955, 1963; Piketty, 1997; Aghion et al., 1999; Barro, 2000).

Since households' bank deposits are growing in importance to the banking sector at a much higher rate than the other bank liabilities, they've turned in to bigger factor for lending, hence for investments and economic development (see Stattev, 2009).[11] Financial deepening – economic inequality nexus has been analysed by Lopez (2004), Beck et al. (2007) and Dabla-Norris et al. (2015).

Capital and housing market dynamics and economic equality are representing strong interdependency according to the results of Wolff (1998), Benjamin et al. (2004) and Bostic et al. (2009).

Inflation is considered as an important factor of wealth inequality. Piketty noted that inflation "can also play a fundamental role in the dynamics of the wealth distribution" (Piketty, 2014).

Furthermore, it is a common belief that progressive taxation can help in decreasing income and wealth inequality. Taxation-wealth distribution nexus has been scrutinized by Laitner (2001) and Meh (2005).

Another important factor to wealth distribution is the interest rate. Piketty (1997) is considering the interest rates-inequality nexus in a modified Solow model framework.

Education and inheritances are also a very important factor for WI, usually causing uneven wealth distribution (see Elinder et al., 2016 and Lusardi et al., 2017).[12] This scientific article is analysing quarterly data and applying specific time series modelling accordingly; however, due to the lack of these important availability, they have been omitted from the analysis.

The models' explanatory (independent) variables are as follows:

DY – households' bank deposits to GDP ratio;

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[11] In the 1991-1997 period Investment lead to higher bank deposits, while in the period 1997-2006 the opposite long-term association is evident, maintaining the general savings-to-investments reasoning (see Stattev, 2009).

[12] In their recent research of Lusardi et al (2017) confirm the positive association between education and economic inequality. Educated people (with a college degree or higher) are maintaining wealth to income ratios at around 7.3 times, compared to 3 times for groups without a high school diploma while the average income for educated people is around 50% higher compared to population groups not possessing a high-school diploma. It can easily inferred Educated people are in better position to understand sophisticated financial products and to manage their wealth, hence not surprisingly financial knowledge is responsible for 30-40% of wealth inequality, with people with higher financial literacy being in position to better manage their wealth (see ibid.). Elinder et al. (2016) examined the inherited wealth as a key determinant of wealth inequality. They used new population-wide register data on inheritances and wealth in Sweden to estimate the causal impact of inheritances on wealth inequality. They found that inheritances reduce relative wealth inequality (e.g., the Gini coefficient falls by 5-10 percent).

HPR – Residential properties price index (2010=100);

ID – interest rates on deposits of households;

IL – interest rates on bank loans of households;

Log(CPI) – natural logarithm of CPI;

Log(Y) – natural logarithm of quarterly seasonally adjusted real GDP;

LY – households' loans to GDP ratio;

SFXR – Bulgarian stock market benchmark values deflated by CPI;

D1 – Global financial crisis impact on Bulgarian economy, beginning Q1 of 2009;

D2 – Dummy variable accountable for imposing 10% proportional (flat) tax rate on personal income;

D3 – Corporate commercial bank crisis dummy.

3. Dynamics and trends of dependent variables

As shown on Fig 1 the Gini coefficient based on deposits of households rises until the end of 2012 reaching a peak value of 0.88, then it starts declining to 0.85, oscillating between 0.84 to 0.88 for the period 2005 Q4 to 2017 Q4. For the whole period under review a slight increase by 1.1 pp is evident. The Gini coefficient value reveals a very uneven distribution of households' bank deposits, which is comprising the largest part of households' financial wealth and is the most liquid part of the overall wealth of households. FWI is much larger than the income inequality.

Figure 2

Dynamics of the GINI coefficient on households' deposits dependent variable for the period 2005:Q4-2017:Q4
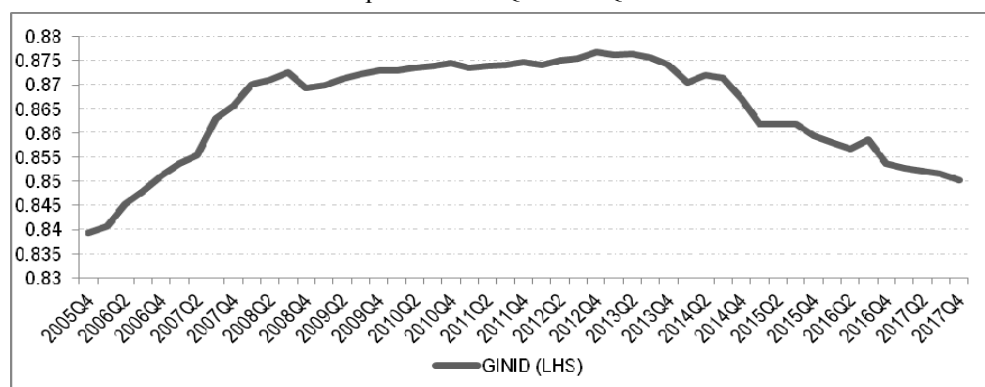
Note: The Gini coefficient can accept values between 0.0 to 1.0 with values closer to 1 signaling for larger inequality.

Source: Own calculations with public BNB data.

The top 1% and top 10% deposit holders lost share, with the wealthiest percentile dropping considerably its share, by hefty 43% for the observed period. The decline of the share of biggest 1% deposit holders is the main contributor for the decline in the deposit Gini coefficient, especially at the end of 2012 onwards (see Fig.3). The top decile share also declines but more gradually. As of the end of 2017 top 1% hold around 31% of the nominal value of deposits, while the top 10%' s share in deposit wealth corresponds to around 79% (see Fig. 3). FW distribution in Bulgaria is very skewed, however following international trends (see Cagetti and De Nardi, (2005) and Saez and Zucman (2014)),[13] 100 000-200 000; 200 000-500 000; 500-1 000 000; > 1 000 000.

Figure 3

Dynamics of TOP 10 % and TOP 1 % dependent variables for the period 2005:Q4-2017:Q4
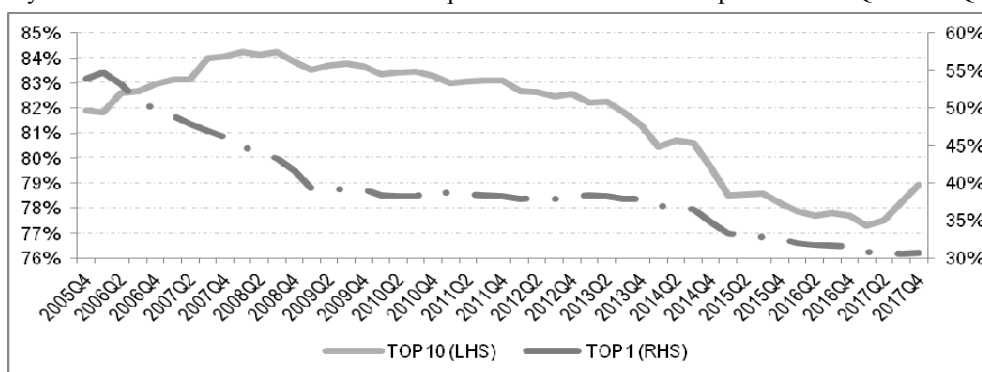
Note: Values between 0 to 100 % reveal the share in deposit wealth of the wealthiest percentile and decile with a value closer to 100% meaning a closer to 100% share of deposit wealth of the Top 1% and Top 10%. Left-hand side axis applies to the Top 10% variable, while the right-hand side vertical axis applies to the Top 1% variable.

Source: Own calculations with public BNB data.

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[13] FW distribution in Bulgaria is very skewed, however following international trends. Cagetti and De Nardi (2005) investigated wealth inequality in the USA and the determinants that explain it. They noted that in the USA a large fraction of the total wealth in the economy is concentrated in the hand of the richest percentiles: the top 1% hold one third and the richest 5% hold more than half of total wealth. At the other extreme, a significant fraction of the population holds little or no wealth at all. They used as a comprehensive measure of the most marketable wealth net worth that includes all assets held by the households (real estate, financial wealth, vehicles) net of all liabilities (mortgages and other debts). They have found evidence that individual savings, bequests and wealth accumulation are important determinants of wealth inequality in the USA. They also have highlighted the role of entrepreneurs in determining capital accumulation and wealth inequality in the United States. As the data of Saez and Zucman (2014) suggest the top 0.1% wealth share in 2012 in the US have increased by hefty 214% in a period of 33 years until 2013, while the bottom 90% wealth share even started stately declining after reaching a peak in the mid-80s. From the late seventies until the end of 2012 the wealth share of top 0.1% has been in a steady uptrend, being the main factor for wealth inequality gap widening. Wealth inequality in the US is approaching the highest levels, reached in the beginning of the 20th century.

BNB publishes quarterly data on the number and the size of deposits in following ranges (all amounts are in BGN): 1 000<; 1 000-2 500; 2 500-5 000; 5 000-10 000; 10 000-20 000; 20 000-30 000; 30 000-40 000; 40 000-50 000; >50 000. Since the third quarter of 2009 BNB started publishing data for the ranges (all amounts are in BGN) 50 000-100 000.

For the whole period under review, the number of households' deposits rose by 7.1% to just above 10 mln., while the value more than tripled, from BGN 11.7 to BGN 47.7 bln. The steady growth of the value of deposits even after the outbreak of the Corporate commercial bank crisis at the end of the second quarter of 2014 shows the confidence and trust of households in the local banking system. The number of deposits starts declining in the post-2009 period, with rising banking fees being one of the main contributors to this process. This assumption is based on the fact that only the number of below BGN 1000 deposits declines.

Deposits in the range above BGN 50 000 rose by the strongest pace from all other intervals, with their number increasing by tremendous 872% to 166 058 for the whole period under review, and their value rose by 816% to BGN 19.2 bln. Owners of deposits in this range increased in number and value the most compared to other ranges. i.e. this group is the biggest contributor to the FWI. At the beginning of the period only 0.183% of all deposit holders were holding deposits above the BGN 50 000 threshold, owning 17.85% of notional value of deposits, while at the end of the period 1.66% of the total number of deposits fall in this range, representing 40.11% of the deposits' value. The growth rate of share of people owning deposits above BGN 50 000 outpaces considerably the growth rate of the share in total deposits' value. The biggest contributor of the number of deposits above BGN 50 000 is the deposit range of 100 000 to BGN 200 000. One of the reasons is that deposits under BGN 196 000 are covered by Deposit insurance fund and after the outbreak of the Corporate commercial bank crisis deposits above the DIF coverage were split into smaller notional value deposits to be insured.

Deposits in the higher than BGN 200 000 ranges are experiencing a much slower growth rate in this regard. The process of splitting larger deposits above the maximum insured amount is artificially impacting the FWI on the downside, so is the fact that many individuals have more than one bank deposit account. We assume that this process, however, is not skewing the FWI considerably.

4. Methodology

Analysing the literature on economic inequality and focusing on financial wealth inequality determinants has helped us in the data selection process. The model creation process was buoyed by cross-correlation analysis of selected variables (see Table.1. in the VII.1. Correlation analysis section in the appendix). A combination between high and low correlated variables leads to the creation of viable econometric models that account for hidden associations and transmission mechanisms.

Results from unit root tests are advocating the use of a specific time series method (see VII.2. Unit root tests' results in the appendix). Usually economic time series at their levels change their mean and variance over time, i.e. they are non-stationary in levels which make

them unreliable for model-creation, analysis and forecasting, unless they are turned into stationary variables, trough first-, sometimes trough second differencing. Among the most popular approaches for dealing with non-stationarity series are the methods developed by Engle and Granger (1987), the approach of Johansen (1988) and Johansen and Juselius (1990) and the ARDL bounds testing procedure developed by Pesaran and Shin (1999) and Pesaran et al. (2001). However, the methods of Engle and Granger (1987), Johansen (1988) and Johansen and Juselius (1990) require I(1) data, i.e. stationary at first differences. Besides that, the approach of Johansen (1988) and Johansen and Juselius (1990) requires large data sets, usually with over 100 observation per variable, (see Hargreaves, 1994 and Ahking, 2002), with around 50 observations for each variable from our dataset. The approach of Pesaran and Shin (1999) and Pesaran et al. (2001) allows for mixed-stationary data, i.e. I(0) and I(1) variables (a combination of stationary at levels and first differences stationary variables).

Performing Im, Pesaran, and Shin test, together with Augmented Dickey-Fuller and Phillips-Perron test reveal that some of the variables are I(0) (i.e. stationary) and other are I(1) (i.e. have unit root) variables at the intercept, intercept and trend, and none option, or in some instances the null hypothesis is barely rejected at the level data (as can be seen for some of the results from the unit root tests in the Appendix VII.2. Unit root tests)[14]. The ARDL bound testing procedure of Pesaran and Shin (1999) and Pesaran et al. (2001) has been considered after accounting for the combination of level-stationarity and first difference-stationarity of variables.

Considering data peculiarities and model creating requirements we have built dynamic ARDL model that is cable of representing short-term and long-term interdependencies, considering the approach of Pesaran and Shin (1999) and Pesaran et al. (2001). With selected variables, we create an ARDL model with one lag of level data and lags of first differences of variables. If found that variables are cointegrated a cointegrated equation, representing the long-term associations, and error-correction dynamic model accounting for short-term associations is created.

$$\Delta Y_t = c + \phi Y_{t-1} + \theta_k x_{k,t-1} + \sum_{m=1}^{m} \eta_m \Delta Y_{t-m} + \sum_{m=1}^{m} \xi_m \Delta X_{k,t-m} + \gamma_m d_{m,t} + \varepsilon_t, \qquad (5)$$

Where:

ΔY_t – first differences of the dependent variable;

c – constant (an intercept in the model);

ϕ – autoregressive coefficient related to the first lag dependent variable;

Y_{t-1} – first lag of the dependent variable;

θ_k – coefficient related to the first lag of the kth explanatory variable;

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[14] In this research paper the common procedure for applying the regular options of a unit root test has been applied, respectively the intercept, intercept and trend, and none option. Visual inspection of data is not enough for considering whether tested data (e.g. single variable) is having, constant, constant and trend, or the data is not having constant and trend. This is the reasoning behind the common practice for testing the data for unit root with one of the three assumptions and options.

$X_{k,t-1}$ – first lag of the kth explanatory variable;

η_m – autoregressive coefficient related to the first differences of the dependent variable;

ΔY_{t-m} – first differences of the dependent variable at lag "t-m";

ξ_m – coefficient related to the first differences of the explanatory variable;

$\Delta X_{k,t-m}$ – first differences of the kth explanatory variable at lag "t-m";

γ_n – coefficient related to a dummy variable;

$d_{n,t}$ – dummy variables;

ε_t – residual of the dynamic model.

The ARDL bound testing procedure allows us testing for cointegrating interdependencies between variables through performing Wald F-test on level data (first lag of level data) in a dynamic model. If the F-statistic is above the upper bound value, then variables are considered cointegrated. We use the small sample size (between 30 and 80 observations) reference values for the bottom and upper bounds found at Narayan (2005). Following the approach of Pesaran and Shin (1999) and Pesaran et al. (2001), long-term and short-term associations between the dependent and explanatory variables have been identified and coupled together in a single dynamic model. If variables are found to be cointegrated then an error-correction model with a single error term(vector) is created (see Nkoro and Uko, 2016).

For model selection and for selecting the lag-structure we've been guided by low-values of Akaike, Schwarz and Hannan-Quinn information criterion, large adjusted R^2 values, stability checks and omitted variables and misspecification tests.

Models have been checked for reliability through performing tests on residuals for normality, serial correlation, heteroscedasticity, and being subject to stability checks, e.g. for omitted variables and misspecification through Ramsey RESET test.

Besides adjusted R^2, F-value, Wald F-test on the first lag of level data, Akaike, Schwarz and Hannan-Quinn information criterion has been employed for selecting and comparing models A to I (see VII.3. ARDL Bounds testing regression results in the appendix).

Application of Wald F-test to lagged level data in models reveals that variables in models are cointegrated. All models' F-stat of the Wald test exceeds the upper bound at 1% significance level, referring them to asymptotic critical value bounds for the F-statistic on p.300-301 in Pesaran et al. (2001) and at 1% and 5% significance level critical values found at Narayan (2005). With cointegrated variables we originate regressions with level data, which also are representing the long-term association (see eq.6). between the dependent variable and explanatory variable in the error-correction models (ECMs) (see eq.7).

$$Y_t = k_0 + k_n X_{nt} + v_t \tag{6}$$

Where:

Y_t – dependent variable;

k_0 – constant of the regression;

k_n – coefficient related to the nth explanatory variable X;

X_{nt} – n[th] explanatory variable;

v_t – residual of the regression;

ECM models reveal the short-term interdependencies and combine the cointegrating equation represented by the error-correction term (ECT). Though the ECT the error-correction process is revealed, i.e. ECT allows the model to adjust to steady state by each quarter (see eq.7).

$$\Delta Y_t = c + \rho ECT_{t-1} + \sum_{m=1}^{n} \eta_m \Delta Y_{t-m} + \sum_{m=1}^{n} \xi_m \cdot \Delta X_{k,t-m} + \gamma_n d_{n,t} + \varepsilon_t, \tag{7}$$

Where:

ΔY_t – first differences of the dependent variable;

c – constant (an intercept in the model);

ρ – coefficient related to the first lag of the error-correction term, representing the speed of adjustment of the model to sa table state (the coefficient should have a negative sign, accepting values between 0 and 1, representing the error correction mechanism);

ECT_{t-1} – first lag of the residual-v_t of the cointegrating equation which is representing the long-run association;

η_m – autoregressive coefficient related to the first differences of the dependent variable;

ΔY_{t-m} – first differences of the dependent variable at lag "t-m";

ξ_m – coefficient related to the first differences of the explanatory variable;

$\Delta X_{k,t-m}$ – first differences of the kth explanatory variable at lag "t-m";

γ_n – coefficient related to a dummy variable;

$d_{n,t}$ – dummy variables;

εt – residual of the dynamic model.

5. Results

Since the ARDL bounds testing procedure of Pesaran and Shin (1999) Pesaran at al. (2001) applied here reveals short- and long-term interdependencies, first, cointegration equation (CE) results which represent the long-term associations have been scrutinized. In this regards it is appropriate to note the fact, that the error-correction mechanism in all presented and analysed models is adhered, through the negative sign of the first lag of the ECT coefficient (first lag of level data), meaning that the dynamic model disequilibrium decreases with each new quarter.

5.1. Long-term results

Following cointegrating equation have been considered after applying the ARDL bounds testing approach of Pesaran and Shin (1999) Pesaran at al. (2001) using small sample size reference values for the bottom and upper bounds found at Narayan (2005). We've created several models with the three dependent variables, Gini coefficient on deposits of households, wealthiest percentile and decile in terms of households' deposits. Our models under the ARDL bounds testing procedure can be found in the appendix section (VII.3. ARDL Bounds testing regression results). Cointegrating equations (CE) reveal the long-term association between FWI (dependent) variables and their determinants (explanatory variables). We use following CE for implementing error-correction terms in the error-correction models:

Model A

$$GINID = 0.084 \ LOG(Y) \ *** +0.281 \ LY \ ***+ 0.05 \ SFXR \ *** -0.001 \ HPR \ *** +0.003 \ ID \ *** +Residual; \tag{8}$$

Where: *, **, *** denotes statistical significance at the 10%, 5% and 1% levels respectively.

Model B

$$GINID= -0.597 \ *** \ +0.102 \ DY \ *** +0.168 \ LOG(CPI) \ *** \ -0.002 TREND \ ***+Residual; \tag{9}$$

Where: *, **, *** denotes statistical significance at the 10%, 5% and 1% levels respectively.

Model C

$$D(GINID)= -0.233 \ *+0.122 \ LOG(CPI) \ *** +0.013 \ SFXR \ * +0.128 \ DY \ *** +0.115 \ LY \ *** \ -0.002 \ TREND \ *** \ +Residual; \tag{10}$$

Where: *, **, *** denotes statistical significance at the 10%, 5% and 1% levels respectively.

Model D

$$Top1=3.142*** + 0.013 \ IL \ *** \ -0.329 \ LOG(CPI) \ *** +0.151 \ SFXR \ **+Residual; \tag{11}$$

Where: *, **, *** denotes statistical significance at the 10%, 5% and 1% levels respectively.

Model E

$$TOP10= -0.826***+0.009 \ IL \ *** +0.189 \ LOG(CPI)*** \ -0.204 \ DY \ *** +0.109 \ SFXR \ ***+Residual; \tag{12}$$

Where: *, **, *** denotes statistical significance at the 10%, 5% and 1% levels respectively.

CE implemented in the models reveal that stock market prices have considerable positive meaning for the FWI (See Models A, C , D and E), while house prices have a minimal negative association with the FWI (as revealed in Model A)[15]. Owning public stock is a common practice for higher educated and richer layers of the society, hence climbing stock prices are enriching the wealthiest percentile and decile leading to even higher overall FWI. Wolff (1998) concludes that stock market prices are having a strong positive association with the wealth of Top 1 percentile (see model D), especially when stock prices are rising faster compared to house prices. High house ownership rates in Bulgaria and rising property prices reduce FWI, but the house price index is having very small meaning for the dependent variable, justified by the small coefficient value. Inherited real estate wealth and the sale of it when property prices are rising is transferred into higher bank deposits, i.e. proceedings from the sale[16].

Cointegrating equations reveal that financial services deepening, measured through penetration of households' deposits and loans in the economy, is in a strong positive association with the FWI, the higher the deposit do GDP and loan to GDP ratio, the larger the inequality in financial wealth distribution. The ratio between households' deposits and GDP and the loan to GDP ratio are in a positive long-term relationship with the Gini coefficient, as can be seen in models A, B, C and E, supporting the hypothesis that financial resources help able individuals gain financial wealth faster than the rest society groups[17]. Dabla-Norris et al. (2015) reached to similar conclusions. They proved that financial deepening, generalized by the ratio of private credit to GDP, is associated with higher income inequality. Lopez (2004) also proved that financial development is associated with increases in inequality.

Negative deposit to GDP association with the wealthiest decile is evident in model E. However, in model E the dependent variable is the wealthiest top decile, assuming that for this specific decile higher deposit to GDP ratio yields to lower share from households' deposits, hence a slightly different association is possible. By analysing remittances Beck et al. (2007) support the hypothesis that a negative association with financial deepening exists, for the bottom quintile though, eventually helping decrease income and wealth inequality.

FWI variables demonstrate a positive elasticity to interest rates on deposits and loans in models A, D and E[18]. Higher interest rates on loans and deposits stimulate credit rationing

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[15] A one-point increase in the deflated value of SOFIX leads to 0.01 to 0.15 percentage points increase in the FWI gauge (accepting values between 0 and 1, i.e. between 0 and 100%).

[16] A one-point increase in deflated House price index leads to 0.001 percentage points decline of the Gini coefficient (accepting values between 0 and 1, i.e. between 0 and 100%).

[17] One percentage point change in the deposit to GDP ratio and in the loan to GDP ratio yields between 0.13 and 0.28 percentage points change of the FWI variable in models A, B, C, while in model E one percentage point change in the deposit to GDP ratio is leading to 0.2 negative percentage points change of the deposit wealth share of the wealthiest decile.

[18] One percentage point change of interest rates on bank deposits yields to 0.0003 percentage points change in the Gini coefficient (accepting values between 0 and 1, i.e. between 0 and 100%). One percentage point change of interest rates on bank loans yields between 0.009 and 0.013 percentage points change in the Top 10 and Top 1 dependent variables (accepting values between 0 and 1, i.e. between 0 and 100%) as can be seen in Models D and E.

and wealth accumulation by capital abundant entrepreneurs, hence increasing the FWI and overall WI, with Piketty (1997) supporting a similar view.

Following the results of models B, C, E it can be concluded that consumer prices lead to higher FWI in the long term, with higher consumer prices being in a distinct strong positive association with dependent variables in CE opposing the findings of Piketty (2014), but supporting the conclusions of Li and Zou (2002), Dollar et al. (2013) and Lopez(2004)[19]. In their research of the Inflation – nominal wealth redistribution nexus Doepke and Schneider (2006) conclude that inflation is helping to restore wealth equality, with the rich, bondholders and old households' share in wealth distribution deteriorating. Fixed-rate mortgage debt holders, middle class and younger part of the population are gaining share in the wealth, buoyed by higher general prices in the economy (ibid.). Piketty (2014) and Doepke and Schnider (2006) are considering general wealth inequality not the financial wealth inequality or the households deposits distribution. Inflation helps in the long run for narrowing the gap between upper and lower percentiles, meaning that larger nominal value deposits grow slower than smaller ones as evident for the wealthiest 1 percent (see model D). If the main source of growth of small-sized deposits comes from salaries and social payments, then they better account for higher prices adjustments, while large-size depositors fail to keep the pace.

Real GDP (natural logarithm of seasonally adjusted quarterly values) positively relates to FWI (as seen in model A), supporting the hypothesis that wealthier layers of society take advantage in boom economic times and loose more wealth during down economic times[20]. After reviewing the pattern of economic development of developed and underdeveloped countries Kuznets (1955, 1963) suggests that economic growth (especially in the long term) is restoring economic equality. Economic growth that is nowadays mainly technological innovations induced contributes to wage inequality in UK and US since 1980s; hence it can be assumed it is impacting in the same way the income inequality and WI (see Aghion et al. 1999). Our results support the view of Aghion et al. (1999), i.e. the positive association between the change of GDP and the FWI.

5.2. Short-term results (Error-correction models)

As a final step, we've created error-correction models, allowing us to identify short-term associations between the dependent and explanatory variables and implementing the error-correction mechanism. The models' summary of statistical significance and robustness of models have been disclosed in the Appendix (VII.4. Error-correction models summary). Short-term results' analysis and comments follow the ECM laid out below.

Model A

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[19] A 100% positive change of the consumer prices index would lead between 12.2 and 18.9 percentage points increase of the FWI variables (accepting values between 0 and 1, i.e. between 0 and 100%) in models B, C and E, while in model D the wealthiest percentile share declines by hefty 33% on a 100% positive change in CPI.

[20] A 100% change of quarterly real GDP leads to 8.4 percentage points change of the Gini coefficients (accepting values between 0 and 1, i.e. between 0 and 100%) ceteris paribus. (see model A).

$\Delta GINID=+0.006^{***}$ $-0.203ECT_{(t-1)}^{**}$ $-0.222\Delta GINID_{(t-1)}$ $-0.143\Delta GINID_{(t-2)}$ $-0.297\Delta GINID_{(t-3)}$ $-0.012\Delta LNY_{(t-1)}+0.142\Delta LY_{(t-1)}$ -0.153 $\Delta LY_{(t-2)}^{*}$ $-0.005\Delta SFXR_{(t-1)}+0.011\Delta SFXR_{(t-2)}+0.037\Delta SFXR_{(t-3)}^{**}-0.001\Delta HPR_{(t-1)}-0.001\Delta HPR_{(t-2)}+0.001\Delta HPR_{(t-3)}-0.001\Delta ID_{(t-1)}$ -0.005 $D1^{**}$ -0.004 $D3^{***}$ (13)

Where: *, **, *** denotes statistical significance at the 10%, 5% and 1% levels respectively.

Model B

$\Delta GINID=0.011^{***}$ $-0.703ECT_{(t-1)}^{***}$ $+0.315\Delta GINID_{(t-1)}$ $+0.344\Delta GINID_{(t-2)}^{*}$ $+0.337\Delta GINID_{(t-4)}^{*}+0.02\Delta DY_{(t-1)}-0.045\Delta DY_{(t-2)}-0.033\Delta DY_{(t-3)}-0.048\Delta DY_{(t-4)}-0.094\Delta DY_{(t-5)}^{**}$ $+0.008\Delta DY_{(t-6)}$ $-0.094\Delta LOG(CPI)_{(t-1)}^{***}+0.005\Delta LOG(CPI)_{(t-2)}-0.008\Delta LOG(CPI)_{(t-3)}-0.052\Delta LOG(CPI)_{(t-4)}^{*}-0.046\Delta LOG(CPI)_{(t-5)}^{**}-0.033$ $\Delta LOG(CPI)_{(t-6)}-0.001@TREND^{***}$ -0.005 $D2^{***}$ (14)

Where: *, **, *** denotes statistical significance at the 10%, 5% and 1% levels respectively.

ECM Model C

$\Delta GINID=0.006^{**}-0.826ECT_{(t-1)}^{**}+0.37\Delta GINID_{(t-1)}+0.155\Delta GINID_{(t-2)}-0.159\Delta GINID_{(t-3)}-0.059\Delta LOG(CPI)_{(t-1)}+0.002\Delta LOG(CPI)_{(t-2)}-0.005\Delta SFXR_{(t-1)}-0.001\Delta SFXR_{(t-2)}+0.028\Delta SFXR_{(t-3)}^{**}-0.037\Delta DY_{(t-1)}-0.021\Delta DY_{(t-2)}$ $-0.013\Delta DY_{(t-3)}$ $-0.029\Delta DY_{(t-4)}+0.189\Delta LY_{(t-1)}-0.181\Delta LY_{(t-2)}$ $-0.005D2$ $-0.003D3$ ** (15)

Where: *, **, *** denotes statistical significance at the 10%, 5% and 1% levels respectively.

ECM Model D

$\Delta TOP1=$ -0.02^{***} $-0.115ECT_{(t-1)}^{***}$ $+0.31\Delta TOP1_{(t-1)}^{**}$ $+0.151\Delta TOP1_{(t-2)}$ $-0.023\Delta TOP1_{(t-3)}$ $+0.433\Delta TOP1_{(t-4)}^{***}$ $-0.006\Delta IL_{(t-1)}^{**}$ $-0.003\Delta IL_{(t-2)}$ $-0.102\Delta LOG(CPI)_{(t-1)}^{*}$ $-0.031\Delta LOG(CPI)_{(t-2)}$ $+0.148\Delta LOG(CPI)_{(t-3)}$ ** $+0.044\Delta SFXR_{(t-1)}$ $-0.003D3$ * $+0.01TREND^{***}$ (16)

Where: *, **, *** denotes statistical significance at the 10%, 5% and 1% levels respectively.

ECM Model E

$\Delta TOP10=-0.002$ $-0.708ECT_{(t-1)}^{***}$ $+0.448\Delta TOP10_{(t-1)}^{**}$ $-0.036\Delta TOP10_{(t-2)}+0.051\Delta TOP10_{(t-3)}$ $-0.006\Delta IL_{(t-1)}^{**}-0.004\Delta IL_{(t-2)}^{*}+0.002\Delta IL_{(t-3)}$ $-0.049\Delta LOG(CPI)_{(t-1)}$ $-0.089\Delta DY_{(t-1)}$ $-0.04\Delta DY_{(t-2)}$ $+0.219\Delta DY_{(t-3)}$ * $+0.076$ $\Delta DY_{(t-4)}$ $+0.014\Delta SFXR_{(t-1)}$ $-0.048\Delta SFXR_{(t-2)}^{*}$ $+0.045\Delta SFXR_{(t-3)}$ -0.012 $D3$ *** $+0.001$ $@TREND$ $^{**}-0.008$ $D1$ * (17)

Where: *, **, *** denotes statistical significance at the 10%, 5% and 1% levels respectively.

The cointegrating equations' residuals act for the error-correction term. Cointegrated variables shown in the cointegrating equations have been identified using the ARDL bounds testing procedure and found at Narayan (2005) critical values. In all ARDL error-correction models, the ECT coefficient negatively relates with the dependent variable, thus representing the error-correction mechanism. With each quarter the deviation from the long-term equilibrium is adjusted in the next quarter at the speed of 20% for model A, 70% for model B, 83% for model C, 12% for model D, and 71% for model E.

Through analysing short-term results, presented by the first differences of data in the model, we can reasonably conclude that the FWI inequality variable is in a strong positive association with its previous quarters meaning, i.e. positive changes/negative changes of the FWI variable leads to future larger/lower FWI variable values at the future (see models B, D and E).

Financial deepening in the short term, measured through deposit to GDP and loans to GDP ratio is reducing FWI, as seen in models A at 0.10 level of significance and in model B at 5% level of significance[21]. Deposit growth outpacing GDP growth benefits larger deposits holders (wealthiest decile) in model E at 0.10 level of significance[22].

Bulgarian stock market performance is in a positive relationship with the Gini coefficient on deposits, i.e. lower stock prices lead to lower inequality in the distribution of households' deposits and vice versa. Such an association is represented by models A, C at 0.05 level of significance[23]. However, positive stock market quarterly returns lower the TOP10 coefficient (as can be seen in model E at 0.10 level). Ignoring the higher significance level in model E, wealthiest decile FW is growing with lower stock prices and declining when stock prices are ascending.

The general price level (with CPI being a proxy for it) helps to restore equality in households' deposits distribution, with higher price level leading to lower Gini coefficient and to declining wealthiest percentile share of deposits. This association is very strongly represented in model B[24]. Our results are in line with findings of Piketty (2014) and Doepke and Schnider (2006). In model D, however, the first lag of the inflation variables is in a negative association with the Gini coefficient, but the third lag is maintaining the opposite relationship.

Interest rates on households' loans are found to be in a negative short-term relationship with the wealthiest percentile and wealthiest decile, i.e. the decline in interest rates is

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[21] One percentage point increase of the quarterly change of the deposit to GDP ratio leads to 0.094 percentage points decline of the quarterly change of the Gini coefficient, while one percentage point increase of the quarterly change of the loan to GDP ratio leads to 0.153 percentage points decline of the quarterly change of the Gini coefficient (see model A and model B).

[22] In model E, however, one percentage point increase of the quarterly change of the deposit to GDP ratio leads to 0.22 percentage points increase of the quarterly change of the Top10 dependent variable, but with the explanatory variable coefficient being significant at 0.1 level.

[23] One-point change of the quarterly change of the Sofix index (deflated values) leads to an increase of 0.028-0.037 percentage points of the quarterly change of the FWI indicator in models A and C.

[24] One percentage point decline of the quarterly growth rate of CPI leads to increase of 0.04 to 0.09 percentage points increase of the quarterly change of the Gini coefficient (see model B).

supporting the inequality in the distribution of households' deposits (see models D and E)[25]. Contemporary interest rates conjuncture in Bulgaria and EU is very challenging, since negative interest rates channel is new and challenging (see Peshev and Beev, 2016). Low-interest rates and high bond prices are fuelling equity prices, leading to higher financial wealth inequality, while house price increase is partially offsetting this effect (see Domanski et al., 2016).

The global recession projection on the local economy dummy D1 variable maintains a negative relationship with the dependent FWI variables in models A and E assuming that the Great Recession's impact on the Bulgarian economy is restoring equality in distribution of FW (see models A at 0.05 level and E at 0.10 level of significance)[26].

Introducing a flat tax rate of 10% on personal income (D2 dummy) from the beginning of 2008 is restoring equality in FW distribution (see model B at 0.01 level of significance)[27]. By lowering taxes entrepreneurship activity is stimulated and also the foreign entrepreneurs' activity in the country intensifies, stimulating employment, hence paying higher salaries and helping the middle-class creation. On the contrary usually it is expected with progressive taxation income and wealth equality to be restored. However, Meh (2005) summarizes in his research that replacing a progressive taxation on income with a proportional tax system has an insignificant effect on wealth distribution, because enhanced entrepreneurial activity leads to higher wages, thus reducing income and accumulated income, i.e. wealth. Laitner (2001) examined wealth inequality in the USA in the period between the 1930s and 1990s. He has found evidence that expansion of social security programs (benefits and taxes) and the increase of the government debt can lead toward more wealth inequality. The research showed also that slower growth implies higher steady-state wealth inequality (see ibid.).

The Corporate Commercial Bank crisis (accounted for by the D3 dummy), which started in June'2014, tested the crisis resolution abilities of local authorities (the Government, leading politicians, the deposit insurance fund and the central bankers) had negative impact on FWI (see models A, C and D, at 0.01, 0.05 and 0.1 level of significance)[28]. The problems of CCB, which eventually defaulted on its liabilities, led to reshuffling bank deposits from Bulgarian owned banks to foreign financial groups owned banks (usually with a parent from a country being a member of the Eurozone) and is with a negative association with the dependent variable.

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[25] One percentage point change of the quarterly change of interest rates on loans leads between 0.006 to 0.004 percentage points of quarterly percentage points change of the TOP1 and TOP10 dependent variables (see models D and E).

[26] The global recession dummy accounts for 0.008 to 0.005 percentage points decline of the change of FWI variables in models A and E.

[27] The introduction of 10% personal income proportional/flat tax rate let to decline of the change of FWI by 0.005 percentage points.

[28] Corporate commercial bank crisis (D3 dummy variable when accepted values from 0 to 1 value) is leading to 0.004-0.0123 percentage points decline of the change of FWI variable in models A, C, D and E.

6. Concluding remarks

In this article we have examined the dynamics of FWI in Bulgaria and its determinants. While the deposit Gini coefficient is in a distinct uptrend until Q4 2012 when the variable starts descending, the wealthiest decile in terms of households' deposit wealth and especially the wealthiest percentile are in a distinct downtrend. We've applied the ARDL approach of Pesaran and Shin (1999) and Pesaran et al. (2001) for analysing a set of dependent and explanatory variables following the characteristics of I(0) and I(1) data. The FWI proxies, measured through a deposit Gini coefficient, the Top 1 and Top 10% share of FW, are driven by similar factors with some specifics. Following the ARDL approach of Pesaran and Shin (1999) and Pesaran et al. (2001) we have created dynamic error-correction models allowing us to identify long-term and short-term factors of FWI.

Our results suggest that there is a strong relationship between stock prices and FWI. Positive stock-market performance increases FWI, in the long- and in the short-run. In the short -run however wealthiest decile's share in FW is declining with higher stock prices, tough at 0.1 significance level.

House prices are having small but negative impact on FWI in the long-run, with higher house prices, helping in restoring the equality of households' deposit distribution. High house ownership rates are supporting the creation of the middle class in terms of deposit ownership.

FWI is negatively impacted by CPI in the short-term, while in the long-run there is a distinct positive association between the dependent and this explanatory variable. Deflation helps to lower the FWI in the long-run, however, it increases the inequality in the short-term.

Financial deepening, measured through deposit to GDP and loans to GDP ratios, is in favour of FWI in the long-run, however in the short term quarterly lags help in restoring FW equality. The share of households' deposits of wealthiest decile is maintaining the opposite interdependences, both in the long- and in the short run.

 Interest rates are among the most important drivers of FWI. Lower interest rates on deposits and loans decrease FWI in the long run, however in the short-term lower interest rates on loans lead to higher FWI values.

Year-over-year change of quarterly GDP is increasing the FWI, with higher economic growth being in favour of the wealthiest holders of households bank deposits.

The income flat tax rate of 10% introduction, the Great Recession and its projection on the local economy and the Corporate commercial bank default on its liabilities are events that led to lower FWI, despite having lower effect for the dependent variable dynamics.

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APPENDICES

CORRELATION ANALYSIS

Table 1

Correlation matrix

	GINID	TOP10	TOP1
GINID	1.00		
p-val	-----		
TOP10	0.45	1.00	
p-val	*0.00*	-----	
TOP1	-0.27	0.67	1.00
p-val	*0.06*	*0.00*	-----
DY	0.13	-0.81	-0.90
p-val	*0.38*	*0.00*	*0.00*
LY	0.90	0.39	-0.38
p-val	*0.00*	*0.01*	*0.01*
ID	0.59	0.90	0.42
p-val	*0.00*	*0.00*	*0.00*
IL	0.22	0.89	0.76
p-val	*0.14*	*0.00*	*0.00*
SFXR	-0.48	0.28	0.69
p-val	*0.00*	*0.05*	*0.00*
HPR	0.14	0.26	-0.01
p-val	*0.32*	*0.07*	*0.95*
LOG(CPI)	0.56	-0.44	-0.92
p-val	*0.00*	*0.00*	*0.00*
LNY	0.11	-0.71	-0.92
p-val	*0.46*	*0.00*	*0.00*

Unit root tests' results

Table 2

Augmented Dickey-Fuller Unit root test (Akaike Info Criterion)

Series	Levels			First differences		
Option on exog. var.	1	2	3	1	2	3
GINID	0.43	0.48	0.50	0.06	0.40	0.41
TOP10	0.40	0.21	0.56	0.16	0.53	0.99
TOP1	0.22	0.46	**0.01**	0.14	0.48	0.74
DY	1.00	0.69	0.25	0.30	**0.00**	0.74
LY	0.72	0.07	0.08	**0.01**	0.07	**0.04**
ID	0.34	0.81	0.22	**0.01**	**0.00**	0.11
IL	0.19	0.98	0.36	0.39	**0.03**	**0.00**
SFXR	0.14	0.30	**0.00**	**0.01**	0.10	**0.01**
HPR	0.57	**0.01**	0.71	**0.00**	0.06	**0.00**
LOG(CPI)	1.00	**0.00**	0.58	**0.00**	**0.00**	**0.00**
LNY	1.00	0.63	0.51	**0.00**	**0.00**	**0.00**

Note: Values in the table represent probabilities for accepting the null hypothesis of a unit root; Option on exogenous variables 1, 2, 3 is associated with no constant and no trend, constant, constant+linear trend on the ADF test;

Table 3

Augmented Dickey-Fuller Unit root test (Schwarz Info Criterion)

Series	Levels			First differences		
Option on exog. var.	1	2	3	1	2	3
GINID	0.85	0.22	0.50	**0.00**	**0.00**	**0.00**
TOP10	0.40	0.21	0.56	0.16	0.53	0.99
TOP1	**0.00**	**0.00**	0.12	**0.00**	**0.00**	**0.00**
DY	1.00	0.63	0.87	**0.00**	**0.00**	**0.00**
LY	0.72	0.07	0.08	**0.01**	**0.07**	**0.04**
ID	0.38	0.90	0.36	**0.00**	**0.00**	**0.00**
IL	**0.03**	0.99	0.36	**0.02**	**0.00**	**0.00**
SFXR	0.16	0.30	0.51	**0.01**	0.10	**0.02**
HPR	0.74	0.09	0.17	**0.00**	**0.03**	**0.07**
LOG(CPI)	1.00	**0.00**	0.58	**0.00**	**0.00**	**0.00**
LNY	1.00	0.47	0.39	**0.00**	**0.00**	**0.00**

Note: Values in the table represent probabilities (from 0.00 to 1.00) for accepting the null hypothesis of a unit root; Option on exogenous variables 1, 2, 3 is associated with no constant and no trend, constant, constant+linear trend on the ADF test;

Table 4

Phillips-Perron Unit root test

Series	Levels			First differences		
Option on exog. var.	1	2	3	1	2	3
GINID	0.79	0.25	0.35	**0.00**	**0.00**	**0.00**
TOP10	0.32	0.93	0.32	**0.00**	**0.00**	**0.00**
TOP1	**0.00**	0.07	0.59	**0.00**	**0.00**	**0.00**
DY	1.00	0.63	0.95	**0.00**	**0.00**	**0.00**
LY	0.77	0.17	0.42	**0.01**	0.11	**0.03**
ID	0.38	0.91	0.67	**0.00**	**0.00**	**0.00**
IL	0.07	0.97	0.66	**0.00**	**0.00**	**0.00**
SFXR	0.19	0.42	0.68	**0.00**	**0.00**	**0.01**
HPR	0.77	0.25	0.50	**0.01**	0.11	0.31
LOG(CPI)	0.99	**0.01**	0.58	**0.00**	**0.00**	**0.00**
LNY	1.00	0.48	0.31	**0.00**	**0.00**	**0.00**

Note: Values in the table represent probabilities (from 0.00 to 1.00) for accepting the null hypothesis of a unit root; Option on exogenous variables 1, 2, 3 is associated with no constant and no trend, constant, constant+linear trend option on the PP test;

Table 5

Im, Pesaran, and Shin unit root test

Series	Levels		First differences	
Option on exog. var.	1	2	1	2
GINID	0.48	0.50	0.40	0.41
TOP10	0.21	0.56	0.53	0.99
TOP1	0.46	**0.01**	0.48	0.74
DY	0.69	0.25	**0.00**	0.74
LY	0.07	0.08	0.07	**0.04**
ID	0.81	0.22	**0.00**	0.11
IL	0.98	0.36	**0.03**	**0.00**
SFXR	0.30	**0.00**	0.10	**0.01**
HPR	0.09	0.71	0.06	**0.00**
LOG(CPI)	**0.00**	0.58	**0.00**	**0.00**
LNY	0.63	0.51	**0.00**	**0.00**

Note: Values in the table represent probabilities (from 0.00 to 1.00) for accepting the null hypothesis of a unit root; Option on exogenous variables 1, 2 is associated with constant and constant+linear trend, respectively on the IPS test.

ARDL BOUNDS TESTING REGRESSION RESULTS

Model A

$\Delta GINID = +0.455 -0.241\ GINID_{(t-1)}** -0.026\ LNY_{(t-1)}\quad -0.105\ LY_{(t-1)}\ * -0.026\ SFXR_{(t-1)} +0.001\ HPR_{(t-1)}\ +0.003\ ID_{(t-1)}\ ** -0.152\ \Delta GINID_{(t-1)} -0.345\ \Delta GINID_{(t-2)} -0.432 \Delta GINID_{(t-3)} ** +0.01\ \Delta LNY_{(t-1)} +0.158\ \Delta LY_{(t-1)} -0.158\ \Delta LY_{(t-2)} +0.057\ \Delta SFXR_{(t-1)}\ +0.032\ \Delta SFXR_{(t-2)} +0.0520.037 \Delta SFXR_{(t-3)} ** +0.001 \Delta HPR_{(t-1)}\ +0.001 \Delta HPR_{(t-2)} +0.001\ \Delta HPR_{(t-3)}\ -0.003\ \Delta ID_{(t-1)}\ **$ (18)

Where: *, **, *** denotes statistical significance at the 10%, 5% and 1% levels respectively.

Note: Wald test F-statistic on level data with one lag is 5.22 and corresponding p-value of 0.001. Using reference values of Narayan (2005) the F-statistic is above the upper-bound value at 0.05 level, suggesting that variables are cointegrated.

Model B

$\Delta GINID = 0.35* -1.301\ GINID_{(t-1)}*** -0.008\ DY_{(t-1)}* +0.17\ LOG(CPI)_{(t-1)}*** +0.786\ \Delta GINID_{(t-1)} ** -0.024 \Delta GINID_{(t-2)}\ +0.087 \Delta GINID_{(t-3)}\ ** +0.299 \Delta GINID_{(t-4)}\ +0.060\ \Delta DY_{(t-1)} +0.048 \Delta DY_{(t-2)} +0.040 \Delta DY_{(t-3)} +0.008 \Delta DY_{(t-4)} +0.007 \Delta DY_{(t-5)} +0.10\ \Delta DY_{(t-6)} ** -0.160 \Delta LOG(CPI)_{(t-1)}*** -0.08 \Delta LOG(CPI)_{(t-2)}* -0.04 \Delta LOG(CPI)_{(t-3)} -0.046\ \Delta LOG(CPI)_{(t-4)} -0.062 \Delta LOG(CPI)_{(t-5)}*** -0.004 \Delta LOG(CPI)_{(t-6)}* -0.002 TREND*$ (19)

Where: *, **, *** denotes statistical significance at the 10%, 5% and 1% levels respectively.

Note: Wald test F-statistic on level data with one lag is 7.75 and corresponding p-value of 0.001. Using reference values of Narayan (2005) the F-statistic is above the upper-bound value at 0.01 level, suggesting that variables are cointegrated.

Model C

$$\Delta GINID = -0.427\ ^{***}\ -0.168\ GINID_{(t-1)}\ +0.089\ LOG(CPI)_{(t-1)}\ ^{***}\ +0.067\ SFXR_{(t-1)}\ ^{***}\ -0.148\ DY_{(t-1)}\ ^{***}\ -0.105\ LY_{(t-1)}\ ^{**}\ -0.484\ \Delta GINID_{(t-1)}\ -0.44\Delta GINID_{(t-2)}\ -0.518\ \Delta GINID_{(t-3)}\ ^{***}\ -0.101\Delta LOG(CPI)_{(t-1)}\ ^{***}\ -0.049\Delta LOG(CPI)_{(t-2)}\ -0.022\Delta SFXR_{(t-1)}\ -0.008\Delta SFXR_{(t-2)}\ +0.003\Delta SFXR_{(t-3)}\ +0.256\Delta DY_{(t-1)}\ ^{***}\ +0.215\ \Delta DY_{(t-2)}\ ^{***}\ +0.172\ \Delta DY_{(t-3)}\ ^{***}\ +0.113\Delta DY_{(t-4)}\ ^{**}\ +0.003\Delta LY_{(t-1)}\ -0.176\Delta LY_{(t-2)}\ ^{*} \tag{20}$$

Where: *, **, *** denotes statistical significance at the 10%, 5% and 1% levels respectively.

Note: Wald test F-statistic on level data with one lag is 6.09 and corresponding p-value of 0.001. Using reference values of Narayan (2005) the F-statistic is above the upper-bound value at 0.01 level, suggesting that variables are cointegrated.

Model D

$$\Delta TOP1 = -0.228\ -0.162\ TOP1_{(t-1)}\ ^{***}\ +0.001\ IL_{(t-1)}\ +0.007\ LOG(CPI)_{(t-1)}\ ^{**}\ -0.009SFXR_{(t-1)}\ +0.087\Delta TOP1_{(t-1)}\ -0.145\ \Delta TOP1_{(t-2)}\ -0.267\ \Delta TOP1_{(t-3)}\ ^{***}\ +0.206\ \Delta TOP1_{(t-4)}\ ^{**}\ -0.007\ \Delta IL_{(t-1)}\ ^{***}\ -0.005\ \Delta IL_{(t-2)}\ ^{***}\ +0.001\Delta LOG(CPI)_{(t-1)}\ +0.019\Delta LOG(CPI)_{(t-2)}\ +0.175\Delta LOG(CPI)_{(t-3)}\ ^{***}\ +0.044\Delta SFXR_{(t-1)} \tag{21}$$

Where: *, **, *** denotes statistical significance at the 10%, 5% and 1% levels respectively.

Note: Wald test F-statistic on level data with one lag is 8.11 and corresponding p-value of 0.0001. Using reference values of Narayan (2005) the F-statistic is above the upper-bound value at 0.01 level, suggesting that variables are cointegrated.

Model E

$$\Delta TOP10 = -0.194\ -0.286\ TOP10_{(t-1)}\ ^{***}\ -0.006\ IL_{(t-1)}\ ^{***}\ +0.045\ LOG(CPI)_{(t-1)}\ ^{***}\ -0.287DY_{(t-1)}\ ^{***}\ -0.026SFXR_{(t-1)}\ ^{**}\ -0.199\Delta TOP10_{(t-1)}\ -0.583\Delta TOP10_{(t-2)}\ ^{***}\ -0.475\Delta TOP10_{(t-3)}\ ^{***}\ +0.004\Delta IL_{(t-1)}\ ^{**}\ +0.003\Delta IL_{(t-2)}\ ^{*}\ +0.002\Delta IL_{(t-3)}\ -0.055\Delta LOG(CPI)_{(t-1)}\ +0.271\Delta DY_{(t-1)}\ ^{***}\ +0.196\Delta DY_{(t-2)}\ ^{**}\ +0.184\ \Delta DY_{(t-3)}\ ^{**}\ +0.145\Delta DY_{(t-4)}\ +0.063\Delta SFXR_{(t-1)}\ ^{***}\ +0.011\Delta SFXR_{(t-2)}\ +0.06\Delta SFXR_{(t-3)}\ ^{**}\ +0.001TREND^{**} \tag{22}$$

Where: *, **, *** denotes statistical significance at the 10%, 5% and 1% levels respectively.

Note: Wald test F-statistic on level data with one lag is 8.81 and corresponding p-value of 0.0001. Using reference values of Narayan (2005) the F-statistic is above the upper-bound value at 0.01 level, suggesting that variables are cointegrated.

ERROR-CORRECTION MODELS SUMMARY

Summary statistics (model A):

Adjusted R-squared   0.51; F-statistic   3.91; Prob(F-statistic)   0.00;

Akaike info criterion -9.74; Schwarz criterion -9.05; Hannan-Quinn criterion -9.48.

Diagnostics: The Jarque-Bera test suggests that the residuals are normally distributed, with Jarque-Bera stat of 2.95 and p-value for the null hypothesis of 0.23. The Breusch-Godfrey Serial Correlation LM Test suggests the absence of serial correlation with p-value of 0.30 for not rejecting the null hypothesis of the absence of serial correlation. The Breusch-Pagan-Godfrey test is indicating that errors are homoscedastic with p-value of 0.91 for not rejecting the null hypothesis of the absence of heteroscedasticity. The null hypothesis of the Ramsey RESET Test that the functional form of the model is correctly specified is not rejected with p-value of 0.42 for the F-test value.

Summary statistics (model B):

Adjusted R-squared   0.64;   F-statistic   5.22; Prob(F-statistic)   0.00;

Akaike info criterion -10.03;   Schwarz criterion -9.28; Hannan-Quinn criterion -9.76.

Diagnostics: The Jarque-Bera test suggests that the residuals are normally distributed, with Jarque-Bera stat of 1.88 and p-value for the null hypothesis of 0.39. The Breusch-Godfrey Serial Correlation LM Test suggests the absence of serial correlation with p-value of 0.82 for not rejecting the null hypothesis of the absence of serial correlation. The Harvey test is indicating that errors are homoscedastic with p-value of 0.28 for not rejecting the null hypothesis of the absence of heteroscedasticity. The null hypothesis of the Ramsey RESET Test that the functional form of the model is correctly specified is not rejected with p-value of 0.81 for the F-test value.

Summary statistics (model C):

Adjusted R-squared   0.50; F-statistic   3.22; Prob(F-statistic)   0.004;

Akaike info criterion --9.70; Schwarz criterion -8.89; Hannan-Quinn criterion -9.40.

Diagnostics: The Jarque-Bera test suggests that the residuals are normally distributed, with Jarque-Bera stat of 0.25 and p-value for the null hypothesis of 0.88. The Breusch-Godfrey Serial Correlation LM Test suggests the absence of serial correlation with p-value of 0.85 for not rejecting the null hypothesis of the absence of serial correlation. The Breusch-Pagan-Godfrey test is indicating that errors are homoscedastic with p-value of 0.68 for not rejecting the null hypothesis of the absence of heteroscedasticity. The null hypothesis of the Ramsey RESET Test that the functional form of the model is correctly specified is not rejected with p-value of 0.61 for the F-test value.

Summary statistics (model D):

Adjusted R-squared 0.48; Akaike info criterion --7.79; Schwarz criterion -7.31;
Hannan-Quinn criterion -7.62.

Diagnostics: The Jarque-Bera test suggests that the residuals are normally distributed, with Jarque-Bera stat of 0.15 and p-value for the null hypothesis of 0.93. The Breusch-Godfrey Serial Correlation LM Test accepts the null hypothesis of absence of serial correlation with a p-value of just 0.17, however the Correlogram of squared residuals and the Correlogram of residuals reveal an absence of serial correlation. The Breusch-Pagan-Godfrey test is indicating that errors are homoscedastic with p-value of 0.70 for not rejecting the null hypothesis of the absence of heteroscedasticity. The null hypothesis of the Ramsey RESET Test that the functional form of the model is correctly specified is not rejected with p-value of 0.44 for the F-test value.

Summary statistics (model E):

Adjusted R-squared   0.29; F-statistic   1.86; Prob(F-statistic)   0.001;

Akaike info criterion   --8.34; Schwarz criterion -7.48; Hannan-Quinn criterion   -8.02.

Diagnostics: The Jarque-Bera test suggests that the residuals are normally distributed, with Jarque-Bera stat of 1.74 and p-value for the null hypothesis of 0.42. The Breusch-Godfrey Serial Correlation LM Test accepts the null hypothesis of the absence of serial correlation with a p-value of 0.29. The Breusch-Pagan-Godfrey test is indicating that errors are homoscedastic with p-value of 0.52 for not rejecting the null hypothesis of the absence of heteroscedasticity. The null hypothesis of the Ramsey RESET Test that the functional form of the model is correctly specified is not rejected with p-value of 0.75 for the F-test value.

DATASET

Table. 1

Variables

	GINID	TOP10	TOP1	DY	LY	ID	IL	SFXR	HPR	LOG(CPI)	DY	LNY	D1	D2	D3
2005Q4	0.84	0.82	0.54	0.25	0.15	3.31	9.49	0.18	83.52	8.44	0.07	9.68	0	0	0
2006Q1	0.84	0.82	0.55	0.26	0.15	3.31	9.52	0.18	87.47	8.48	0.06	9.70	0	0	0
2006Q2	0.85	0.83	0.53	0.26	0.16	3.37	9.58	0.19	88.91	8.47	0.06	9.71	0	0	0
2006Q3	0.85	0.83	0.51	0.26	0.16	3.36	9.81	0.20	92.96	8.46	0.07	9.74	0	0	0
2006Q4	0.85	0.83	0.50	0.27	0.17	3.58	9.33	0.25	98.09	8.50	0.08	9.76	0	0	0
2007Q1	0.85	0.83	0.49	0.27	0.18	4.04	8.42	0.25	107.23	8.52	0.08	9.78	0	0	0
2007Q2	0.86	0.83	0.48	0.28	0.19	4.08	8.40	0.28	112.97	8.52	0.08	9.79	0	0	0
2007Q3	0.86	0.84	0.47	0.28	0.20	4.12	8.38	0.34	121.42	8.59	0.07	9.80	0	0	0
2007Q4	0.87	0.84	0.46	0.30	0.22	4.63	7.83	0.32	132.06	8.62	0.07	9.83	0	0	0
2008Q1	0.87	0.84	0.45	0.30	0.22	4.85	8.32	0.22	141.08	8.65	0.07	9.86	0	1	0
2008Q2	0.87	0.84	0.44	0.30	0.24	5.29	8.81	0.20	149.36	8.66	0.06	9.86	0	1	0
2008Q3	0.87	0.84	0.43	0.31	0.25	5.97	9.45	0.13	153.92	8.69	0.06	9.86	0	1	0
2008Q4	0.87	0.84	0.42	0.30	0.25	8.03	10.23	0.06	147.53	8.69	0.04	9.86	0	1	0
2009Q1	0.87	0.84	0.39	0.30	0.25	7.82	9.65	0.05	130.77	8.70	-0.02	9.84	1	1	0
2009Q2	0.87	0.84	0.39	0.30	0.25	8.15	10.39	0.06	118.17	8.70	-0.03	9.82	1	1	0
2009Q3	0.87	0.84	0.39	0.31	0.26	7.95	10.48	0.08	112.62	8.69	-0.03	9.83	1	1	0
2009Q4	0.87	0.84	0.39	0.33	0.26	7.50	9.72	0.07	109.58	8.70	-0.06	9.80	1	1	0
2010Q1	0.87	0.83	0.38	0.35	0.26	6.57	9.33	0.07	107.18	8.71	-0.01	9.81	1	1	0
2010Q2	0.87	0.83	0.38	0.35	0.26	5.97	9.08	0.06	106.52	8.71	0.01	9.84	1	1	0
2010Q3	0.87	0.83	0.38	0.36	0.26	5.65	8.44	0.06	105.38	8.73	0.01	9.83	1	1	0
2010Q4	0.87	0.83	0.39	0.37	0.25	5.83	8.34	0.06	104.15	8.74	0.04	9.85	1	1	0
2011Q1	0.87	0.83	0.39	0.36	0.25	5.44	8.33	0.07	102.03	8.77	0.03	9.84	1	1	0
2011Q2	0.87	0.83	0.39	0.36	0.24	5.38	8.35	0.06	100.23	8.76	0.03	9.87	1	1	0
2011Q3	0.87	0.83	0.38	0.36	0.23	5.39	8.45	0.05	99.54	8.76	0.02	9.86	1	1	0
2011Q4	0.87	0.83	0.38	0.38	0.23	5.44	8.10	0.05	98.10	8.77	0.01	9.85	1	1	0
2012Q1	0.87	0.83	0.38	0.39	0.23	5.04	7.75	0.05	98.23	8.79	0.01	9.86	1	1	0
2012Q2	0.88	0.83	0.38	0.40	0.23	4.83	7.51	0.05	98.67	8.78	0.00	9.86	1	1	0
2012Q3	0.88	0.82	0.38	0.41	0.23	4.78	7.07	0.05	98.57	8.81	0.00	9.86	1	1	0
2012Q4	0.88	0.83	0.38	0.42	0.23	4.71	7.04	0.05	96.82	8.81	0.00	9.85	1	1	0
2013Q1	0.88	0.82	0.38	0.43	0.22	4.18	6.96	0.06	96.00	8.81	0.00	9.85	1	1	0
2013Q2	0.88	0.82	0.38	0.43	0.23	3.85	6.71	0.07	96.48	8.80	0.00	9.86	1	1	0
2013Q3	0.88	0.82	0.38	0.44	0.23	3.77	6.63	0.07	95.52	8.79	0.01	9.87	1	1	0
2013Q4	0.87	0.81	0.38	0.46	0.23	3.52	7.06	0.07	95.66	8.80	0.01	9.87	1	1	0
2014Q1	0.87	0.80	0.37	0.47	0.23	3.27	6.64	0.09	96.66	8.79	0.01	9.87	1	1	0
2014Q2	0.87	0.81	0.37	0.47	0.23	2.95	6.53	0.08	96.97	8.78	0.02	9.87	1	1	0
2014Q3	0.87	0.81	0.36	0.47	0.22	2.57	6.58	0.08	97.21	8.78	0.01	9.88	1	1	1
2014Q4	0.87	0.80	0.35	0.47	0.22	2.45	6.24	0.08	98.32	8.79	0.02	9.89	1	1	1
2015Q1	0.86	0.79	0.33	0.48	0.21	1.70	6.10	0.08	98.85	8.79	0.03	9.90	1	1	1
2015Q2	0.86	0.79	0.33	0.47	0.21	1.30	5.77	0.07	99.71	8.79	0.03	9.90	1	1	1
2015Q3	0.86	0.79	0.33	0.47	0.21	1.23	5.72	0.07	99.21	8.78	0.04	9.92	1	1	1
2015Q4	0.86	0.78	0.33	0.48	0.20	1.16	5.44	0.07	102.23	8.78	0.04	9.93	1	1	1
2016Q1	0.86	0.78	0.32	0.48	0.20	0.64	5.15	0.07	103.38	8.77	0.04	9.94	1	1	1
2016Q2	0.86	0.78	0.32	0.48	0.20	0.59	4.97	0.07	106.24	8.77	0.04	9.95	1	1	1
2016Q3	0.86	0.78	0.32	0.47	0.20	0.52	4.74	0.08	107.94	8.78	0.04	9.95	1	1	1
2016Q4	0.85	0.78	0.32	0.48	0.20	0.44	4.37	0.09	110.52	8.79	0.04	9.97	1	1	1
2017Q1	0.85	0.77	0.31	0.48	0.20	0.22	4.13	0.11	112.66	8.79	0.04	9.97	1	1	1
2017Q2	0.85	0.78	0.31	0.48	0.20	0.19	3.92	0.10	115.37	8.79	0.04	9.98	1	1	1
2017Q3	0.85	0.78	0.31	0.48	0.20	0.16	3.88	0.10	117.62	8.80	0.04	9.99	1	1	1
2017Q4	0.85	0.79	0.31	0.48	0.20	0.18	3.66	0.10	120.17	8.81	0.04	10.00	1	1	1

Figure 1

Dependent and explanatory variables graph set
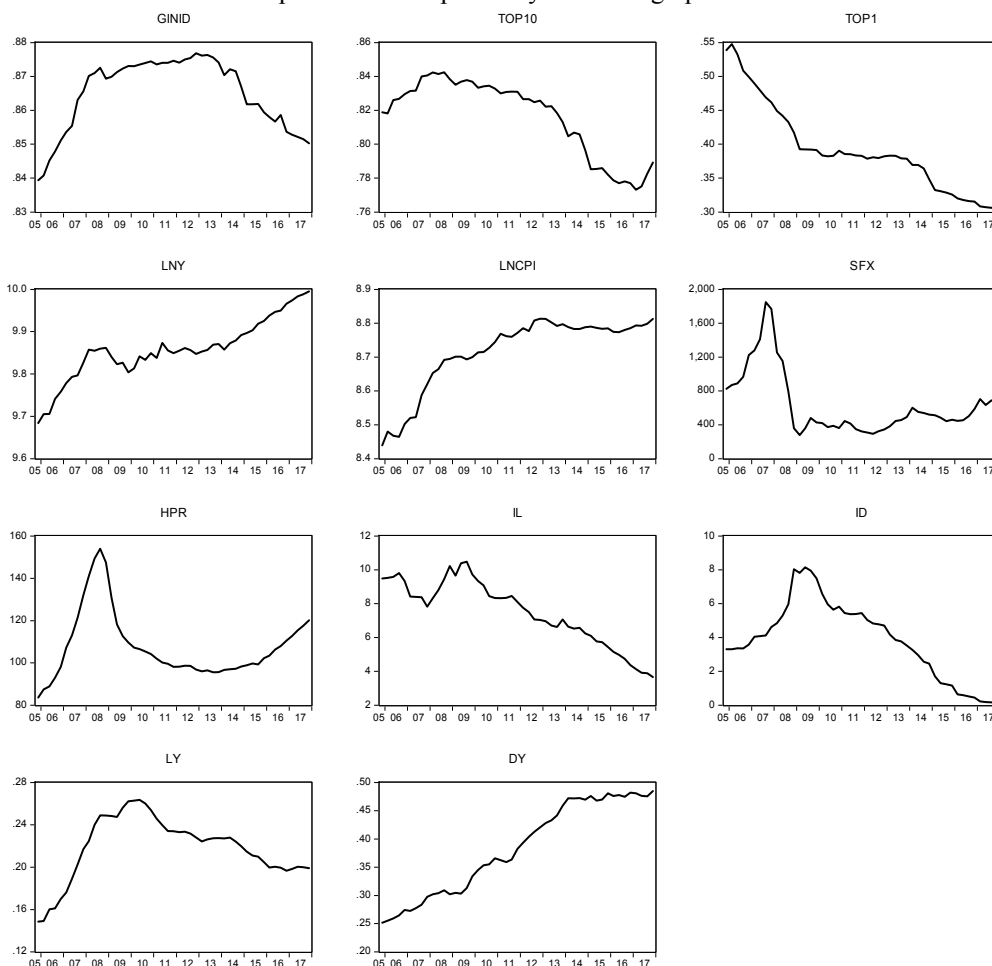
Source: NSI, Own calculations.

Donka Zhelyazkova[1]

ENERGY CONSUMPTION IN THE TRANSPORT IN BULGARIA IN THE CONTEMPORARY CONDITIONS

In the present paper, the author aims to theoretically highlight the transport in logistics and to focus on some options for optimal solutions and based on analysis of the dynamics in the development of the final energy consumption in the transportation sector of Bulgaria, to reveal the role of technologies as a means of improving energy efficiency in the country's transport. In order to achieve this goal, transport is theoretically defined in the context of the overall reproduction process, its role in the supply chain is highlighted, and in this relation, the system approach is reviewed as a way of optimizing transport costs. The different modes of transport are compared, as the comparative characteristic is one of the approaches that will allow to be taken transport solutions in line with the current requirements of economic efficiency and environmental friendliness.

The analytical part follows the dynamics in the development of the final energy consumption in the transport sector of Bulgaria for the period 2001-2017, differentiated by type of transport, in order to be able to highlight the specifics of the different transport alternatives with regard to the used energy sources. On the basis of the analyses made, conclusions are drawn that emphasize the established trends and the localized problems.

In the third part, the technological achievements in the field of the automotive industry are presented as the main sources for improving the energy efficiency in the transport of Bulgaria.

JEL: L62 ; L91 ; Q01 ; Q49

Introduction

Current issues in modern economies are closely linked to energy efficiency issues, given the increasing intensity of the different sectors and their dependence on energy sources. The reason for the necessity for research in this direction is the limited possibilities for securing the economic processes in the conditions of increasing economic dynamics. This requires finding alternatives to conventional resources in the form of multiple non-standard solutions.

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In this regard, arises the idea of tracking the development of these transport processes as an important logistic function, accounting for serious levels of energy consumption in the performance of its tasks in the context of the basic logistics principles known as the 7R rule or as a logistical mix – to deliver the exact product, in the right quantity and quality, in the right place, at the right time, to the exact customer, with the exact cost.

The aim of the present paper is to theoretically highlight the transport in logistics and to focus on some options for optimal solutions and based on analysis of the dynamics in the development of the final energy consumption in the transportation sector of Bulgaria, to reveal the role of technologies as a means of improving energy efficiency in the country's transport.

In order to achieve the stated goal, three main tasks are drawn, and namely:

1. Revealing the role of transport in logistics and opportunities for optimal solutions.

2. Analysis of the dynamics in the development of final energy consumption in the transport sector of Bulgaria.

3. Exploring technologies as a means to improve energy efficiency in Bulgaria's transport.

The methods to be used are: method of comparison and synthesis, dynamic statistical analysis, graphical method.

The period covered by the analysis of the development of the final energy consumption in the transport sector in Bulgaria is from 2001 to 2016/2017. The choice of the period is dictated by the changes in the new millennium which affect both the Bulgarian economy as a whole and the transport sector in particular, given the full Bulgarian membership in the European Union and the resulting prior and subsequent synchronization processes.

Tracking the evolution of final energy consumption, totally and differentiated by modes of transport, will reveal the extent of implementation of the currently set parameters. By final energy consumption should be understood the total energy consumption in transport, excluding fuel losses for marine bunkering (National Statistical Institute, 2019).

The main limitation of the empirical study is the lack of unified official statistical information published by the National Statistical Institute, which to be systematized for the entire period under review. This also predetermines the existence of certain differences in the length of the surveyed period by different modes of transport, which does not reduce the qualities of the paper.

The actuality of the chosen subject is a prerequisite for conducting research that is relevant both for the development of the theory and the practice.

1. The role of transport in logistics and opportunities for optimal solutions

Transport ensures the normal flow of the entire reproduction process by promoting the rhythmical movement of material flows from raw material sources through the manufacturing area to consumers, whether they are end users or industrial buyers, using

"means of transport and a number of other machinery and equipment, which are consumed in the production process... and fuels, lubricants and other materials are consumed" (Nikolov, 2013, p. III-114). It is precisely the role that transport performs throughout the supply chain and the costs it accumulates that place it at the centre of business logistics. Regardless of whether we will adopt the definition of S. Blagoeva for a supply chain such as "Three or more economic units (legal or natural persons) directly involved in the movement of internal or external flows of production, services, finances and/or source information to the user" (Blagoeva, S., Kehayova-Stoicheva, M., 2008, pp. 168-206) or that by M. Rakovska et al as a "system of organizations involved in the process of creating and realizing the products and services from their generation at the stage of extraction of the raw materials to their delivery to end users" (Rakovska, etc. , 2014, p. 21), we will highlight transport as a strategically significant function that implements the objectives of "material and related flows through all phases and stages of movement as a whole (system)" (Dimitrov, etc., 2010, p. 17). It is the system approach that implies "integrated management of incoming, internal and outgoing flows" (Rakovska, 2011, p. 17), which optimizes transport costs and leads to desired levels of customer satisfaction.

Achieving these goals in transport requires a comparison between different modes of transport, as the comparative characteristic is an approach that will allow for transport solutions to meet modern requirements for economic efficiency and environmental friendliness.

In this connection Hr. Nikolova notes that "only in rail transport is currently possible the massive use of electricity as a driving force, while in all other modes of transport, deficient liquid fuels are used" (Nikolova, 2010, p. 23). The author adds that rail transport "offers the lowest cost for transporting one tonne of cargo per 1 km compared to other types of land transport, with lower energy consumption, lower labour costs and higher environmental friendliness of transportation" (Nikolova, 2018, p. 10). This statement certainly focuses the interest on this transport option, as it very much meets the modern requirements and expectations of the organization of freight transport. On the one hand, large volume shipments at a favourable cost, that is, at low unit costs, correspond to the economic efficiency postures where the main goal is to achieve high results at relatively low-cost levels. On the other hand, the choice of rail transport accumulates some of the lowest energy costs in carrying out the transport activity, which should be highlighted as a strategic advantage over other options in the context of a shortage of energy resources.

Another important land-based opportunity for freight transport in compliance with environmental parameters provides pipeline transport, which is considered one of the most technologically advanced options in the sector. In addition to being highly mechanized, reliable, ensuring a continuous transport process, it is distinguished by high throughput and high labor productivity, it also has three very important advantages: it does not consume much energy, does not pollute the environment and is relatively silent and safe. Therefore, we can join to the statement of Al. Dimitrov, that transportation via oil pipelines and gas pipelines is much more economical and faster than other modes of transport (Dimitrov, 2013, p. 7).

Undoubtedly, these distinctive features in conducting transport via pipelines confirm the claim that the future of freight transport belongs precisely to this alternative, as humanity must abandon the "transport" of the engines and the fuel they need (Cosmos, 1975, p. 36).

Inland road transport also includes the vehicles which, in terms of environmental parameters, does not stand out as a possible competitive solution, given the specificity of the rolling stock it operates at this stage, but it is an optimal solution for relatively short distances, where it is economically unreasonable to use the other modes of transport. They have their advantages over long distances and then are recommended mainly water (sea and river) and air transport (Nikolova, 2010, pp. 27-29):

- Water transport because the cost of fuel per unit of transport is much lower than in rail, road and air transport.

- Air transport because the speed of traffic is many times higher than other modes of transport and the transport is done directly in the air space, which shortens the routes.

Knowing the specificities of the different modes of transport requires the research of optimal transport solutions to reduce energy costs and, consequently, reduce irrational transport through (Nerush, Yu, Sarkisov, 2016, p. 114):

- improving the geographical distribution of the transport network based on the construction of new railway lines, motorways, the use of new waterways;

- making the most of the capability of the routes on the shortest possible route;

- the most efficient distribution of freight traffic between modes of transport;

- maximum use of water transport for the carriage of bulk and road vehicles for short haul;

- continued development of mixed transport involving different modes of transport;

- improving transportation planning.

Rational transport solutions are also directly related to modal transport, such as the intermodal, where "most of the shipment is by rail, inland waterway or sea transport, and the start and end of the road where road transport is used, are the shortest possible" (Dybskaya, etc., 2008, p. 528). The author specifies the organization of transport, which, when traveling over significant distances, provides for the use of these modes of transport, which are characterized by the fact that they leave the smallest environmental footprint in the environment and have capacity of the rolling stock for the transport of mass cargo, which reduces the cost of energy resources per unit load. Logically, in overcoming relatively short distances connecting infrastructure points and destination of the cargo, is recommended the most flexible transport that is avoided over a long distance due to two main deficiencies: its operating costs are much higher than rail and water transport per tonne-kilometre and its carrying capacity is less than that of other modes of transport, which also determines higher capital inputs for delivery and repair divided into one tonne carrying capacity.

Optimization processes in transport are directly related to new technologies and, to a very large extent, intelligent transport systems (ITS), defined as applications that create prerequisites for the use of information and communication technologies in transport, the main innovation that these systems offer is the integration of existing technologies for the creation of new services (Nikolova, 2017, p. 79).

Their development is based on the 12 basic principles envisaged in Directive 2010/40/EU of the European Parliament and of the Council of 7 July 2010 on a framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport, which can be systematized in the following order (The European Parliament, 2010, p. 13):

1) *The principle of effectiveness*, which in practice is associated with reducing congestion, lowering emissions, improving energy efficiency, achieving higher levels of safety and security, including of the vulnerable road users.

2) *The principle of economic benefits*, which helps to achieve an optimal cost-to-end result ratio in terms of achieving the goals.

3) *The principle of proportionality* envisaged to achieve different levels of service quality and deployment, taking into account the specificities of local, national and European level.

4) *The principle of continuity of services* ensures ITS deployment without interruption.

5) *The operative compatibility principle (inter-operability)* ensure the availability of data sharing capacities and the sharing of information and knowledge that will enable the effective provision of ITS services.

6) *The principle of backwards compatibility* ensures the ability of ITS to work with the existing systems.

7) *The principle of respecting the existing characteristics of national infrastructures and networks* takes into account the differences inherent in the characteristics of transport networks.

8) *The principle of promoting equal access opportunities* provides for non-discrimination of vulnerable road users when accessing ITS applications and services.

9) *The principle of reaching maturity* requires that the deployment plans for the relevant systems demonstrate the stability of the innovative ITS, after an appropriate risk assessment.

10) *The principle of provision of qualitative determination of the time and location* is based on the use of satellite-based infrastructures or any technology providing equivalent levels of accuracy for ITS applications and services.

11) *The principle of facilitating intermodality* implies, after ITS deployment, improved coordination of different modes of transport.

12) *The principle of consistency* concerns the implementation of ITS deployment projects between the EU Member States.

Compliance with these principles in the development of ITS is mandatory in order to achieve higher levels of stable entry of the technology into transportation, the role of which is further enhanced by the single digital market, which guarantees the free movement of people, services and capital, and where individuals and businesses can seamlessly perform and engage in online activities in the conditions of fair competition and a high level of consumer and personal data protection regardless of their nationality or place of residence (European Commission, 2018).

The new market configurations place high expectations on technology and to a large extent on information and communication technologies as a means of improving energy efficiency in transport, and their potential for energy savings in the transport sector is estimated at 26% of their total primary energy consumption in 2020 (Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, 2008, p. 7).

This requires surveys to track the development of energy consumption in the transport sector.

2. Analysis of the dynamics in the development of final energy consumption in the transport sector of Bulgaria

The analysis of the energy consumption in the country as a whole, and in particular in the transport sector, is of strategic importance, given that "Bulgaria is a net importer and a poor of energy resources (except for coal)" (Center for the Study of Democracy, 2014, p. 1).

From the beginning of the 21st century until 2017 we see a serious decline in the final energy consumption in Bulgaria's rail transport, which in relative terms reaches 44,196%. The highest levels were reported in the first year of 71.5 thousands toe and the lowest in 2014 (25.7 thousands toe) (see Table 1).

The low energy consumption in 2014 can be related to stopping the reforms related to changes in the business model applied in the Bulgarian railways, which has an impact on the economic activity. Efforts focus on optimization measures regarding the irrational empty carriage and human resource engagement.

Traditionally, rail transport uses electric power as a driving force and, to a lesser extent, uses petroleum products. In this transport sector, natural gas and renewable fuels are not applicable. In a comparative plan, electricity occupies a priority position over petroleum products. The consumption of both energy sources is definitely reduced, but for oil products, the levels at which consumption is established are 13.5 thousands toe (2017), or 60.177% less than in 2001. (33.9 thousands toe). For electricity, it is noted that final consumption in 2017 is almost twice as high as that of petroleum products (see Figure 1).

Table 1

Final energy consumption and performance in the railway transport of Bulgaria for the period 2001-2017

| Years	Total (thousands toe)	Natural gas (thousands toe)	Petroleum products (thousands toe)	Renewable fuels and wastes (including non-renewable waste) (thousands toe)	Electrical energy (thousands toe)	Transport performance (mln. tkm)
2001	71.5	-	33.9	-	37.6	4904.2
2002	70.4	-	31.8	-	38.6	4627.4
2003	66.3	-	28.8	-	37.5	5273.8
2004	65.0	-	28.8	-	36.2	5211.6
2005	65.3	-	29.8	-	35.5	5163.3
2006	62.9	-	29.0	-	33.9	5396.2
2007	57.7	-	25.3	-	32.4	5241.4
2008	62.2	-	32.3	-	29.9	4693.3
2009	51.2	-	20.2	-	31.0	3144.5
2010	45.4	-	20.2	-	25.2	3063.5
2011	40.0	-	18.2	-	21.8	3291.2
2012	42.1	-	22.2	-	19.9	2907.6
2013	30.9	-	14.1	0.9	16.8	3246.0
2014	28.7	-	12.1	-	16.6	3439.2
2015	39.5	-	16.2	-	23.3	3649.8
2016	36.7	-	13.1	-	23.6	3433.7
2017	39.9	-	13.5	-	26.4	3931.0

Source: National Statistical Institute, 2019.

Figure 1

Final energy consumption in the railway transport of Bulgaria for the period 2001-2017
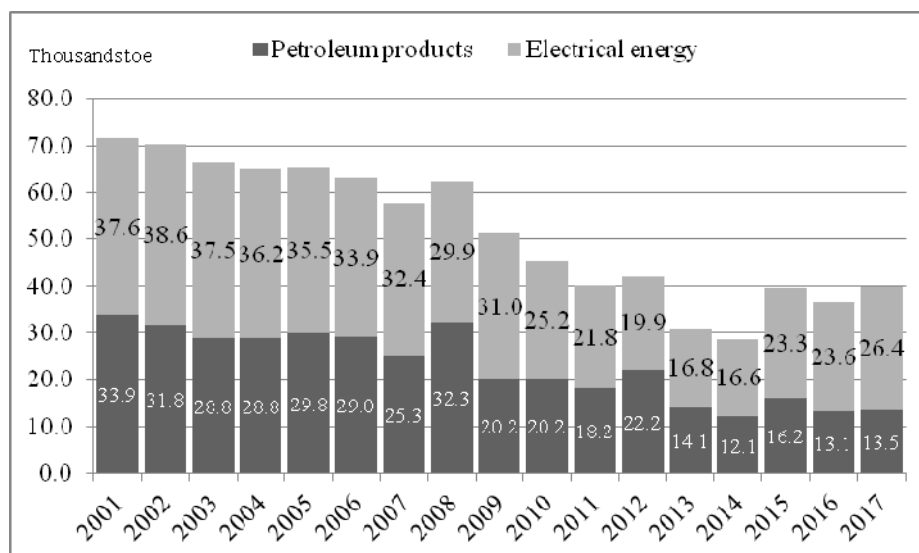
If we follow the dynamics of total final consumption in rail transport and the transport performance indicators in tkm, we will notice that these indicators move relatively unidirectionally (see Figure 2).

Figure 2

Dynamics in the development of final energy consumption and performance in the cargo rail transport of Bulgaria for the period 2001-2017
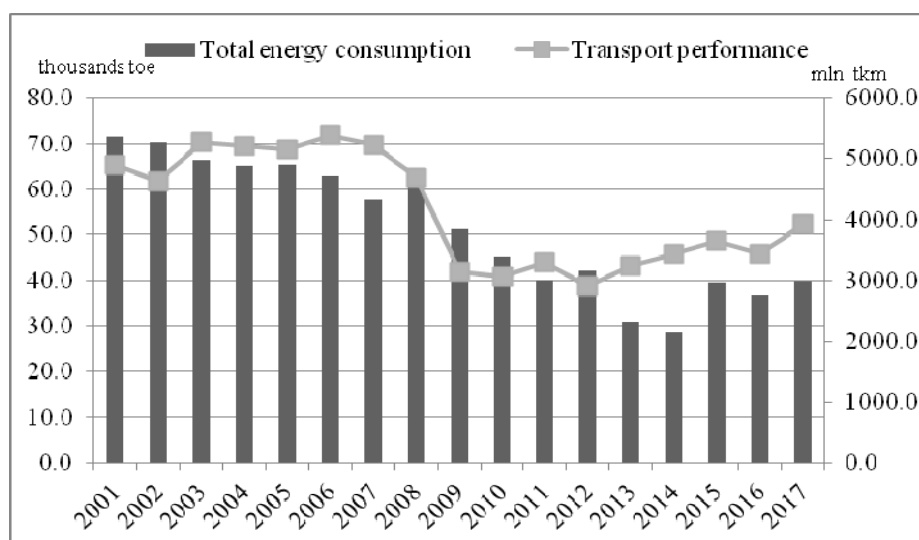
The causal link is embedded in the complexity of the "transport performance" indicator, which in the transport relates for a certain period of time, the volume of the goods carried and the average distance travelled. Logically, with changes in the volume of goods carried and the distance, the final energy consumption is intensified or reduced. In rail transport, we find that for the period 2001-2017 the curve of the transport performance follows that of the goods transported, and the average transport distance is 246 km. The real operational parameters of the Bulgarian railways do not correspond to the fundamental characteristics of this transport, designed to transport bulky and heavy goods over long distances at favourable costs.

The period, which is close to 18 years, is characterized by dynamics in the Bulgarian railway transport sector, which however does not increase the interest of the economic operators in it. In 2007, with the country's accession to the European Union, this market segment is being liberalized and the railway carriers currently are 14, and the most active players on the market are 5 ("BDZ Freight Transport" EOOD, 2019).

The downward trend in the sector, regarding the final energy consumption and performance, are indicators of the existence of problems that arise from:

- The pace of development in industrial production in Bulgaria.

- The cessation of Kremikovtzi's activity in 2009, resulting in the loss of 1/4 of the freight transport volume.

- Competition of the road transport.

- The limited volumes of business activity of enterprises, which prevent them from benefiting from the main advantage of rail transport associated with the lower cost per unit of freight.

Reasons can also be sought in infrastructure provision of railways and rolling stock, which require major modernization, as well as criticism of the railways in relation to the unused opportunities that are revealed on the basis of intermodal and multimodal transport. The participation of the railways in overcoming the main length of the routes in these transport solutions is expected to be active. The advantage of the Bulgarian railway carriers is the possibility of combining rail and sea transport via the ferryboat complex in Varna, connecting Europe and Asia through regular trips to Ilychovsk (Ukraine), Poti / Batumi (Georgia) and Caucasus (Russia).

The enormous competition in road transport by freight transport can also be ascertained on the basis of the volumes of final energy consumption (see Table 2).

Table 2

Final energy consumption and performance in the road transport of Bulgaria for the period 2001-2017

Years	Total (thousands toe)	Natural gas (thousands toe)	Petroleum products (thousands toe)	Renewable fuels and wastes (including non-renewable waste) (thousands toe)	Electrical energy (thousands toe)	Transport performance (mln. tkm)
2001	1723.6	-	1723.6	-	-	5423.0
2002	1826.6	-	1826.6	-	-	6603.0
2003	2066.3	-	2066.3	-	-	6840.0
2004	2198.6	5.8	2188.2	-	4.6	9015.0
2005	2418.4	19.1	2395.1	-	4.2	11843.0
2006	2538.6	25.3	2503.5	5.4	4.4	10793.0
2007	2404.4	37.0	2360.5	2.3	4.6	11795.0
2008	2548.4	35.0	2504.7	4.2	4.5	11027.0
2009	2539.5	49.1	2480.0	3.7	6.7	13871.0
2010	2490.5	65.9	2404.6	13.4	6.6	15641.0
2011	2492.1	60.7	2407.0	17.2	7.2	17943.0
2012	2654.4	64.8	2500.7	85.9	3.0	20994.1
2013	2392.1	70.9	2213.2	103.4	4.6	23530.3
2014	2708.2	78.6	2511.5	110.7	7.4	24454.7
2015	3009.7	77.8	2781.1	146.2	4.6	28741.5
2016	3065.0	74.1	2823.1	163.1	4.7	32069.7
2017	3115.4	75.0	2869.7	166.2	4.5	32187.1

*Source: National Statistical Institute, 2019.*

The growing interest in road transport over the years has been accompanied not only by criticism due to the footprints it leaves in the atmosphere but also by positive trends due to the increasing efficiency measured on the basis of work (effect) and total energy consumption (resource) (see Figure 3). There is a nearly six-fold increase in indicators measured in tonne-kilometres at 1,807 times or nearly double the increase in final energy consumption.

Figure 3

Dynamics in the development of final energy consumption and performance in the cargo road transport of Bulgaria for the period 2001-2017
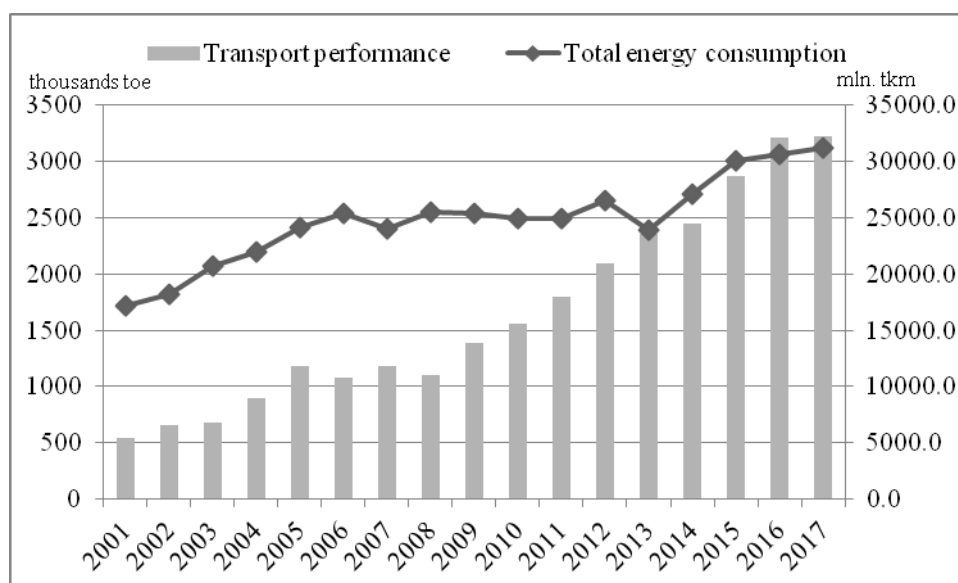
We should also reflect the fact that the levels of consumption of natural gas and of renewable fuels and waste are the most serious. Of all renewable energy sources reported by the National Statistical Institute: water, wind, solar (photovoltaic) energy, solar thermal, geothermal, renewable landfill waste, wood burning, wood waste and other vegetable waste, wood-coal, landfill biogas, biogas from sewage sludge, other types of biogas, liquid biofuels (biogasoline and biodiesel), only data on biofuels used in road transport from 2006 on is registered (see Figure 4).

Figure 4

Dynamics in the consumption of biofuels in road transport of Bulgaria for the period 2006 - 2017
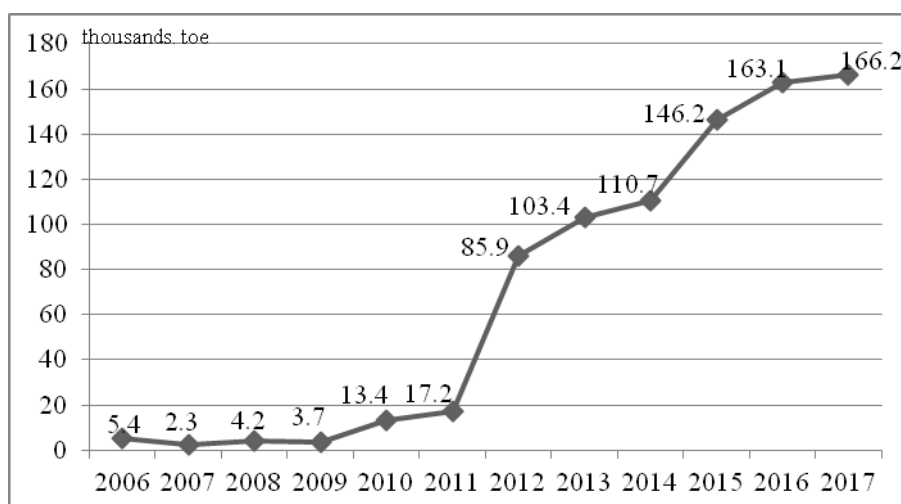
The established growth in biofuel consumption in Bulgaria's road transport is in line with the long-term objective, which requires an upward growth in energy efficiency compared to the growth of energy consumption and an increase in the share of electricity from renewable sources (Executive Environment Agency, 2015). However, we should not ignore the growing consumption of petroleum products. Only with electricity, fluctuations are unstable with declines and increases over the years ranging from 3.0 (2012) to 7.2 (2011) thousands toe. This is an indication of the still unstable penetration of electric-powered vehicles in the transport of goods. Indeed, particularly in this market segment, the future is associated with a re-routing of carriers from the use of internal combustion engines to electric trucks, which will reduce oil consumption in the sector.

Compared to the overall energy consumption in the transport sector, there is a tendency towards unilateral development, which shows that in practice on the Bulgarian transport market, the road transport is an indisputable leader and the other transport solutions are not its real competition (see Figure 5).

Therefore, levers should be sought to shift goods to transport solutions which either completely exclude the participation of vehicles, such as rail transport or to seek modal solutions involving the use of vehicles in the initial and final stages of the route. In this direction, priorities should focus on innovations in railways and in water transport, which have been neglected in recent years, despite the benefits they have in terms of efficacy and efficiency of transport. This is a solution with serious long-term consequences for the country's economic development and losing postions in the European transport area.

Figure 5

Final energy consumption in the transport sector and road transport of Bulgaria for the period 2001-2017
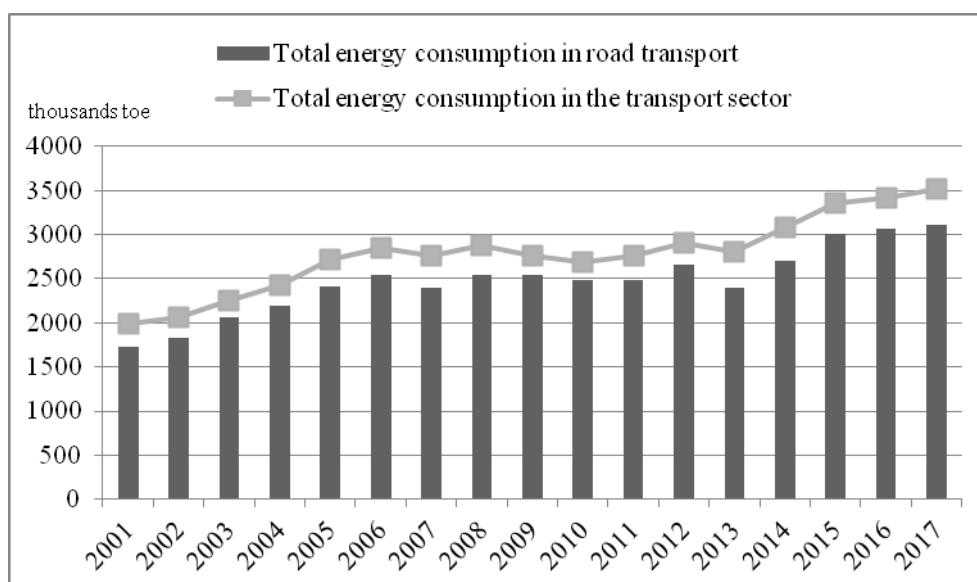
The third land alternative involves the rhythmic movement of cargo (gaseous, liquid, dust, slurries, sludge from waste materials, etc.) through pipelines, which reflects positively on the variable costs associated with transported volumes of material flows.

During the period 2001-2017, Bulgaria's pipeline transport increased the final energy consumption by 2,378 times, with a reported growth of 1,737 times the performance indicators (see Table 3, Figure 6).

Data shows some inefficiency based on energy consumption (resource) and performance (effect). The reasons for the relatively low dynamics in the development of this transport could be related to the discontinuation of the "South Stream" marine gas pipeline, an element of the "South Stream" gas transmission system, which would have finished with more than 2300 km in length. The Black Sea section of the pipeline had to consist of four parallel pipelines, about 930 km in length, from the Russian coast near Anapa, pass through the Turkish exclusive economic zone and reach the Bulgarian coast 11 km south of Varna.

Expansion of Bulgaria's national gas transport network from the Turkish to the Serbian border is currently expected, which means that the second pipeline of the "Turkish Stream" gas pipeline will be directed to the Bulgarian rather than the Greek border (Stanchev, 2018).

Table 3

Final energy consumption and performance in the pipeline transport of Bulgaria for the
period 2001-2017

Years	Total (thousands toe)	Natural gas (thousands toe)	Petroleum products (thousands toe)	Renewable fuels and wastes (including non-renewable waste) (thousands toe)	Electrical energy (thousands toe)	Transport performance (mln. tkm)
2001	145.3	138.0	1.9	-	5.4	3692.0
2002	144.3	139.0	1.9	-	3.4	3720.0
2003	91.5	87.5	1.9	-	2.1	3910.0
2004	138.5	134.5	1.9	-	2.1	3977.0
2005	220.3	216.0	1.0	-	3.3	4515.0
2006	229.6	227.8	-	-	1.8	4602.0
2007	263.8	262.1	-	-	1.7	5129.0
2008	260.2	258.1	-	-	2.1	4968.0
2009	142.0	139.6	-	-	2.4	3716.5
2010	143.3	140.8	-	-	2.5	3735.5
2011	206.3	203.7	-	-	2.6	4559.8
2012	206.1	203.5	-	-	2.6	4472.3
2013	368.4	181.7	-	-	2.5	4772.7
2014	340.5	167.9	-	-	2.3	4301.1
2015	298.0	146.7	-	-	2.3	4285.7
2016	291.5	143.6	-	-	2.1	4759.6
2017	345.5	171.0	-	-	1.8	6413.9

Source: National Statistical Institute, 2019.

Figure 6

Dynamics in the development of final energy consumption and performance in the pipeline
transport of Bulgaria for the period 2001-2017
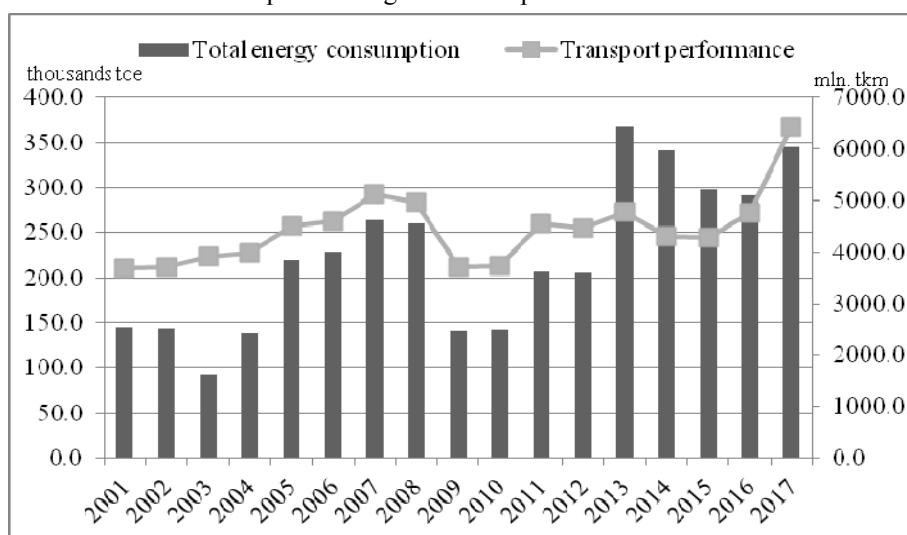
Following the shown in Figure 6 the dynamics in the development of final energy consumption and performance in the pipeline transport of Bulgaria for the period 2001-2017, we establish, that empirically measured both indicators follow an unstable trend. Energy consumption in the sector sets minimum levels in 2003, which is a consequence of the increase in excise duties this year in order to reduce fuel consumption. In 2001, 2002, 2004 and 2009, 2010, pipeline transport energy consumption was resistant to levels below 150 thousands toe.

Bulgaria's preparations for entry into the European Union requires harmonization of the legislative framework and of the existing mechanisms within the single European market, which implies the imposition of certain requirements by the EU on the legislation on excise duties, the most important of which is the mandatory nature of excise duties on certain goods which cannot be lower than the minimum levels laid down in the directives. Specifically, such energy products are motor fuels and heating fuels – gasoline, diesel, electricity, natural gas, coal and coke. Consequently, given the purpose of pipeline transport and the use of mainly natural gas in its operation (see Figure 7), we can link the outlined trends and the country's adaptation processes to the one created in 1993 Common European Market.

Figure 7

Final energy consumption of natural gas and electricity in the pipeline transport of Bulgaria for the period 2001-2017
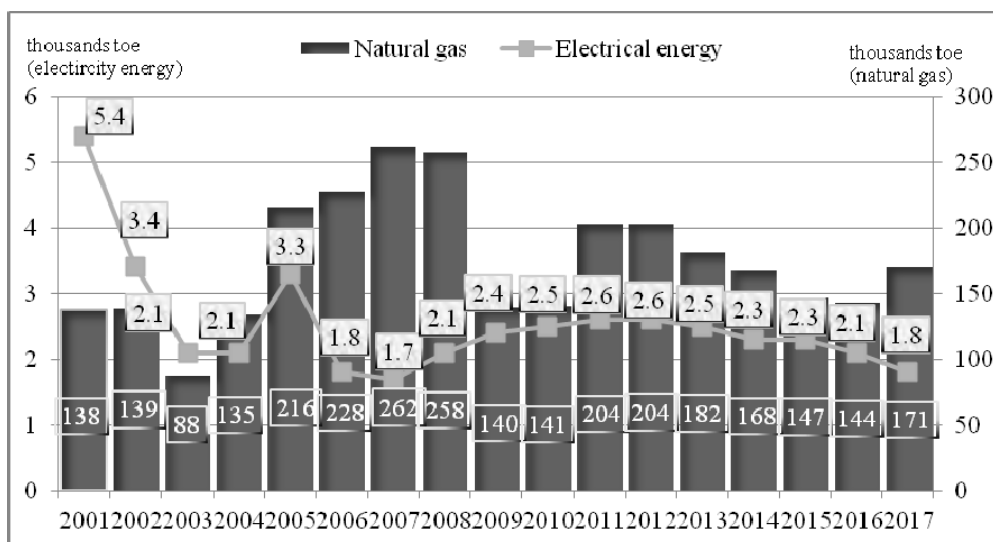
Pipeline transport spends two types of energy products – natural gas and electricity, which are one of the most environmentally friendly sources of energy. Priority is given to the consumption of natural gas, which is logical given that "In Bulgaria, the natural gas price for corporate customers is times lower than that of traditional energy sources – 0.227

BGN/kwh for electricity, BGN 0.242 per kwh for gas oil, 0.160 BGN / kwh for LPG and 0.070 BGN / kwh for natural gas" (Overgas, 2019).

On the other opposite is the structure of final energy consumption in Bulgaria's air transport, where the only energy source is petroleum products (see Table 4).

Table 4

Final energy consumption and performance in air transport of Bulgaria for the period 2012-2016

Years	Total (thousands toe)	Natural gas (thousands toe)	Petroleum products (thousands toe)	Renewable fuels and wastes (including non-renewable waste) (thousands toe)	Electrical energy (thousands toe)	Transport performance (mln. pkm)
2012	175	-	175	-	-	3528
2013	171	-	171	-	-	3738
2014	179	-	179	-	-	4023
2015	190	-	190	-	-	3644
2016	233	-	233	-	-	3869

Source: National Statistical Institute, 2019.

The comparatively narrow timeframe of reporting final energy consumption data does not create prerequisites for tracking sustained trends, but outlines the dynamics of the performance indicator in the passenger segment, which is significantly more active in air transport compared to the transportation of loads (see Figure 8).

Figure 8

Dynamics in the development of final energy consumption and performance in air passenger transport of Bulgaria for the period 2012-2016
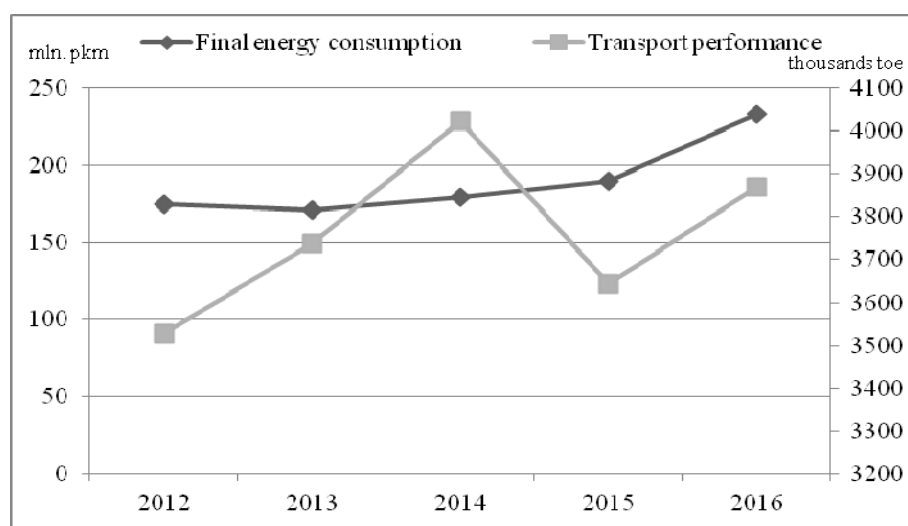
It is important to draw in parallel the final energy consumption and the performance curves in order to assess the levels of efficiency. On a comparative plan, the energy consumed shows that it maintains relatively constant levels from 2012 to 2015 and reaches the highest levels in 2016 while at the same time the work done increases in 2013 and 2014 compared to the beginning of the period, then the trend turns for one year, and in 2016 there is a certain upturn in air transport. An interesting divergence between the two indicators is found in 2014, when the performance is positioned at the highest levels and the final energy consumption at the lowest and precisely in this time range of the survey period the efficiency reaches maximum values. The reasons for these results can be related to the increase in absolute figures: passenger numbers and length of distance.

Domestic flights account for some fluctuations in final energy consumption over the period 2001-2017, with the highest figures being measured in 2001 and the lowest in 2014 (see Table 5).

Table 5

Final energy consumption and performance in domestic aviation in Bulgaria for the period 2001-2017

Years	Total (thousands toe)	Natural gas (thousands toe)	Petroleum products (thousands toe)	Renewable fuels and wastes (including non-renewable waste) (thousands toe)	Electrical energy (thousands toe)	Transport performance (mln. pkm)
2001	46,4	-	46,4	-	-	10,1
2002	27,4	-	27,4	-	-	10,4
2003	24,2	-	24,2	-	-	17,3
2004	19,6	-	19,6	-	-	17,3
2005	13,4	-	13,4	-	-	18,9
2006	24,7	-	24,7	-	-	22,0
2007	41,1	-	41,1	-	-	32,0
2008	13,4	-	13,4	-	-	56,0
2009	23,6	-	23,6	-	-	45,0
2010	15,4	-	15,4	-	-	44,0
2011	21,6	-	21,6	-	-	70,0
2012	11,3	-	11,3	-	-	70,0
2013	12,3	-	12,3	-	-	62,0
2014	9,3	-	9,3	-	-	57,0
2015	13,4	-	13,4	-	-	55,0
2016	19,5	-	19,5	-	-	-
2017	20,6	-	20,6	-	-	-

*Source: National Statistical Institute, 2019.*

Domestic flights have been developing more intensively since 2006, when "Fraport Twin Star Airport Management" won a 35-year concession at the airports in Varna and Burgas, with an option to extend it. The airport operator has invested nearly BGN 368 million at the two Black Sea airports, its priority being the opening of new destinations (Chipilski, 2018).

This is impossible within the country, as the main traffic is borne by 4 airports in Sofia, Burgas, Varna and Plovdiv, but on an international scale, this is a reality.

If we follow the movement of the indicators for final energy consumption and performance on the domestic lines of the country there is a sharp border between their directions after 2007 (see Figure 9).

Figure 9

Dynamics in the development of final energy consumption and performance in the domestic aviation of Bulgaria for the period 2001-2015
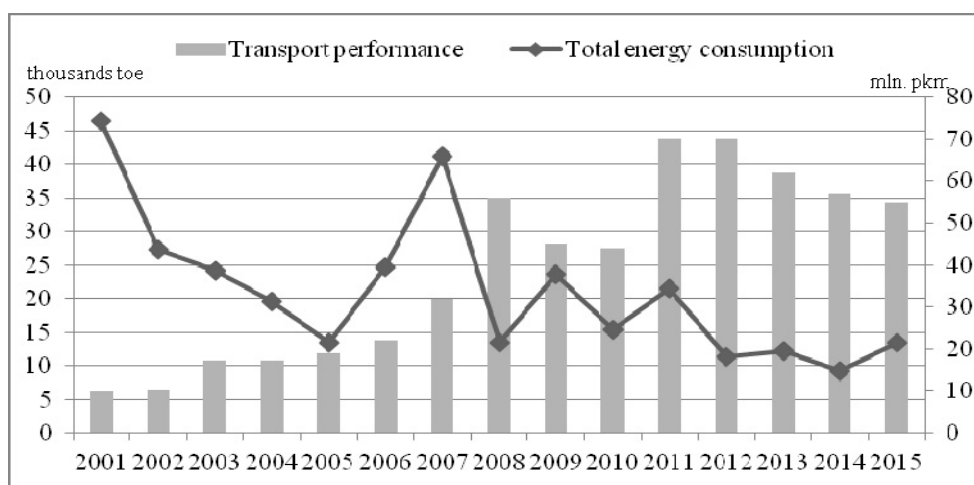
In 2008 the effective operation of the flights performed in the country is clearly expressed as the trends we witness are in changed directions compared to the period 2001-2007. With slight fluctuations, total energy consumption has been steadily decreasing over the years, while at the same time there is an unsteady increase in performance, but at steadily higher levels than in the early millennium. While the decline in the first indicator is a consequence of the entry of companies operating in the country's domestic airspace airplanes with lower fuel costs, the dynamics of the second indicator is due to the increased interest of passengers in domestic flights, as a result of which their number jumped from 26,000 in 2001 to 156,000 in 2015, with two spikes in 2011 (199 thousands) and 2012 (197 thousands).

To sum up, we can say that air transport is developing in a positive direction in terms of energy costs and reported results. These trends are expected to be maintained, as in this sector the concession of Sofia Airport will be particularly influential as the biggest air transport infrastructure in Bulgaria. The conditions of the concession presume the airport to be held for 35 years, with a total prime cost of around 3.9 billion euro. The concessionaire will be required to build a third terminal, which will have to be done within a period of 10 years from the date of contract. Also his investments will have to be at least 600 million euro (Stoycheva and Boneva, 2018).

Also interesting are the structural indicators of the final energy consumption in transport of Bulgaria, which reveal the lack of balance in the sector (see Table 6 and Figure 10).

Table 6

Structure of final energy consumption in Bulgarian transport for the period 2001-2017 (%)

Years	Total	Railway transport	Road transport	Pipeline transport	Domestic aviation
2001	100	3,599	86,753	7,313	2,335
2002	100	3,403	88,297	6,975	1,325
2003	100	2,949	91,905	4,070	1,076
2004	100	2,684	90,787	5,719	0,809
2005	100	2,403	88,997	8,107	0,493
2006	100	2,203	88,893	8,040	0,865
2007	100	2,085	86,896	9,534	1,485
2008	100	2,157	88,357	9,022	0,465
2009	100	1,858	92,134	5,152	0,856
2010	100	1,685	92,426	5,318	0,572
2011	100	1,449	90,293	7,475	0,783
2012	100	1,445	91,094	7,073	0,388
2013	100	1,102	85,319	13,140	0,439
2014	100	0,930	87,738	11,031	0,301
2015	100	1,175	89,558	8,867	0,399
2016	100	1,075	89,812	8,542	0,571
2017	100	1,133	88,470	9,811	0,585

Figure 10

Average relative share of the final energy consumption in the transport of Bulgaria for the period 2001-2017
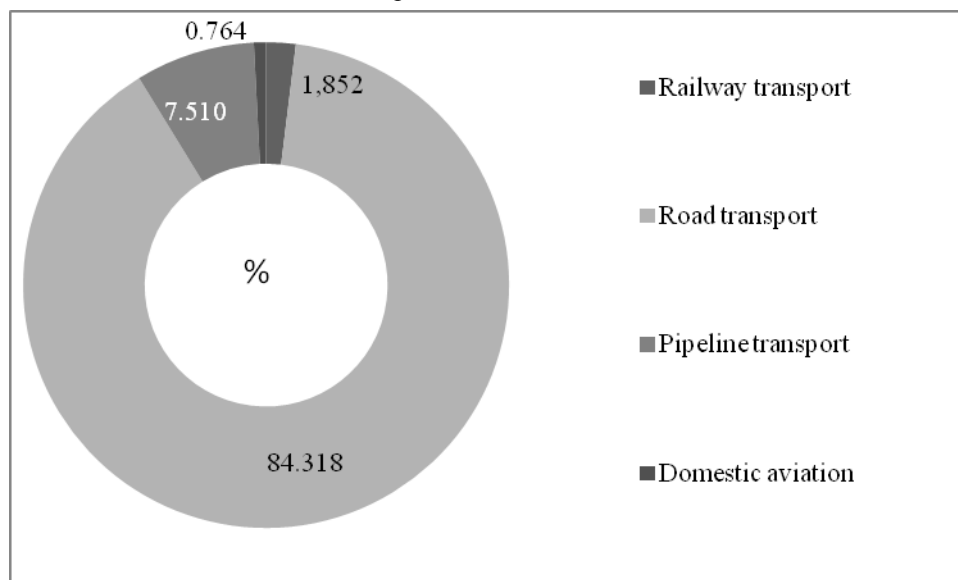
The unbalanced structure of final energy consumption is an indicator of the lack of effective and environmentally friendly solutions in the Bulgarian transport sector, given the high relative share of road transport. This focuses our attention on the fact that petroleum products are the main energy source used in the country's transport system. Conceptually this means that the pollution in the atmosphere is at significant levels. In a positive light, we are looking at the results reported by air transport (0.762% average final energy consumption over the whole period) that are adequate to the "green" development strategies, because in practice the overcoming of air distances means 100% consumption of petroleum products. At present, environmentally friendly technologies related to the use of natural gas or electricity are not being used in this transport segment.

In the 2001-2017 survey, two years were highlighted, configuring extreme energy consumption, which accounted for the highest percentages for pipeline transport and one of the lowest for road haulage. We highlight this finding, given the priority position to be taken by pipeline transport, based on the used energy sources – natural gas and electricity, i.e. two environmental solutions.

On this basis, we can make the conclusion that Bulgaria has conditions for the restructuring of the final energy consumption in transport on the basis of the higher activity of the ecological transport options, i.e. by increasing the operating levels of the railway and pipeline transport alternatives. They should be developed as a matter of priority in view of their underlying characteristics relating to energy consumption and the volumes of transported goods.

Another possibility for changes in the structure of final energy consumption is the transformation of the energy sources used in the most widely used transport option, such as road transport, by stimulating the development of technologies that consume natural gas and electricity.

An important player in the transport services market and respectively a significant fuel user are the municipal transport companies operating in all geographic regions of the country which requires the monitoring of the change in fuel consumption in municipal transport by economic planning regions in Bulgaria during the last reporting period 2017 compared to 2016 (see Table 7).

Following the dynamics of the change in fuel consumption by country, we find that the quantities of diesel fuel used have decreased most seriously. These processes respond to the European initiatives aimed at limiting diesel-powered vehicles. The reasons for taking these measures are the harmful emissions of nitrogen oxides (NOx), which are released into the air. The European Union applies a system of standards for normative emissions, differentiated according to the type of vehicles, which are updated periodically. Effective as now are: from 31 December 2013, the Euro VI standard for high power diesel engines and from 1 September 2014 Euro 6 standard for light commercial vehicles.

The objective of the Euro VI standard is to set the exhaust emission limit values for high-power diesel engines, i.e. heavy-duty vehicles, which typically include diesel-powered trucks and buses. These norms have the following empirical expression: carbon monoxide

(CO) to 1.5 g/ kwh, hydrocarbon (HC) to 0.13 g/kwh, nitrogen oxides (NOx) to 0.4 g/kwh, fine particulate matter) to 0.01 g / kwh and smoke to 8.10 umh^{-1}.

Table 7

Change in fuel consumption in municipal transport by economic planning regions in Bulgaria in 2017 compared to 2016 (liters)

City	Total diesel fuel	Impurity biodiesel (6%)	Total gasoline	Impurity bioethanol (7%)
North-East region				
Varna	-562292,0	-33737,1	-7675,0	-543,3
Dobrich	-90377,3	-5422,3	-31159,8	-2181,0
Targovishte	82150,8	4928,6	61395,4	-10002,4
Shumen	-164855,4	-10429,9	42991,5	-88,2
Total	-735373,9	-44660,7	65552,1	-12814,9
Southeastern region				
Burgas	-95339	-5711	1730	121
Sliven	-48611	-2917	4326	303
St. Zagora	-51497	-2090	-28466	-1992
Yambol	-42893	-2574	-11883	-764
Total	-238340	-13292	-34293	-2332
Northwestern region				
Vidin	5 116	307	1 431	102
Vratsa	-401 418	-24 085	-6 340	-443
Lovech	-128	-8	-2 675	-179
Montana	-70 268	-4 216	-22 731	-1 591
Pleven	42 169	2 529	38 890	2 725
Total	-424 528	-25 473	8 575	613
Southwestern region				
Blagoevgrad	-123 097	-7 256	-38 784	-2 716
Kyustendil	-34 104	-2 047	251 181	17 551
Pernik	-12 517	-801	8 058	559
Sofia	-10 550 794	-633 047	-70 693	-4 948
Total	-10 720 512	-643 151	149 762	10 446
South Central Region				
Kardzhali	10 859	651	9 809	687
Pazardzhik	-92 657	-5 560	2 690	188
Plovdiv	-75 047	-4 502	6 853	479
Smolyan	5 658	339	12 329	864
Haskovo	-65 437	-3 926	-42 733	-2 992
Total	-216 624	-12 998	-11 053	-774
North Central Region				
V. Tarnovo	65 339	321	-3 475	-243
Gabrovo	-913 238	-54 795	-15 321	-1 073
Razgrad	84 419	2 066	-948	-66
Ruse	-23 389	-1 404	-3 001	-210
Silistra	-13 589	-846	22 731	1 592
Total	-800 458	-54 658	-13	0

Source: Agency for Sustainable Energy Development, 2016 and 2017.

In only five Bulgarian cities there is an increase in the consumption of diesel fuel in municipal transport and these are Targovishte, Vidin, Kardzhali, Smolyan, Veliko Tarnovo and Razgrad. The most serious decline in diesel consumption is reported in Sofia related to the commissioning of new gas and electric buses, renewal of tramways and trolleybuses, which reduces the average age of the rolling stock and the amount of exhaust gases in the atmosphere.

Parallel to the reduction of the total diesel fuel used in the municipal transport of the country, the decrease of about 6% and the quantities of biodiesel is reported, as according to Art. 47 of the Renewable Energy Act, diesel fuel should contain 6% of biodiesel (Renewable Energy Act Effective, 2018). Similarly, within the meaning of the same law, gasoline fuel should contain 7% bioethanol. This is also the reason to observe unidirectional dynamics of movement of reported data - when reducing petrol consumption, it drops by approximately 7% and the amount of bioethanol mixtures. Only in the Northeast region this rule is not met and the growth in total petrol consumption is accompanied by negative amounts of bioethanol mixtures.

The main conclusions that can be systematized on the basis of an analysis of the dynamics in the development of the final energy consumption in the transport sector of Bulgaria are:

1. The final energy consumption in rail transport is reduced for the period 2001-2017, by changing the structure of fuels used in favour of electricity at the expense of petroleum products. In regard to the relation between the total energy consumption and the work performed by the railway transport, there is a downward trend on both indexes.

2. Road transport shows a progressively increasing positive trend in terms of efficiency measured on the basis of work (effect) and total energy consumption (resource), with reported growth in biofuel consumption over the period 2001-2017.

3. Pipeline transport has shown inefficiencies when comparing energy consumption and performance. The indicators, that take into account the priority consumption of natural gas are positive and, the ones using electricity to a lesser extent, which are one of the most environmentally friendly sources of energy.

4. In air transport, there is a certain instability in performance indicators over the period 2001-2017 and a relatively steady trend in total final energy consumption growth. Specifically for domestic flights, the market situation has changed since 2007, which to some extent we associate with the concessions of the airports in Varna and Burgas.

5. The structure of final energy consumption in Bulgaria's transport sector is unbalanced, as road transport consumption ranges between 85,319% (2013) and 92,426% (2010). This in practice means that in Bulgaria's transport system the most widespread applications have the petroleum products, as they are the major source of energy for the motor vehicles in the country.

6. At the municipal level, fuel consumption is evolving towards a reduction in diesel fuel, which corresponds to European initiatives aimed at limiting and completely decommissioning diesel-powered vehicles.

The analysis of the dynamics in the development of the final energy consumption in the transport sector of Bulgaria and the main conclusions objectively focus on the search for new opportunities for its restructuring, in order to increase the levels of energy efficiency and preservation of the natural resources.

3. Technologies as a means of improving energy consumption in Bulgaria's transport

Technology development is one of the factors that is expected to make the biggest contribution to protecting the living environment. In the practice new technologies that influence the energy consumption of rolling stock in transport are known. "As it does not matter for the grid, what kind of energy is used to generate electricity, in the same manner, the means of transport and the fuel distribution system must be open to a diverse mix of fuels. This is in the spirit of the emerging neo-industrial era, and there is already movement in that direction, though it is only at the beginning – pure electric vehicles, hybrid electric vehicles, methanol vehicles, etc." (Milina, 2013, p. 58), as well as the so-called technological "communication" road transport.

Definitions that are recognized by European and Bulgarian law are defined according to Art. 3 of Regulation (EC) № 168/2013[2] and they are:

"Hybrid vehicle" means a motor vehicle which is equipped with at least two different energy converters and two different energy storage systems (in-vehicle) for driving.

"Hybrid electric vehicle" means a vehicle which, for the purpose of mechanical propulsion, draws energy from the following two energy storage/power sources in the vehicle:

(a) fuel for consumption;

(b) a rechargeable battery, a condenser, a flywheel/generator or other device for storing electricity or power.

This definition also includes vehicles that draw energy from fuel for consumption only for the purpose of recharging an electrical energy / power storage device.

Hybrid cars are a new and at the same time already proven opportunity to reduce fuel consumption and emissions of harmful substances in the atmosphere (Selifonov, etc., 2007, p. 31). The hybrid vehicle engine delivers significant fuel savings, reduced environmental emissions, reduced overall engine running time, especially in areas where urban driving is stopped, which has a positive effect on the performance of such vehicles compared to conventional ones.

Under the meaning of the law, "All-electric vehicle" means a vehicle driven by:

(a) a system of one or more electrical energy storage devices, one or more electrical power control units and one or more electrical machines for converting stored electrical energy into mechanical energy to be transmitted to the vehicle drive wheels;

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[2] With Ordinance № 117 for the type approval of new L category vehicles, March 2018, it is ensured that Regulation (EU) № 168/2013 of the European Parliament and of the Council of 15 January 2013.

(b) an auxiliary electric drive mounted on a vehicle powered by pedals;

For the purposes of Regulation (EU) № 168/2013, the following categories and subcategories shall apply:

(a) a category L1e vehicle (light-duty two-wheeled motor vehicle);

(b) a category L2e vehicle (three-wheel moped);

(c) a category L3e vehicle (two-wheel motorcycle);

(d) a category L4e vehicle (two-wheel motorcycle with sidecar)

(e) a category L5e vehicle (three-wheel motor vehicle);

(f) a category L6e vehicle (light four-wheeled);

(f) a category L7e vehicle (heavy four-wheeled).

In creating energy-efficient vehicles, much attention is paid to reducing energy consumption to overcome movement resistance, focusing primarily on the strength of rolling resistance, the inertia of the vehicle during acceleration and the strength of aerodynamic drag. Given the operating conditions of an electric vehicle in modern high traffic density cities and frequent "acceleration-delay" cycles, the presence of a large battery is ineffective in terms of these losses. A positive feature of an electric vehicle is the absence of harmful emissions in its use, which defines electric vehicles as an environmentally friendly mode of transport suitable for use as personal, commercial or public transport (Bakhmutov, etc., 2015, pp. 4-5).

Also interesting are the technologies forming the basis of the hydrogen economy, due to several advantages of hydrogen over other fuels, which can be reduced to (Petrov, 2019, pp. 465-466):

• the high availability of hydrogen in the universe (according to the astrophysicists, 75% of the mass and 90% of the number of atoms consists of hydrogen);

• the conversion of hydrogen into electricity is done quickly and efficiently (fuel cell efficiency reaches 60-70% or more) (Tawfik, H., 2003);

• products using hydrogen and hydrogen itself at the exhaust do not harm the environment;

• high lightweight and diffusion lead to a relatively low explosion hazard (hydrogen is ignited at concentrations much lower than in an explosion). At the same time, the strength of a hydrogen explosion is 22 times less than that of petrol vapour, and the hydrogen output of the hydrogen flame is 7% lower than that of gasoline;

• there are already pipelines to transport hydrogen over long distances. In addition, the theoretical energy losses during the transport of hydrogen are estimated to be half of those in electricity transmission to power lines. Also, pipelines can be cheaper, easier to deploy, and safer than ground high-voltage power lines (Lovins, 2003, pp. 8-9).

At present, the legislative framework does not cover the technological "communication" vehicle, also called a non-pilot vehicle or automated controlled vehicle, which is self-driven and, after an initial moment, management decisions are taken without human intervention. Therefore, the main distinctive feature of conventional vehicles is related to the exploitation of artificial intelligence that partially or completely replaces the human factor in management with its rational and emotional solutions.

The development of self-driving technology in freight transport can lead to radical improvements in fuel efficiency, emission reduction and pollution reduction. This is possible when heavy truck convoys move, which accelerate, stop and run synchronously with each other and according to other vehicles.

With a view to improving energy consumption in transport, the state should take measures to motivate consumers to target so-called "green" transport solutions. To this end, the purchase and use of green cars and electric motorcycles, mopeds and electric vehicles of categories L1e-L7e should be encouraged as they are related to electric and hybrid transport when driven by an electric or hybrid engine, by exempting owners from paying an annual local tax, taking into account their characteristics and ecological parameters.

One of the incentives to promote sales of environmentally friendly cars can be financial levers with which to exempt partially or completely from tolls, the owners of such cars, who are correct payers to the state and municipal budgets, have no violations within the meaning of the Road Act, and in the case of company vehicles, apart from the driver's integrity, account should also be taken of the profile of the economic operator who owns the vehicle.

This is fully possible after the introduction of an electronic toll collection system, as it will provide data, which is to be a platform for deploying applications based on intelligent transport systems, ranging from data collection for traffic management to providing mobile services to road users. In Bulgaria, the toll system is of mixed type, which means that passenger traffic uses electronic vignettes, and cargo traffic is charged on a real-distance basis, which can be done in two ways: on-board units, which will not be mandatory and by purchasing, online or by special machines, a routing ticket that will take into account the distance travelled and the selected roads – highway, first-class, second-class, third-class.

Local authorities should also join environmental policy, besides tax incentives, they can provide some privileges to environmental vehicle owners such as free parking spaces in central city areas, reserved parking spaces in other urban areas, increased public transport fleets driven by gas and electricity in the populated areas.

Mobile applications should also be developed to encourage people to re-orientate from passenger cars to more intensive use of public transport services. These applications need to monitor the frequency of public transport and the distance travelled by car. On this basis, assessment scales can be configured to take account of these indicators, compare them with the results of the other participants, with a view to drawing up a weekly, monthly and yearly ranking, and on this basis to provide preferences for payment of dues to the municipality for the citizens with the highest ecological parameters during the year. The idea of the application should be encouraging on the basis of mutual competition between

citizens, with the idea in the long term to build awareness of personal responsibility to environmental problems and the involvement of everyone in their solution.

For the purpose, a number of technologies must be put in place, as this will require, for example, the purchase of an electronic ticket, which will take into account the use of public transport. Such a work platform algorithm has been developed in Varna and includes the following steps ("Urban Transport" EAD Varna, 2019):

Each passenger must first download the TICKEY mobile app from the respective e-shop. For users with Android operating system the application is from Google Play, and for iOS operating system users, it's from the App Store. The app is free for users.

As a second step, the passenger must have registered in the system with his name, email, password, and bank card. Debit and credit cards, as well as PayPal, are accepted.

TICKEY mobile application for electronic ticket purchase works only when the passenger is in a vehicle equipped with proximity sensors. Every vehicle must therefore be equipped with such sensors. When the passenger boards the vehicle and the application starts, a connection is established between the proximity sensor and the mobile application. At the passenger's leaving the vehicle the connection is respectively interrupted.

With only one click on the screen of your mobile device on the "BUY" sign, the passenger confirms the purchase transaction and pays the price displayed on the screen, then receives an "Electronic Ticket" with all the requisites. The ticket is validated with a correct and valid date and time. The payment is made by transferring the specified amount to the bank account of "Tickey Mobile Solutions" Ltd. from the bank card entered upon registration.

All actions described above are recorded on a server designed specifically for the purpose of the project in Varna and can be controlled by authorized employees of "City Transport" EAD Varna.

In the worldwide practice, the principle of buying an electronic ticket does not imply a need to place the buyer in the vehicle, as this can also be done through a remote platform, and in order to stimulate the purchase of such a travel document by electronic means rather than conventional ones, discounts are also envisaged.

Therefore, the technological progress reveals the potential for finding environmental solutions that engage both state and local government resources, as well as economic operators and Bulgarian citizens.

Conclusion

Satisfying unrestricted needs with limited resources is a major economic problem that has reached high levels of relevance in recent years. The reasons for this are mainly the consumer's attitudes of the society, which are expressed in the ever-wider and varied needs of the modern individual. In turn, they also give rise to the pursuit of business agents, operating in a competitive environment, to offer a diversified product portfolio in the widest possible market.

It is these supply and demand characteristics that drive the market mechanism at faster speeds and directly or indirectly find a tangent to the transport sector. In this respect, the role of transport operators, which seek to respond adequately to their expectations, is also strengthened. The high intensity of demand for transport services reflects directly on the final energy consumption and forms a new rank of needs, satisfied in a fundamentally new way, based on the environmental and equity considerations in the exploitation of transport alternatives.

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THE INTELLECTUAL-INFORMATIONAL GOOD: VALUE AND MARKET PRICE

In this article, specifics of the intellectual-informational product are reviewed based on a system and structural method: its binary structure and specifics of the appropriation process are determined. The advantages of free licenses for authors of the intellectual products (employees) that appear in the possibility of receiving additional income from services of the intellectual-informational goods are determined. Theoretical and methodical basics of value and price formation of the intellectual-informational good are justified. The triple value-creating substance of the intellectual-informational good that represents abstract humanization, specific humanization and utility, that the consumer receives, is determined. A cost and result nature and direct connection of elements of the value-creating substance of the intellectual-informational good are determined. The forms of value of the intellectual-informational good are analyzed. A term "functional of complex valuation of the intellectual-informational good" that consists of cost function of essential efforts of the author of the intellectual product, growth function of essential efforts of the author of the intellectual product, cost function of essential efforts of producer of the storage medium and utility function of the intellectual-informational good for the customer is proposed. Recommendations for improvement of current methods of valuation of the intellectual-informational good are given.
JEL: B41; D11; D23; D46; J24; O34

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Introduction

Postindustrial trends of society development, scientific development, computer and telecommunications technologies, intense use of information and knowledge in production, determine the immediacy of more deep research of regularity of the intellectual-informational good market functioning.

An indisputable synthesis of theories of labor value, marginal utility, marginal productivity of factors, of costs of production, demand and supply is a necessary condition of development of the common theory of value that is capable to explain the formation of value of the intellectual-informational good. Just at the end of the XIX – the beginning of the XX century an idea of synthesis of theories of labor value and marginal utility were developing by M. Tugan-Baranovsky, V. Dmitriev, E. Slutsky, V. Voitinsky. It should be noted that in modern conditions T. Artemova, V. Afanasiev, A. Busgalin, A. Gritsenko, K. Valtuh and A. Kolganov work successfully in the mentioned direction.

The problematic of application of the theory of labor value for the valuation of the intellectual-informational good has found a reflection in studies of A. Anchishkin, M. Vodomerov, Y. Denisov, A. Diomin, R. Ziablyuk; use of the marginal utility theory with the same purpose is common for studies of such international scientists as H. Verian, G. Kazakevitch, L. Torlina, K. Shapiro. O. Antipina, V. Basilevitch, E. Bliokov, G. Getman, M. Kuznetsova, L. Melnik, R. Nizhegorodtsev, I. Rizhenkova, T. Stavtseva, A. Chuhno successfully study points of price formation of the intellectual-informational good.

Studies of foreign scientists: G. Akerlof, K. Arrow, F. Machlup, M. Porat, M. Spence, G. Stigler, J. Stiglitz and others are devoted to the current matters of production and distribution of information and knowledge, analysis of the factors influencing the price of information in different conditions.

Despite undisputable achievements of the common theory of value, lack of research of essential grounds and mechanisms of formation of value and price of the intellectual-informational good should be noted. Due to this, a necessity to rethink of definitive foundations of the formation of value of the intellectual-informational good escalates.

The goal of the article is a definition of theoretical and methodical basics of value and price formation of the intellectual-informational good. Realization of the purpose is carried out by solving the following main tasks:

- definition of the structure of the intellectual-informational good;

- definition of value essence of the intellectual-informational good;

- development of theoretical and methodical basics of value and price formation of the intellectual-informational good;

- detection of specificity of value formation of the intellectual-informational good;

- development of recommendations for improvement current methodological approaches of the intellectual-informational good valuation.

For completing tasks in research process were used such general scientific and special methods as analysis and synthesis, induction and deduction, scientific abstraction – for definition of the intellectual-informational good essence of value; systemic and structural method – for definition of the intellectual-informational good elements of value and the nature of interconnections between them, determination of specificity of their formation; institutional approach – for analysis of property rights concerning the intellectual-informational good etc.

Binary Structure of the Intellectual-Informational Product and Its Features

As an economic category, the intellectual-informational product (IIP) is a product of the intellectual activity, which is fixed on the storage medium. The intellectual-informational product destined for market exchange is the intellectual-informational good (IIG). Intellectual in content and informational in the form the intellectual-informational product represents the unity of the product of intellectual activity and the storage medium.

The intellectual-informational product is, as a rule, non-material, and therefore needs a display on one or another storage medium. If the first one is a result of primary productive activity, so the last one – primary reproductive. The productive activity (incl. intellectual) is defined by the direct humanization and the indirect objectification. The reproductive activity unlike the productive, is not innovative on the first place, and allows a repeat of already checked (processed) method to achieve a known result. It is defined by crystallization of the process of achievement of goals or by crystallization of the process of goal setting and includes direct objectification and indirect humanization.

If the main result of reproductive activity is the storage medium of the IIP, than in regards to the intellectual activity it is additional (supportive). The storage medium of the IIP is a real object where the IIP is fixed and stored; it can be hard, electronic, light-sensitive etc. By hard storage medium, one understands hard copy (paper medium) of the IIP in bookish form, in forms of pamphlets, magazines etc. The electronic mediums are magnetic and optical, magnetic and optical discs, portable data storage, magnetic tape (for example video and audio tapes) etc. Light sensitive ones are photo and video films, microforms etc. The main features of storage mediums of the IIP are homogeneity, as they are a result of mass production, exceptionality and competitiveness in consumption.

The ground of existence of the IIP as a product is a specifics of its appropriation. Whereas by its nonmaterial extract it has features of a public good, than it can be considered (determined) as an object of individual and social appropriation. Whereas the storage medium of the IIP can be an object of private property, than the real opportunity of appropriation of the intellectual-informational good (IIG) has only the one subject (business or individual). If the IIP on a certain storage medium appears on the market with a sale purpose, it obtains a commodity form – transforms into the IIG. It is inherent to it as to the IIP binary type (nature) of appropriation. That causes that on the surface of phenomena the object of purchase and sale becomes not the IIP itself, but the IIP on a storage medium, property rights to it. Falsification of the IIG is fulfilling. The property rights are determined and limited by Law, as at the same time the IIP (personal non-property right) cannot be

expropriated form its author. So on the surface of phenomena the IIG property represents human relationships that erase in the case of appropriation or expropriation property rights on it.

The splitting of property relations has led to the creation of a license market – a secondary market to the IIG market. Whereas the license defines a content of rights to the good, the IIG itself is not an object of buying and selling on a license agreements market. Let's also note a possibility of combined mode, when physical copy also becomes a good, that not rarely leads to the development of the pirate goods market.

The existence of free license that allows a consumer to partially combine rights to the good and to its copies is also a distinctive feature of the property on the IIG. The free license for the IIG allows all subjects, who joined it, to copy, to study, to modify and to use this good in any purposes (Opensource.org). The examples of free licenses for the IIG, in particular software, are BSD License, Mozilla Public License, General Public License (GNU), GNU Lesser General Public License, Apache License, MIT License.

The free license for the IIG allows subjects who joined a certain agreement to gain income from the use of this good. This license type doesn't provide license royalty to the owner. But, the last one can sell commercial licenses for this good and, therefore, gain income from it. This practice is possible on condition that the owner of the free license for the IIG use it for development the own good with a purpose of selling commercial licenses. Therefore the owner of the IIG copy on free license conditions can gain income from the sale of the IIG duplicates, commercial activity (using the IIG) and service supply of this good.

The IIG owner may use it in any purposes, give permission to other parties to its use or prohibit other parties to use this good. Therefore, the realization of use and of gaining income for the owners of the IIG copies will be varied according to the license type (table 1).

Table 1

Specifics of use and of gaining income for copies owners of the intellectual-informational good according to the license type

Subject	Commercial license	Free license
The owner of the IIG copy (author of IIP or consumer)	only has opportunity of non-commercial use of IIG copy, which does not allow to gain an income from a copy of IIG	has the opportunity of commercial and non-commercial use of IIG copy (with opportunity to gain an income from a copy of IIG)

Source: developed by the author.

Therefore, the free license for the IIG permits the author-employee of the IIG:

1. To make future developments based on this IIG, such as modification and improvement of the last one.

2. To self-engage, to self-improve and to increase own entity powers.

3. To gain an income of services from this intellectual-informational good.

The author – employee of the IIG can gain additional income that he couldn't gain on conditions of commercial license, such as, the income from services of the IIG.

The Use Value and Exchange Value of the Intellectual-Informational Good

Despite that in fact expropriation and appropriation of the property rights to the IIG are taking place on the market, the IIG has use and exchange value. The use value of the IIG lays in its capability to satisfy a certain need of consumer. As it is known, all human needs can be divided in two big groups – primary needs (physiological) and secondary needs (social and spiritual). The use value of the IIG satisfies secondary (non-material) needs, as intellectual part of the product is dominant. But it becomes possible only with the availability of the document – material that fixes information on a material storage out of the author's memory. Herewith the utility of the information fixed on the storage medium is determined directly by a document – material capacity and by the user ability to understand a source and to use it for the satisfaction of his own needs (Podprugin, 2004).

If the determination of a use value of the IIG doesn't cause any discussion between scientists, this cannot be said about its value, that lays in a ground of exchange proportions. In our opinion, the main reason of the argumentative nature of the value of the IIG is a review of the last one through the prism of the certain theories of value that lead to one-sided presentation of the object, and also, to fictivization of the IIG. A cost of any product of labor is determined, from one side, as common costs for its production, from the other – as a utility that this product provides to society (Engels, 1975). To an expense side of the value relate main principles of the theory of labor value, theory of marginal productivity of factors and theory of costs of production. Principles of the marginal utility theory are showing the problems of customer behavior and his relation to the utility of goods.

In our opinion, value formation of the IIG fulfills under the influence of two components: the value of the IIG and the value of its storage medium. According to the theory of labor value a value dimension of the IIG and its storage medium should be determined by the costs of the socially necessary labor. But as on its nature, the production of the IIG has individual (single-piece) character (parallel developments are not being taken into consideration), in this conditions a concept of "middle" socially necessary labor costs per unit of output is not suitable (Anchishkin, 1987, p. 83). In its turn, a reproductive activity of the storage medium production is a necessary part of a process of materialization of the IIG. Therefore, the individual costs of a separate producer become socially necessary. The last one determines the imperfect nature of competition on the IIG market and the price of production stops being the ground of their market price.

The valuations of the economic subjects concerning utility and rarity of the IIP and its storage medium is a substance of value according to the marginal utility theory. The marginal utility of the IIG coincide with its total utility and represent utility increase for the customer from its consumption. The concept «marginal utility» of the IIP has a specificity

that appears in its singularity. It is connected to the fact that for the customer who has already had this product, the same other products lose their value (utility). The utility-based approach allows to take into consideration the results of informational-intellectual activity in the form of customer valuation. In our opinion, the important meaning for the IIP has a concept of marginal benefit from its consumption. The last one represents an additional benefit that one gain from use of this IIP. It is connected to the fact that the customer from one and the same IIP can gain benefit more than once. Unlike long term goods, the use of the IIG, as a rule, is characterized by the growth of marginal benefit with an increase of the number of customers.

In conditions when information becomes the main production factor, under its influence it is possible to set another proportion between output growth and certain resource at constant values of the number of other resources. But in this case the law of decreasing productivity acts even on the other quantitative level. For the IIG a high economy of the scale takes place: after the first unit of good was created, there are almost no limits for the quantity of copies that can be produced (volumetric capacity of a market and copying costs act as a limit).

According to the theory of costs of production, the substance of value of the IIP and its storage medium are the production costs. Under the last ones understand the fixed costs – FC, variable costs – VC, average costs – AC and marginal costs – MC. Marginal costs of the storage medium production are relatively not big in comparison to the value of the fixed costs, as, improvement of technology of its copying has caused a quick decrease of production costs of the new copies. Production costs are the value dimension and the base of the storage medium price, however at the low part of the price range. There is an assumption in the microeconomic theory about the same cost functions of competing firms. It means that all the firms – producers in the same branch to maximize profit will use the same resource volumes for the production of a chosen quantity of products. But this assumption cannot be used for the branches of scientific products, that are characterized by monopolistic competition or monopoly. As the market structure of the monopolistic competition characterize, as a rule, by the production of heterogeneous products that have advantages based on the differences of a set of qualitative characteristic, using this concept it is possible to determine a price function as a function of a qualitative characteristic of the product (Kazakevich & Torlina, 2004). If to agree with this, the right one will be the conclusion that the different quality of products is determined by the different functions of costs. It is possible to assume that more unique and useful for the customer product features determine higher costs for their production. The price, in condition of the market demand, will also depend on the production costs of such product. As for the monopoly, the change of qualitative characteristic for a producer-monopolist means "competing with himself" (Kazakevich & Torlina, 2004, p. 51). So it is about the production of a new, improved product version, for which one consumer will pay a higher price.

The analysis of value of the IIP based on marginal costs showed that the theory of costs of production as well as the theory of marginal productivity of factors cannot fully explain a process of formation of value of the IIP, their cognitive ability is limited only by the process of formation of value of the storage medium. It is also right for the theory of labor value.

A Triple Substance of Value of the Intellectual-Informational Good

Therefore, for the search of the adequate theories of value and price of the IIG it is expediently to address to the common theory of value. According to the theory of positions IIP has a triple substance of value (pic. 1). The first element is an abstract humanization (costs of essential human's efforts for production of the result of the intellectual-informational activity irrelevantly to their specifics), leading place in the structure of which have expenditures of the intellectual abilities of a person. The second element – is the specific humanization, that arises as increase of essential efforts of the author. The third element of the substance of value of the IIP is the *utility* the consumer receives.

Picture 1

A triple substance of value of the intellectual-informational product
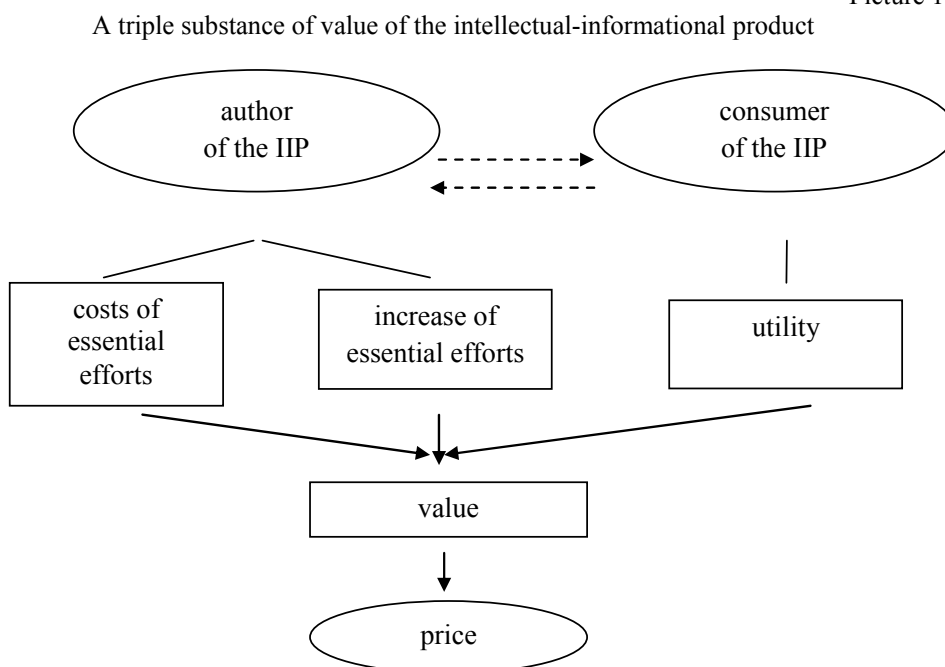
Source: developed by the author.

There is a dialectical connection between elements of a triple substance of value of the IIP, that represents unity of costs and result. Therefore, an abstract component of humanization represents knowledge, information, abilities, skills, that are spent in the process of creation of the IIP irrelevantly to its specifics. The utility has a resultant nature and is an individual attribute for each consumer. It is connected, firstly, with a limitation of cognitive capabilities of economic subjects (the hypothesis of limited rationality of H. Simon). These capabilities are a natural bound on a way of assimilation of information and acquisition of knowledge, and also use and production of the IIP. In a process of creation of the IIP an increase of essential efforts is carried out (new knowledge and information enrich human's

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inner world, so and a human, that is their author makes progress and self-improve). Personal development of the author is at the same time costly and resulting element that combines costs of his essential efforts (as an abstract expense mainly for intellectual abilities), and also include a useful part as an end goal.

For the research of correlations between the elements of the substance of the value of the IIP, let's define the basic premises of the analysis. Firstly, only relevant costs of essential efforts of the author are taken into consideration; secondly, the intensity of spending of human's essential efforts, their productivity and qualification of the author are not lower than socially necessary level; thirdly, the level of technical devices that are used is not lower than socially necessary for this branch. Relevant costs include costs of essential efforts of the author for the production of the IIP, that is useful for the consumer. Irrelevant (infertile) costs of essential efforts of the author (those costs that don't lead to the IIP appearance at all or those leading to the appearance of an intellectual result that has no use for the consumer) are level off. The intensity of spending of essential efforts of the author of the IIP characterizes the amount of human's essential efforts that are being expended per time unit. The productivity of human's essential efforts is time spent for the production of one unit of the IIP. Qualification of the author is availability of training, professional knowledge, skills and experience that give him the opportunity to engage in intellectual activity. Technical equipment for creating an IIP and its subsequent fixation on the storage medium are the computer, organizational and other technics.

On the ideas of M.I. Tugan-Baranovsky of synthesis of the theories of labor value and marginal utility, correlation of expendable and resultant elements of substance of value of the IIP, it is possible to suppose hypothetically in a way of direct relation: the more are the costs of intellectual abilities of the author the more significant is the increase of essential efforts of the author and the more potential use will gain the consumer (under permanent other conditions). Lesser expenditures determine a lesser increase of human's essential efforts and accordingly lesser utility for the consumers. So, the structure of value of the IIP is characterized by the direct correlations between substantial elements of its value: costs of essential efforts of the author determine the increase of its human's essential efforts and potential utility for the consumer under permanent other conditions.

Let's consider how the change of the mentioned above conditions will influence quality correlations between the main elements of the substance of value of the IIP. Despite that some expenditures of human's essential efforts don't lead to the appearance of IIP, as itself, or don't provide the quality result for the consumer, they favor an increase of inner world of the author, besides, increase of his essential efforts. This is due to the fact that any results of intellectual activity, even not formalized, make a person, develop certain skills and abilities, influence his world view and life experience and therefore favor the increase of his essential efforts. If to the costs of human's essential efforts include also irrelevant costs this will also determine the increase of his essential efforts. In this case, the utility for the consumer of the IIP will remain unchanged and will depend directly from relevant costs of essential efforts of the author.

The utility of the IIP for the consumer will also increase with the increase of human's essential efforts but will remain indifferent to the influence of irrelevant costs of essential efforts of the author. So, the increase of the costs of human's essential efforts with

considering of irrelevant costs leads to the additional increase of human's essential efforts but doesn't influence the increase of the utility for the consumer. If the intensity of spending of human's essential efforts, their productivity, qualification of the author and also level of the technical equipment used for production of the IIP, won't match socially necessary conditions for this brunch, correlations between main elements of the substance of value of the IIP won't change (will be direct), though it can have positive (if the level of technical equipment used for production of the IIP will be higher than the socially necessary condition), and negative (if analogues will exist in the branch, which production costs will be lower) influence on competitiveness of the author of this IIP.

Mentioned above regarding to the value basics of the IIP, allow to move to the more detailed examine of price of the IIG. The triple substance of value of the IIP appears in relations between its author and consumer. Cooperating between themselves they implement their own economic interests. For the author – it is an increase of human's essential efforts, gaining income and compensation of his own expenditures. The economic interest of the consumer lays in the wish for maximization of the potential utility which he can receive by using IIP and/or in gaining income.

The sale of the IIG represents relations appearing between seller and buyer (consumer or mediator) of the IIG. The seller can be: the author of the IIP, owner of the IIG, and also the mediator. The sale of the IIG is an act of one-time transition of the last one on certain conditions (determined price, terms etc.). It characterizes the primary distribution of the income between parties (subjects) i.e. receiving the part of the income in the created IIP. Schemes of the interaction of subjects of value and price formation of the IIG on a surface level are provided below (pic. 2 and pic. 3). Pic.2 shows that the author transferring the IIG to the storage medium. After an act of purchase and sale the owner of the IIG can himself or with the aid of employees (direct producer of copies) replicate it. Distribution of the IIG can be carried out as with the aid of the mediator as without him.

Picture 2

The scheme of interaction of subjects of value and price formation of the IIG on a surface level
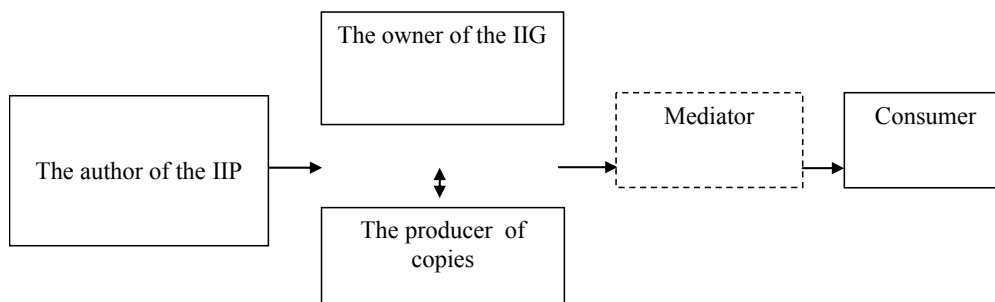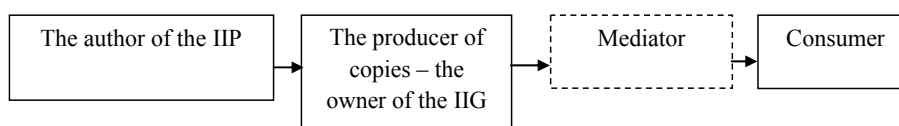

The author of the IIP, the owner of the IIG and the producer of the copies of the last one – are different persons
Source: developed by the author.

If the author of the IIP is the employee, the first exemplar of the IIG belongs to the employer (the owner of the IIG), who produces copies for the future selling (pic. 3).

Picture 3

The scheme of interaction of subjects of value and price formation of the IIG on a surface level

| The author of the IIP | → | The producer of copies – the owner of the IIG | → | Mediator | → | Consumer |

The owner of the IIG is a producer of its copies.
Source: developed by the author.

Forms of Value of the Intellectual-Informational Good

On a surface level as a result of the sale of the IIG, its value takes different forms, including transformed, that hide the intellectual nature of the product. Among them are: the cost price of the IIG, price of production of the IIG, market price of the IIG, price of demand on the IIG, price of supply of the IIG. The cost price of the IIG is production costs of the IIP, costs of production and distribution of its storage medium (the cost price of the storage medium), costs of transition of the IIP to the storage medium and selling costs of the IIG. The price of production of the IIG is the cost of the IIG and the average for this branch (production of the IIG) profit (calculated as an average norm of profit). A market price of the IIG – is a price formed on the IIG market as a result of the relation of buyers and sellers of the IIG. It represents linking of different entities – prices of the IIP and its storage medium. A price of demand on the IIG – is a maximum price at which the buyers are willing to purchase the IIG. A minimal price at which the sellers are ready to put up the IIG for sale on the market is a price of supply of the IIG. All the above-mentioned forms arise as a result of sale of the IIG. Except for these forms, the price of the IIG can take the form of the license price.

The price of the license equals a license payment that the owner of the IIG receives as a result of their sale. It can take forms of regular (royalty), onetime (lump-sums) and mixed payments.

In our opinion, the owners of IIG in conditions of free licenses are aimed at gaining income from the technical support of IIG, such as education, certification, integration, etc. Besides, there is also an opportunity to gain income from the sale of commercial licenses for this product (that is already becoming the object of the private property), since the owners of the IIG have the right to "relicense" it (i.e. to sell commercial licenses). The owners of these licenses, as a rule, are software writers who based on "free" product have a purpose to create a commercial product.

Among materialistic motives of the economic activity of the owners of the IIG the main ones are the maximization of the profit from services and also from the sale of commercial licenses. Of course, there are no less important motives that induce owners to assist in the

distribution of free licenses for the IIG. Therefore, the existence of the "free" IIG stimulate demand for other products that are complements of the first ones. Consumers of the "free" IIG can follow both market and non-market motivation depending on the dominated goals of their activity: maximization of the income from services or the increase of their essential efforts. Authors of the IIP follow mainly non-market motivation.

Pic. 4 represents the scheme of the income distribution of the IIG that is the object of free and commercial licenses. Of course, there is a competition on the market for the provision of technical support services and distribution of copies of the IIG. But as the price of the copies is actually a price of a storage medium, so the competition for their distribution has no sense. Let's note that the author of the IIP (as the other consumers) can provide services as a consumer – user of the free license and also as an employee. In our opinion, he has competitive advantages over other consumers. These advantages lie in the absence of a time lag between the appearance of the IIG on the market and the opportunity to provide services of it (support, guarantees, modifications of the basic product etc.), that are determined by the fullest a priori knowledge of the product by his author, and so it is conditioned by greater quality of services he can provide to other consumers.

Picture 4

Distribution of incomes from transactions with the IIG between subjects*
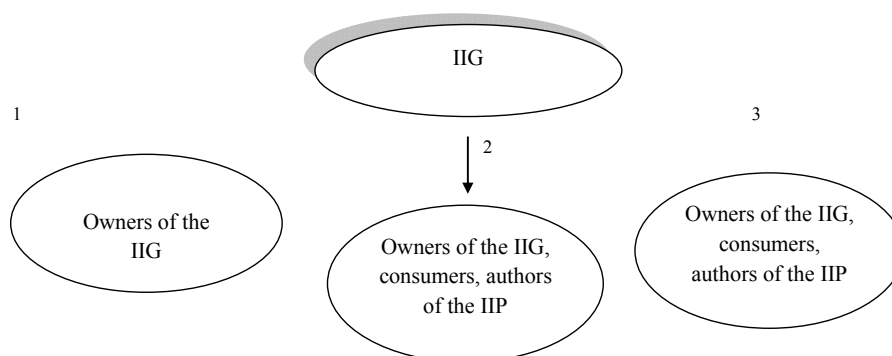
***1** – the income from commercial licenses for the IIG; 2 – the service income; 3 – the income from copies of the IIG. The shaded part shows a zone of commercial licenses for this IIG; not shaded part – free licenses for this IIG.

Source:developed by the author.

Valuation of the Intellectual-Informational Good from the Standpoint of the Common Theory of Value

Studying valuation methods of the IIG from the prism of the common theory of value, it becomes evident that cost-based methods don't include utility receiving by consumer and the income methods don't show costs of essential human's efforts for production of the IIP without reference to their specifics. Some extent of the essential human's efforts is

considered methods of cost-based and market-based approaches; utility for the consumer – methods of market-based and income-based approaches. The increase of the essential efforts of the author of the IIP doesn't find reflect in any of the approaches. Despite this, indirectly it can be defined based on the methodology of the cost-based and income-based approaches and also on the method of direct valuation of the parameters.

Table 2 shows the main methodical approaches of the valuation of the essential efforts of the author of the IIP. As can be seen from table 2, the disadvantages of approaches don't allow to evaluate the level of his essential efforts fully.

Table 2

Methodical approaches of valuation of the essential efforts of the author of the IIP

Approach	Content	Disadvantages of the approach, due to the nature of essential efforts
Cost-based	taking into consideration made in the past efforts directed to generation of the essential efforts of the author of the IIP	- difficulty of the allocation of the costs; - unpredictability of the result; - the presence of expenditures that do not have a direct monetary equivalent
Income-based	valuation of the result of the past accumulations through the output received by essential efforts of the author of the IIP	- existence of the nonmonetary benefits that cannot be measured and are not brought to a single basis - diversity of the factors influencing on the wage and labor income (including an opportunity to appropriate income by the other economic subjects)
Direct valuation of the parameters	valuation of the parameters that can be referred to the essential efforts of the author of the IIP.	Technical and methodological difficulties related to the justification of the parameters that are subjected to the accounting, development of the technology of their valuation and also bringing of the diverse indicators to a single basis.

Source: developed by the author.

As essential human's efforts are not directly subjected to the accounting, to the relevant knowledge, information, skills and abilities, economists include those which are expressed in market categories (Smirnov, 2000), although this is not the full valuation. Therefore, the method of the direct valuation relates to the nature of intellectual activity most of all, but its realization complicates by the difficulties of formation of the parameters of the essential efforts of the author of the IIP in market indicators. The cost-based approach, by contrast, least relate to the nature of the essential human's efforts, though it is partially evaluated by the market. In our opinion, the income-based approach allows to more fully show the market valuation of the essential efforts of the author of the IIP in comparison with the possible valuation of costs directed to their formation.

The increase of the essential efforts of the author of the IIP can be estimated indirectly with the aid of the explicit (resultant) and implicit (indicative) cost indicators. To the first ones relate only the indicators that have market valuation. Therefore, the level of the essential efforts of the author of the IIP can be determined with the help of the nonvisible costs or of the income from which he refuses in order to have the opportunity to create the IIP. The costs of the alternative opportunities of the author of the IIP can take form of discounted future incomes from certain types of activity that fit his qualification level. This means that

the author of the IIP can use his own potential in other, better for him way, alternative from the creation of the IIP. For example, he can hold positions that suit his professional level, receiving money reward.

Therefore the increase of essential efforts of the author of the IIP can be created on an explicit level as a change (increase) of future incomes from activity that suits his qualification. Quantitatively this can be presented as the difference between the amount of the discounted future incomes from alternative (different) types of activity of the future period and the amount of incomes that could be received engaging in alternative (different) types of activity in the current period. Implicit indicators that mediate the increase of the essential efforts of the author of the IIP – these are the indicators characterizing his personal input in the development of the certain type of activity that he carries out. Otherwise, these are the indicators of certain parameters of the essential efforts of the author of the IIP. Therefore if the author is an employee than the increase of his essential efforts can be considered as a payment of the qualification level that had increased and his professional ability in the form of the raise to the basic wage. The increase of the qualification of the employee is determined by the Tariff and Qualification Committee with the support (participation) of necessary experts by a valuation of gained knowledge and also skills and abilities that the employee perform within the certain position (profession).

The Functional of Integral Valuation of the Intellectual-Informational Good

To summarize, and based on the common theory of value let's present the functional of integral valuation of the IIG analytically:

$$F_{IIG} = F (f_1; f_2; f_3; f_4), \tag{1}$$

Where F_{IIG} – the functional of the integral valuation of the IIG;

f_1 – the function of costs of the essential efforts of the author of the IIP;

f_2 – the function of increase of the essential efforts of the author of the IIP;

f_3 – the function of costs of the essential efforts of the producer of the storage medium of the IIP;

f_4 – the utility function of the IIG for the customer.

To the factors influencing on the valuation of costs of the essential efforts of the author of the IIP belong conditions of a simple reproduction of his workforce. The reproduction of the workforce of the author of the IIP foresees continuous restoration and support of his physical strength and mental abilities. It is necessary to study this process from the one side as a reproduction of the ability to some kind of activity (primary intellectual), from the other side as the reproduction of a cluster of features that determine this ability. The extended reproduction of the workforce of the author of the IIP is more complicated. In the basis of the low line (border) of the workforce of the author of the IIP lay more basic needs of the ordinary degree of need, mostly primary. The high line meets the satisfaction of the whole complex of physiological, social and spiritual needs, including the growth of essential efforts.

Effects of factors influencing costs of essential efforts of the author of the IIP indirectly, appear in attracting auxiliary tools for the creation of this product. Thus, the level of technical tools characterizes the economy of time for the creation of the IIP and also technical benefits of the last one. The application for the professional advice in certain fields of knowledge (theoretical and practical) means applying essential efforts of other specialists that had been spent (attracted) for the creation of this product. Conditionally to this group of factors can be attributed the purchase of property rights to the already created IIG, which are necessary for the future improvement of the existing IIP or creating of the new one.

The extended reproduction of the workforce of the author of the IIP can be extensive and intensive. Appearance, existence and development of the top needs (primary social and spiritual), the satisfaction of which provides for a higher level of development of the workforce of the author of the IIP (his essential efforts) causes reproduction of the intensive type.

It is characterized by changes in knowledge, skills and abilities of the author of the IIP (the increase of his essential efforts). Consumer expenditures of the author of the IIP within the extended reproduction can be conditionally divided on extensive and intensive. In our opinion, extensive consumer's expenditures are expenditures directed to the satisfaction of needs (mostly primary needs) that grow quantitatively with the growth of the consumption. Consumer expenditures directed to the self-development of the author of the IIP, which increase provides the quality change of his essential efforts, can be characterized as intensive. The last one characterizes the increase, mostly in the secondary needs of the author of the IIP. To identify which consumer's expenditures relate to the extensive and which ones to the intensive is possible only with the time lag because to determine if the change of the essential efforts of the author of the IIP has taken place or not is possible only in the future (next) period. For indirect factors influencing the valuation of essential efforts of the author of the IIP belong level of knowledge, skills and abilities that are changing; the existence of the realized and unrealized IIG; reputation and increasing adaptation to the market opportunities of the author of the IIP.

Conclusions and Recommendations

Main results of the research of the value essence of the IIG are the following statements:

- structure of value the IIG represents a dialectic unity of value of the intellectual product and the value of the storage medium;

- from the position of the common theory of value, the intellectual product has the triple substance of value. The first element is the abstract humanization; the second one is the specific humanization. The third element is the utility that the consumer of the product receives;

- the triple substance of value of the intellectual product has cost-result nature. The dialectic correlation that represents the unity of costs and the result exists between its elements;

- the structure of value of the intellectual product is characterized by direct relations between substantial elements: costs of essential efforts of the author of the intellectual product foresee the increase of its essential efforts and potential utility for the customer under other constant conditions.

Among the main results of the study of the process of formation of value and price of the IIG are followings:

- the price of the IIG is formed as a result of the cooperation of the owner of the IIG, mediator, the producer of the copies of the IIG and also of its consumer;

- the value of the IIG appears in the form of the price of the IIG, its cost price, prices of the demand and supply of the IIG etc.;

- imperfection of the existing methodical approaches to the valuation of the IIG, determines the necessity of development of the integral approach. In general terms, the functional of the integral valuation of the IIG may consist of following functions: function of costs of the essential efforts of the author of the intellectual product, function of increase of the essential efforts of the author of the intellectual product, function of costs of essential efforts of the producer of the storage medium and utility function of the IIG to the consumer.

Summarizing the above, in our opinion it is necessary to add to existing approaches of the valuation of the IIG (European IPR Helpdesk Fact Sheet Intellectual Property Valuation, June 2015) the following recommendations: a) within the limits of the income-based approach to take into consideration the increase of essential efforts of the author of the IIP as the change of future possible incomes from alternative activities, that meets his qualification; b) to implement a concept of the functional of the integral valuation of the IIG that depends on functions of the costs of essential efforts of the author of the IIP, of their increase, of costs of the essential efforts of the producer of the storage medium of the IIP and of utility of the IIG to the consumer; c) to complete the quality methods of the IIG by such parameters as a quality level and a level of professional mastery of the author of the IIP according to the valuation date of the IIG.

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OBLIGATION AND RESPONSIBILITY OF EMPLOYERS TO PROVIDE HEALTH AND SAFETY AT WORK – PRINCIPLES, CURRENT REGULATION AND PROSPECTS

The paper examines the specifics of the obligation and responsibility of employers to provide occupational health and safety in terms of their current state, the requirements, trends and the characteristics of the legal framework. A comprehensive analysis of the issues has been performed in their economic and labour law aspects and the corresponding conclusions and generalizations have been put forward with the aim to improve the practice of enforcing this legal construct.
JEL: J81; K31

Introduction

In the last three decades, the concepts of occupational health and safety management systems (viewed as a wide range of programmatic measures taken by employers voluntarily or under applicable laws and regulations) have received wide international recognition among policymakers, employers, academics and other interested parties. Regulatory authorities in industrialized countries have gradually begun to shift the statutory and political interpretation of the prescribed requirements towards more widely formulated standards for processes or results, in an attempt to persuade employers to implement internal control systems for occupational health and safety.

The paper examines the specifics of the employer's duty to ensure health and safety at work in terms of their current state, the requirements and characteristics at two main levels: economic analysis and legal framework. ***The topicality of the subject*** is determined by the still insufficient responsibility of employers as regards working conditions and the steady trend of non-compliance with rules on the part of employees.

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In this line, the **aim of this study** is to perform a comprehensive economic and legal analysis of the economic environment, the existing legislation and European standards, principles and rules, and thus to explore and summarize the current state of the system ensuring occupational health and safety and to propose options for its updating.

Given the set aim the authors pursue the following **main tasks**: 1) analyse comprehensively the specifics and characteristics of the obligation of employers to ensure occupational safety and health; 2) establish the qualitative characteristics of this obligation in terms of scope, parameters and degree of compliance, in the light of the social and economic aspects of health protection at work; 3) analyse and identify in a systematic way the relevant legal provisions and European principles; 4) propose methods of remedying the existing shortcomings.

1. Organizational aspects of occupational safety and health management systems

1.1. Origin and development of the concept of occupational safety and health (OSH)

The International Labour Organization (ILO) defines the occupational safety and health management system as "a set of interrelated or interacting elements to establish occupational safety and health policy and objectives, and to achieve those objectives." (ILO, 2001, p. 19). Such elements may include an elaborated policy, planning of measures and the organizational structure of OHS, risk management, training, communication, monitoring, corrective and preventive measures, etc.

The development of the OHS system can be seen as the culmination of the wave of occupational health and safety regulation that started in the 70's of the last century in most industrialized countries, in combination with mechanisms for employee participation through the introduction of internal work standards and partial self-regulation (Brooks, 2001). Already in 1972 the UK Health and Safety Committee prepared a report on the state of working conditions, which reported a shift from sectoral regulation towards a single regulatory framework covering all industries and employees (ILO, 2011). Accordingly, regulatory reforms in the last decades of the 20th century in many industrialized countries changed some of the attitudes and views on occupational safety and health management systems, putting forward a systemic approach. The obligation imposed on employers to take a comprehensive, programmatic and preventive responsibility for health and safety at work, rather than prescribing specific solutions, emerged as an important new regulatory strategy (Frick, Jensen, Quinlan & Wilthagen, 2000).

ILO's Convention No. 155 of 1981 concerning Occupational Safety and Health and the Working Environment (ILO, 1981a) and Recommendation R164 thereto (ILO, 1981b) introduced some new principles, among which the emphasis on prevention of occupational risks and the tripartite partnership in providing healthy and safe working environment (partnership and mutual consultation between the government and the representative organizations of respectively employers and employees).

The global strategy of ILO adopted in 2003 (ILO, 2003) highlights the need for a strong and sustainable preventive culture of safety and health at national and company level. ILO

Convention No. 187 of 2006 (ILO, 2006), in line with all principles adopted by then, focused on promoting the basic principles of risk management in the working environment.

The main instrument governing the management of occupational health and safety at the European Union (EU) level is Framework Directive 89/391/EEC (European Union, 1989). The Directive is implemented in all Member States and is accompanied by more than 25 related directives on various topics (European Union, 2016, p. 4). Framework Directive 89/391/EEC requires continuous and systematic improvement of the safety and health of employees, the integration of preventive measures in all activities, assessing risks and adopting measures adapted to the changing technological and economic conditions.

After the Community Strategy for Health and Safety at Work for 2007-2012 (European Commission, 2007), which emphasizes the need to strengthen the enforcement of EU legislation throughout Member States, the European Commission adopted a Strategic Framework for Health and Safety at Work 2014-2020 (European Commission, 2014). It identifies key challenges and strategic objectives in achieving OHS. One of the challenges is to simplify the existing rules in order to prevent new risks and occupational diseases in the light of an aging population. The Strategic Framework also defines the tools to achieve these objectives: social dialogue, awareness-raising, law enforcement at the level of EU legislation and synergies with other policy areas.

Once ensured, OHS create the necessary preconditions for effective use of the workforce and the successful achievement of the production and economic goals of the enterprise. The system is also attractive to the political leadership of a country, for three reasons (Saksvik & Quinlan, 2003, p. 34). First, the concept of this system takes a comprehensive, proactive and adaptive approach to identifying and managing risks and is seen as a means to achieve greater involvement of employers in occupational health and safety. Second, the transfer of attention from compliance with standards to compliance with systems monitoring working conditions creates the prospect of a more profitable strategic use of monitored resources. And thirdly, in response to public pressure and media coverage of incidents or dissatisfaction with the failure of existing indicators of occupational health and safety (death, disease and long-term disability), it provides governments with a new remedy with the justification that efforts are being made to improve the situation over time.

In the economic literature, there are many studies demonstrating the effectiveness of OHS systems (ATSB, 2012; MacEachen et al., 2016). However, there are cases where companies with well-designed OHS management systems fail to achieve improvements in the level of safety and security at work (Frick & Wren, 2000). Nowadays the statistics on incidents at work still shows large numbers. This is very clearly indicated in the joint conclusions of the European Agency for Safety and Health at Work (EU-OSHA) and the International Labour Organization (European Agency for Safety and Health at Work, 2017). Worldwide:

- occupational accidents and diseases lead to a loss of 3.9% of GDP with an annual expenditure of approximately 2680 billion euros, and in the EU – 3.3% of GDP with an annual expenditure of approximately 476 billion euros;

- occupational diseases account for 86% of all work-related deaths; in the EU this figure is 98%;

- the value of losses resulting from occupational accidents and diseases is equivalent to 123.3 million (7.1 million in the EU) disability-adjusted life years (DALY). Of these, deaths amount to 67.8 million (3.4 million in the EU) and disabilities to 55.5 million (3.7 million in the EU).

These data show that gaps in the system still exist and the laws are not always enforced in practice. Loopholes are possible, allowing for "circumvention of rules". The responsibility for ensuring OHS in organizations lies with employers. The State creates laws and regulations, but it is the employers who need to protect the health and lives of their employees from the dangers that may arise in the course of employment. Studies on this subject reveal that the most important contributory factor for assuring OHS in a company is compliance with the existing legislation (Van den Broek et al., 2011). But providing a good working environment can be seen not only as a legal obligation, but also as an element of corporate social responsibility and of the understanding that the success of a business hinges on the motivation of its employees. The economic success of a responsibly managed organization is firmly linked to the social preconditions to recruit and retain motivated and able employees. "Through good occupational health and safety you are reducing the chances that your best-qualified mechanic will get badly injured in an accident, that your promising designer will be out of work for weeks because of a burnout, that your experienced accountant will start making mistakes as he is suffering from constant back pain." (European Union, 2016, p. 5). A poor safety and health system will bring losses to organizations, but a good system will generate dividends. Studies show that each euro invested in OHS brings the organization a return of more than two euros (ISSA, 2013). In addition, companies with higher standards for safety and health at work are more stable and more successful due to reduced absenteeism, improved worker productivity and less compensations paid.

The ASET model (Atmosphere-Systems-Exposure-Targets) can be used for effective management and integration of occupational health and safety systems in an organization (Shaw & Blewett, 2000). This model provides insight into the causal relationship between the atmosphere in the organization (its culture of behaviour), the implemented systems, the risks faced by employees and the objectives pursued to prevent possible incidents leading to injury or disease (Figure 1). The application of this model facilitates the decision-making related to reducing the exposure of employees to risk and the control of negative results.

The idea behind the model is that it is not enough for an organization simply to identify emerging risks and seek opportunities to limit them in the future. It is necessary to create a comprehensive organizational culture (of course not without the help of the relevant legal regulations) to promote and support the search for positive solutions in each of the four sectors of the preventive diagnosis model and avoidance of the possible risks for the working environment. The role of the behaviour of the employees themselves should also be noted, as they also can cause situations of incidents. Thus human behaviour can be included as an element of the last stage of the causal chain of the model. But the factors determining whether human behaviour will lead to an incident are generally formed in each of the previous three stages (organizational environment, rules, norms of behaviour, etc.).

Figure 1

The ASET model
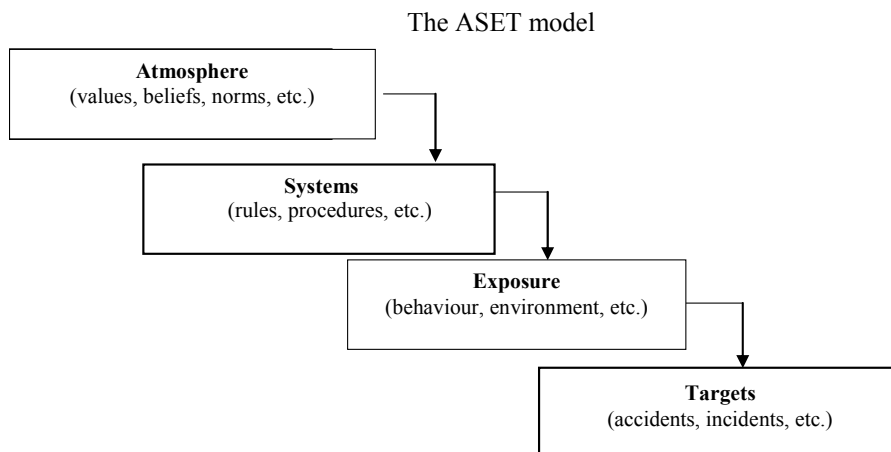
Source: European Agency for Safety and Health at Work (2010, p. 14).

In identifying the possible hazards one must also take into account situations which are similar to incidents, but not reported as such. A statement has been made in publications, that for each reported serious injury there are 300 situations similar to incidents that have not been reported because they did not result in serious injury. This is the so-called "Theory of the iceberg" (European Union, 2016, p. 7).

1.2. Occupational health and safety in Bulgaria

Bulgaria has been a member of the ILO since 6 December 1920 and as such has ratified a large number of conventions whose provisions play an important role in shaping the national legislation. As of 7 May 1992, Bulgaria is a member of the Council of Europe and has adopted the European Convention on Human Rights and the European Social Charter. In line with the European Strategy for Promoting Health and Safety at Work 2007-2012, Bulgaria has developed a Strategy for Safety and Health at Work for the period 2008-2012. The aim of the Strategy is to outline the commitments and direct the efforts of state authorities, employers' organizations, employees' organizations, NGOs and others towards ensuring the well-being at work, taking into account changes in the workplace and the emergence of new occupational risks (Ministry of Labour and Social Policy (MLSP), 2008). Reduction of the rate of occupational accidents in Bulgaria by 25% is envisaged. The currently existing National Program for Safety and Health at Work (NPSHW) 2018-2020 (MLSP, 2018) builds on the priorities of Strategy 2008-2012 and follows the guidelines for development adopted in EU's Strategic Framework for Health and Safety at Work 2014-2020. The highlight again is a reduction of the prevalence of occupational accidents and diseases. NPSHW 2018-2020 lays down the objectives, priorities and actions to be pursued in line with the main objectives of the National Development Program: Bulgaria 2020 aimed at boosting the domestic economy's productivity and competitiveness.

The goals are balanced growth, sustainable convergence and welfare in the long term, according to the Governance Priorities of the Government of the Republic of Bulgaria (2017-2021).

The controlling activity is the main instrument of the State to ensure consistency between the legal framework and the actual working conditions in businesses. In 2009 the legislature passed the Labour Inspection Act, which regulates, among other thing, the activities related to the integrated control of the provision of healthy and safe working conditions. This is a coordinated control exercised by the General Labour Inspectorate Executive Agency (GLIEA) – unilaterally or jointly with other control authorities, trade unions and representatives of employees in the relevant sector. The National Program for Safety and Health at Work 2018-2020 focuses specifically on the role of the controlling activity in the field of OHS and proposes measures to improve its efficiency.

A current picture of the achieved level of OHS can be derived from the reports on implementation of the activities issued by the General Labour Inspectorate Executive Agency. Table 1 summarizes some of the results indicated in the annual reports of the Agency.

The data in the table represent a sufficiently reliable sample to draw conclusions, as the persons employed at the quite large number of inspected businesses account for more than half of the total workforce in Bulgaria.

One positive result is that almost all inspected business had performed a risk assessment. This means that they are aware of the possible hazards at work, and therefore have identified the rate of manifestation and taken preventive measures. At the same time data on the violations identified by GLIEA raise suspicion that some organizations prepare risk assessments just for the sake of government inspections, without the intention of actually implementing them.

The data show that over the years the violations have decreased. But their number is still extremely high. Moreover, violations of HSWA account for about half of all identified violations. This is a very high proportion which reveals both poor OHS culture and a desire to circumvent the rules.

The tripartite collaboration introduced by ILO Conventions requires social dialogue between government, employers' representatives and employees' representatives. Therefore, the organization itself needs to put in place such a dialogue and consultations between the employer and representatives of the employees. Studies have established a link between the lower number of accidents leading to disability and the existence of an OHS committee or a trade union in the organization. Other studies have shown that where an OHS Management System is functioning with the participation of employees, the results in terms of achieving a healthy working environment are better, especially where there is a trade union (ILO, 2011, p. 7). It is obvious that a successfully functioning system requires allocation of initiatives and responsibilities among all hierarchical levels, with the involvement of the employees.

Table 1

Results of GLIEA inspections conducted between 2009 and 2017

Indicator / year	2009	2010	2011	2012	2013	2014	2015	2016	2017
Number of inspected businesses	38,662	33119	37,566	40,347	42,170	41,975	39,272	39,395	37,284
Number of employees in the inspected businesses	1318984	1173902	1407046	1575447	1584372	1462993	1539744	1567267	1661649
Identified violations of the Health and Safety at Work Act (HSWA)[4]	140 182	110 552	101 713	111 117	101 945	114 135	111 895	99,709	97,615
Proportion of violations under HSWA to the total number of violations	60%	53.40%	43.13%	43%	41.3%	46.4%	50.3%	46.95%	49.9%
Proportion of inspected businesses which had prepared risk assessments	88%	95%	95%	97%	96%	97%	96%	94%	94%

Source: GLIEA (2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018).

In this regard, GLIEA has adopted the practice of inviting representatives of trade unions and representatives of OHS committees or groups in the relevant organization to take part in the inspections.

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[4] Health and Safety at Work Act (Bulgaria).

2. Social and economic impact of occupational health and safety in Bulgaria

1.2. Social challenges for the working environment

Development of new technologies, globalization, heightened competition and demographic changes lead to increasingly complex work processes and changing working conditions. Along with existing risks, a number of new risks have emerged. For instance, an aging population and the need to stabilize the pension system require the increasing of the retirement age and retention at work of older people (Blagoycheva, 2012; Aleksandrov, 2017). Due to the natural wear of the body and difficulties in adapting to new technologies, the elderly are more threatened by risks at work. The development of computer technology and the Internet change the concepts of workplace and working hours. We see an increased number of cases of longer working time (at the expense of the balance between work and free time), flexible working hours, increased information load, stress and tension caused by the state of constant readiness required for rapid response, physical immobilisation, precarious employment or work in isolation. This and many other factors require the OHS system to be integrated as part of the overall management of businesses.

The OHS system in Bulgaria influences the frequency and severity of manifestation of risks to the health and lives of employees in two basic forms: occupational accidents and occupational diseases. Both cause employees to suffer losses from a lost opportunity for work (and consequently, income to provide subsistence for themselves and their households) and the discomfort from the injury and the disease, respectively (incurrence of additional costs for treatment). But not all consequences of ill health are measured in loss of money. The manifestations are much broader, as they affect not only employees but also their families and communities. In the event of injury or disease, the effects are primarily subjective: pain, fear and sense of loss, suffered by the affected persons, their families and their immediate communities (Dorman, 2000).

Due to their social manifestation, occupational accidents and diseases are treated as social security risks and are protected by the social security system. Persons affected by such risks receive benefits from the Occupational Accident and Disease Fund under the National Social Security Institute. Since it is the employer's responsibility to ensure a healthy and safe working environment, the social security contributions paid into the Fund for employees are entirely at the employer's expense. These provisions, however, apply only to people employed under an employment contract. The rest of the working population (hired under freelance contracts, self-employed, etc.) are not covered by such protection and have to cope with the consequences on their own.

According to Art. 55, Par. 1 of the Social Security Code (SSC), an occupational accident (OA) is any sudden impairment of health which has occurred during and in connection with or because of the work performed, as well as during any work performed in the interest of the enterprise where the said impairment has resulted in temporary incapacity for work, permanently reduced working capacity or death. For the purpose of social protection, the legislation expands the spatial and temporal scope of events recognized as an occupational accident, thus including events which are not directly caused by conditions of the workplace, but are linked to the employment of the relevant person at the company.

According to Art. 55, Par. 2 SSC, an occupational accident is also that suffered by a person who is socially secured under Article 4 (1) and Article 4a SSC during the usual commuting to the workplace or from the workplace to:

1. the principal place of residence or to another additional place of residence of a permanent nature;

2. the place where the person customarily takes his or her meals during the working day;

3. the place where remuneration is received.

Table 2 shows the dynamics of occupational accidents (and their effects) in the period 2009-2016. Besides the total number of cases, the table also shows cases under Art. 55, Par. 1 SSC, which are direct reflections of the working conditions in the organization.

Table 2

Social consequences of occupational accidents in Bulgaria in the period 2009-2016

indicator/ year	2009	2010	2011	2012	2013	2014	2015	2016	2017
OCCUPATIONAL ACCIDENTS									
- total	3125	3086	2891	3084	2806	2859	2993	2917	2911
- under Art. 55, Par. 1 SSC	2605	2457	2384	2407	2275	2397	2431	2312	2318
OA RESULTED IN DEATH									
- total	118	103	116	111	108	138	115	105	94
- under Art. 55, Par. 1 SSC	88	92	94	98	87	117	95	81	79
OA RESULTED IN DISABILITY									
- total	87	66	82	64	55	55	57	54	6
- under Art. 55, Par. 1 SSC	86	56	74	56	48	50	54	50	6
CALENDAR DAYS LOST DUE TO OA									
-total	254964	252782	206957	220968	259642	259728	261164	251720	193017
-under Art. 55, Par. 1 SSC	208371	194026	167080	171096	206017	215821	215106	198529	151278

Source: Section "Statistics and Analysis" at the National Social Security Institute[5]

The data in the table show a reduction in the number of occupational accidents compared to the beginning of the period, though not particularly substantial. Most pronounced is the result for the last two years, which may be due to the increased risk assessment culture of employers and employees. Some enterprises have implemented modernization of production, introduction of new technologies and safer equipment, better care by employers to ensure better and healthier workplaces and a greater awareness and responsibility among employees for safety in performing their tasks. Another reason for the reduced number of accidents and resulting deaths may be the employers' respect for inspections conducted by the General Labour Inspectorate Executive Agency.

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[5] http://www.noi.bg/aboutbg/st/statistic/154-tzpb.

However, occupational accidents remain frequent. What is more, the number of occupational accidents resulting in disability has dropped significantly, but that of accident that caused death remains almost unchanged, and in some years has even grown. These facts confirm the relevance of the problem and require the constant attention of the legislature and strong control by the inspecting authorities.

Working conditions in the various lines of work are examined in terms of the diseases they may cause. In some cases, the classification of a disease as an occupational disease is uncertain, as the effects of the factors and the ensuing injury to the body can remain undetected for a long time and manifest themselves by chance, for example at a time when the body is weakened for any reason or in conjunction with another disease. To avoid controversies in this regard, the legislator has defined which diseases should be categorized as occupational. In Bulgaria, these are specified in the List of Occupational Diseases, prepared and published pursuant to a Council of Ministers Decree, and are managed on the grounds of the Ordinance on the procedure for notification, registration, confirmation, appeal and reporting of occupational diseases. Table 3 presents the dynamics of occupational morbidity in Bulgaria between 2009 and 2016[6], its impact on the physical condition of the diseased and occurrence by gender and age.

Table 3

New cases of recognized occupational diseases in Bulgaria in the period 2009-2016

indicator/year	2009	2010	2011	2012	2013	2014	2015	2016
Occupational diseases – total	116	41	29	14	16	22	28	33
SEVERITY OF THE DISEASE								
- able-bodied	9	3	-	-	-	3	1	-
- temporarily incapacitated	-	-	-	-	-	-	2	1
- up to 50% degree of permanently reduced working capacity	83	34	23	10	9	14	19	23
- more than 50% degree of permanently reduced working capacity	24	4	5	4	6	5	6	9
- death	-	-	1	-	-	-	-	-
OCCURRENCE BY GENDER								
- men	72	29	19	9	11	13	16	22
- women	44	12	10	5	4	9	12	11
OCCURRENCE BY AGE GROUP								
- 25-34	-	-	-	1	1	1	-	-
- 35-44	10	4	5	1	1	3	2	2
- 45-54	46	12	11	5	8	5	13	17
- 55-64	42	14	11	6	5	11	10	8
- 65 and over	18	11	2	1	-	2	3	6

Source: National Social Security Institute (2017).

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[6] There are no more recent data.

The frequency of occurrence of occupational diseases is much lower than that of occupational accidents, but it too requires serious attention. It is noteworthy that by 2012 the number of occupational diseases decreased, but from 2013 onwards it has increased by each year. This trend shows that some Bulgarian enterprises have not taken all the necessary measures to ensure a healthy working environment.

Almost all occupational diseases in Bulgaria in the above period have led to permanent injury and reduced working capacity of the affected people. For these people this is an extremely unfavourable outcome, as they lose the opportunity to work at full capacity and this affects the level of income earned.

The people most often affected by occupational diseases are those aged 45-54, followed by those between 55 and 64. The social effect on them is stronger than that on younger people. On the one hand, the natural wear of the body increases with age, as its protective functions weaken and the disease unfolds in a more injurious way. On the other hand, such individuals are approaching the retirement age. The loss or decrease of labour income will result in lower pensions.

This is especially unacceptable where the standards of social justice in the workplace were violated, i.e. when the injury could have been avoided, but was not, because of the manipulations of the employer to achieve the greatest possible profit. The evidence of such practices is the significant number of violations of occupational health and safety regulations identified by the General Labour Inspectorate Executive Agency (see Table 1).

It is therefore necessary to take more measures to encourage a healthy working environment, both through on-going implementation of control and punitive measures and by convincing the owners and managers of companies to integrate the concepts of health promotion into the overall company policy. The legal framework and economic analyses must put forward more rules, arguments and justifications so that the application of the OSH system is accepted as attractive and necessary for the operations of organizations.

1.3. Economic results from the implementation of OHS systems

Social considerations and ethical arguments are important in organizing the working environment, but may not be sufficient to stimulate employers to act beyond the minimum requirements of the law. It is therefore necessary to understand the economic results from the proper organization of the working environment. Labour is one of the key factors of production and therefore the health of employees is an indirect component of the production function of any organization (Van den Broek & Kruger, 2010). However, operations and productive resources are managed by the employer (Miller and Haslam, 2009). So the employer must be convinced that it is worthy to develop its objectives in terms of a safe and healthy working environment and to integrate these objectives into the overall objectives of the company (De Greef and Van den Broek, 2004).

In principle, the ultimate goal of any business is the economic benefits. This means that the relevant company will consider any investment in OHS from this perspective. The making of decisions on measures for occupational safety and health is influenced by the economic

evaluation of the end result, i.e. the information on and perceptions of the future financial effects of these decisions.

Direct measurement in financial terms is not possible due to the variety of external factors and the complexity of effects of measures taken to ensure safety and health at work. Interventions concerning health at work are particularly difficult to evaluate.

It is estimated that the costs incurred for occupational safety and health constitute investments that are repaid from the microeconomic point of view and can be beneficial for the company itself (Van den Broek et al., 2011). But like any other investment, the investment in OHS can prove to be either profitable or economically inefficient. In this case it is necessary to explore also the indirect benefits from the outcome. Moreover, the economic effects associated with the organization of the working environment may be caused by external interference (insurance premiums, higher tax burden, fines imposed, order by a controlling body to suspend the operation of machinery and equipment, or the closing down of jobs), intended to provide economic incentives to improve the working conditions in the organization. The effects of these external interventions are different for the different sectors (or even for individual companies) and can have a significant impact on the economic assessment of investment in OSH. Further influence of varying intensity is exercised by other factors such as the type of company, its safety culture, knowledge of health and safety at work, existing structures, procedures and measures, organization of labour, the market and the competition, etc.

A distinction can be made between the direct benefits of costs incurred for improving the working environment (reduction of occupational accidents and diseases) and the indirect benefits (enhanced reputation and improved productivity of the company). These benefits are of both qualitative (e.g. assessment of the importance of occupational safety and health in the company) and quantitative nature (fewer cases of operational disturbances and production downtime caused by accidents). This leads to the conclusion that while the costs of prevention in the workplace are incurred in a short time, the benefits often appear in the long run, but are therefore sustainable (ISSA, 2013).

For example, if an organization fails to pay the necessary costs for providing OHS, it will at a later time have to pay the costs incurred because of ill health and hazards in the workplace. The most common costs are those related to the payment of compensations, sickness benefits and the need to seek an alternate, pay for overtime or outsource the tasks of the affected person. Quality employees specializing in a particular function cannot be easily replaced. Individual productivity losses and reduced return on labour occur. The situation is even more complicated in the case of small businesses, where the interruption of operations can lead to loss of customers or missed opportunity to conclude important contracts. In some cases of more severe accidents, the business can be closed down until the consequences are remedied. All this justifies the assertion that investing in an occupational health and safety system leads to return on investment for the organization, and neglecting it – to a likelihood of serious economic consequences.

For example, occupational accidents and diseases lead generally to social problems for employees, but as they stem from work as an economic activity, they manifest themselves also as an economic problem. The economic perspective of the problem is expressed both

through the reasons (the role of economic factors as a cause of ill health in the workplace) and through the impact on the economic outlook not only of the employee but also of the company (and thus of society as a whole).

Among the indicators of the level of loss of earnings from employment are the Severity Coefficient and the Severity Index provided for in Art. 16 of the Ordinance on the identification, investigation, registration and reporting of occupational accidents (Figure 3 and Figure 4).

The Severity Coefficient represents the average calendar days lost because of occupational accidents per one person with social security.

$$\text{Severity Coefficient} = \frac{\text{calendar days lost due to occupational accidents, registered in the reporting period}}{\text{average number of people insured against occupational accident and disease in the reporting period}} \quad (1)$$

Figure 3

Severity Coefficient of occupational accidents for the period 2009-2017
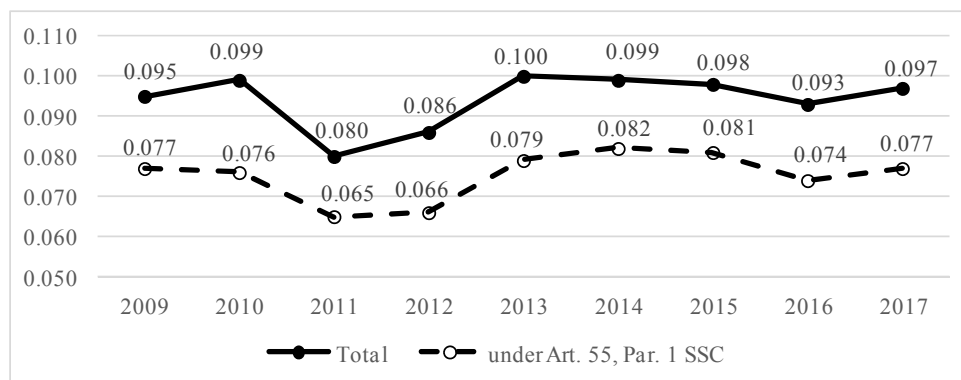
Source: NSSI

The results in the graph show an alarming picture. Despite broad regulations, incentives and monitoring by supervisory bodies, the Severity Coefficient does not show a declining trend. With the exception of 2011 and 2012, the coefficient fluctuates within similar ranges. As we saw in Table 2 above, the total number of occupational accidents was in decline. Therefore, the persistence of the values of the Severity Coefficient shows that the reported accidents have occurred with greater severity and/or have entailed longer periods of absence from work. But the fact is that for every 10 persons insured the business loses one day worked[7]. If we examine the values of the coefficient with respect specifically to accidents at workplaces (under Art. 55, Par. 1), we see that for every 20 employees the

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[7] It should be also recognized that the data for 2017 are estimates and after a certain period of time they may undergo a slight change, which would have an impact on the calculated coefficients.

business loses about 1.5 days worked, due to the inadequate organization of healthy and safe workplaces. total number of man-hours worked in the reporting period

The Severity Index gives an idea of calendar days lost due to occupational accidents per 1 million man-hours worked.

$$\text{Severity Index} = \frac{\text{calendar days lost due to occupational accidents, registered in the reporting period}}{\text{total number of man-hours worked in the reporting period}} \times 1\,000\,000 \qquad (2)$$

Figure 3

Severity Index of occupational accidents for the 2009-2017 period

Source: NSSI
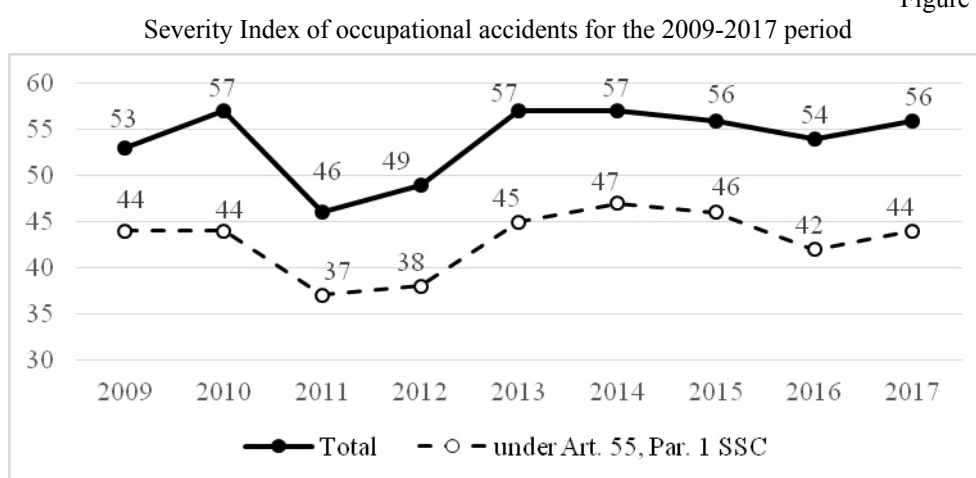
The dynamics of the Severity Index of occupational accidents matches that of the Severity Coefficient. The end result is that due to occupational accidents, an average of 56 calendar days not worked are lost per 1 million man-hours worked. The days lost due to accidents which occurred specifically within the organization are about 44. Of course, the employer cannot be held responsible for the circumstances under which an accident occurred outside the company, but the consequences of such an accident will ultimately affect the normal course of operations. According to Art. 200 of the Labour Code, for damages caused by an occupational accident or disease that caused temporary disability, permanently reduced working capacity by at least 50% or the death of the employee, the employer is liable to pay pecuniary compensation regardless of whether an executive or another employee is to blame for their occurrence (Aleksandrov, 2018).

To minimize the risks of occupational accidents (both within the workplace and outside it – under Art. 55, Para. 2 SSC) and diseases, in addition to creating healthy and safe working conditions the management needs to pay special attention to preventive measures and care for the health of employees. Medical examinations, training and awareness-raising campaigns about the possible dangers and ways to avoid them, maintenance of personal protective equipment and mutual responsibility of all stakeholders for the working

conditions are all factors regulated by the legislation and constitute the minimum base to build on.

Employers may, within the framework of corporate social responsibility, go beyond the requirements of the law and improve the conditions so that employees feel comfortable in the workplace. In practice, there are numerous cases where fitness facilities, organized catering, events to reduce stress such as team building, joint visits to cultural events, open days, company nurseries, etc. are provided. Equally important are the organized training activities in the form of role-playing games, workshops and the like. Thus, apart from the economic benefits, the organization enhances its reputation, retains loyal employees and achieves higher productivity.

Unfortunately, although existing, such cases are still not widespread in Bulgaria. The majority of organizations, in pursuit of short-term profits, ignore the necessary culture and understanding of the consequences of organizing a healthy and safe working environment; this requires further regulation and intensification of the regulatory sanctions.

3. Legal aspects of the organization of OSH: specifics, current regulations and trends in the synchronization with European standards

3.1 Regulation of OHS standards

The State policy to ensure safe and healthy working conditions has a history related to the development of the legal branch itself. The significance of this issue has been appreciated at each stage of the development of the legal branch, and OHS have been the subject of statutory regulation and process management. In its evolution, Bulgarian legislation has been shaped by the combination of historical[8] and international factors. The focus of this paper is on the current state of the legal framework and the highlights in the obligations of employers.

Achieving a proper work process in an environment that stimulates quality work and ensures the safety and health of employees requires the commitment of both parties to the employment relationship. The employer, as the organizer of the work process, has the responsibility to abide by the general labour legislation, inseparably combined with the special provisions on the relevant type of work process, and thus to create a working environment focused on protecting the health of the employees.

The provision of safe and healthy working conditions is enshrined in our domestic sources of law at different levels of the legislative hierarchy. First comes the Constitution, which provides a guarantee of the highest level for exercise of labour-related rights and serves as the basis for further detailed regulation of this matter through legal instruments at the lower

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[8] 09.1905: entry into force of the Women's and Children's Labour in Industrial Establishments in Bulgaria Act; 11.1907: entry into force of the Labour Inspectorate Act; 06.1917: entry into force of the Labour Hygiene and Safety Act; 09.1936: entry into force of the Decree-Law on Employment Contracts; 1951: entry into force of the Labour Code, 1951; 01.1987: entry into force of the Labour Code, 1986; 12.1997: entry into force of the Health and Safety at Work Act.

levels of the hierarchy of legal sources. Article 48, Par. 5 of the Constitution of the Republic of Bulgaria contains a basic regulation in this regard: "Employees shall be entitled to healthy and safe working conditions." The main duties of the employer in this field are regulated by mandatory provisions in the general and special laws, in particular the Labour Code, Chapter XIII, and the Health and Safety at Work Act, Chapter III.

Comprehensive regulation is provided by the secondary legislation: Ordinance No. 7 of the Ministry of Labour and Social Policy (MLSP) and of the Ministry of Health (MH) (1999) on the minimum requirements for health and safety at work and in using work equipment; Ordinance No. 5 of MLSP and MH (1999) on the procedure, manner and frequency of risk assessment; Ordinance No. 3 of MLSP (1998) on the functions and tasks of officers and specialized departments of companies in organizing the implementation of activities related to the protection against and prevention of occupational risks; Ordinance No. RD-07-2 of MLSP (2009) on the conditions and procedures for conducting periodic workplace training and briefing of employees on the rules to ensure healthy and safe working conditions; Ordinance No. 4 of MLSP and MH (1998) on the training of representatives in the committees and groups on working conditions in enterprises; Ordinance No. 15 of MLSP and MH (1999) on the conditions, procedures and requirements for development and implementation of physiological working regimes and rests during the working time; Ordinance on the identification, investigation, registration and reporting of occupational accidents (Council of Ministers Decree No. 263, 1999); Ordinance on the procedure for notification, registration, confirmation, appeal and reporting of occupational diseases (CMD No. 168, 2008), etc.

Given Bulgaria's membership in the EU and the commitments arising from this, there is a broad system of transposing European acts into our domestic legislation, and in this sense the law governing labour issues is also based on the principles, rules and norms of the European Union and reflects the requirements of Framework Directive 89/391/EEC (European Union, 1989).

Historically, the state policy to ensure healthy and safe working conditions has passed through all stages of socio-political development of Bulgaria. Nevertheless, the course has always been one of observance and implementation at a national level of the achievements of the international community.

3.2 Systematics of the employer's obligation to provide OHS

In our legal system, the scheme of imposing obligations on the employer to provide OHS is established at three main levels: generalizations in the general law and as part of the content of the employment relationship, at the level of the special law and at the level of the secondary legislation. Thus, with highest priority is the general obligation under the Labour Code, whose Article 127, paragraph 1, item 3 in conjunction with Article 275, paragraph 1 impose on employers the obligation to provide healthy and safe working conditions, so that the dangers to the life and health of the employees are eliminated, restricted or reduced.

Next is the level of the special law, namely the Health and Safety at Work Act (HSWA), whose Article 4, paragraph 1 stipulates the obligation of employers to ensure the health and

safety of employees by taking the necessary measures, including prevention of occupational hazards, provision of information and training and provision of the necessary organization and means. This is elaborated in Article 16 HSWA, which imposes further obligations on employers in the implementation of measures to ensure healthy and safe working conditions.

The most detailed regulation is contained in the provisions of the secondary legislation. It deals primarily with the observance of the minimum requirements for health and safety in workplaces, the work process and the use of work equipment. This obligation is directly linked to the legal capacity of employers and their function in the overall organization of the work process at the company level (Ordinance No. 7 of MLSP and of MH, 1999).

Second is the obligation to carry out an assessment of the risk to health and safety. This employer obligation is a continuation of the previous one, but here the emphasis is placed on the characteristics of the specific work, which is why the assessment should include work processes and work equipment, premises, workplaces and other factors of the working environment. This information must be provided to employees (Ordinance No. 5 of MLSP and of MH, 1999).

Next is the obligation of employers to designate one or more officers with appropriate education and training or create a specialized department for protection and prevention of occupational risks (Ordinance No. 3 MLSP, 1998).

The fourth obligation of employers is to provide their employees with medical care by the Occupational Health Service (Ordinance No. 3 of MLSP and of MH, 2008).

The next obligation of employers is the inclusion of employees in the process of ensuring healthy and safe working conditions. This requires that each employee receives appropriate training and briefing on safety and health at work (Ordinance No. RD-07-2 MLSP, 2009). In the process of establishing and implementing the policy on health and safety at work, employers must consult with employees or their representatives and organizations in the discussion and adoption of all measures relating to the health and safety of employees; the designation of employees who will carry out activities relating to occupational health and safety, first aid, fire fighting and evacuation of employees; the planning and organization of training of employees on occupational health and safety issues.

The individual company or organization should establish a committee or a group engaged in OHS, with the commitment of the employer to provide initial and annual training of members of committees and groups on OHS (Ordinance No. 4 of MLSP and of MH, 1998).

The employers' obligations can be grouped into those concerning the creation of a comprehensive organization for safe and healthy working conditions, and those of more specific nature: for example, to take into account the specific hazards for employees requiring special protection, including those with reduced working capacity, and to provide facilities for such persons enabling them to perform their functions; where the work is carried out under high neuropsychological strain, a certain rhythm, monotony or forced posture, expected minimum rate of production and in shift work, the obligation is to implement physiological regimes of work and rest (Ordinance No. 15 of MLSP and of MH, 1999).

Chronologically viewed in the light of the temporal parameters of employment, the employer has duties that correspond to the development of the labour process and with the requirement to create a safe and healthy environment. In this regard the legislation stipulates the actions to be taken by employers in the event of occupational accident or disease, namely to identify, investigate, register and report each instance, and to implement measures to prevent the harmful consequences in cases of emergency, according to the specifics of the work and the size of the enterprise, by taking steps to eliminate the danger, provide first aid, ensure fire fighting readiness and evacuation schemes for employees. In order to ensure OHS, employers must cause monitoring and control of the measures taken to ensure OHS to be exercised by line managers and other officers in the enterprise, and hold the relevant persons liable in case of violations.

With a view to create additional guarantees, employers must insure their employees against occupational accident if a danger to their life and health exists. The terms and procedures for compulsory insurance against occupational accidents are laid down in the Ordinance on compulsory insurance of employees against occupational accidents (Ordinance No. 24, 2006). Another measure is the compulsory social security within the public social security and the compulsory supplementary social security, for which contributions for the relevant risks are paid solely by the employer.

A level by itself, though one that should not be examined in isolation from the above, consists in the respective obligations of the employee to comply with OHS rules. These are divided into two sublevels: compliance with the general rules and particularisation of the obligations under the individual employment contracts. Thus, on the one hand, the basic obligation of the employee to comply with the rules for OHS within the meaning of Art. 126, item 6 of the Labour Code is imposed as part of the system of employment-related duties, and furthermore as an obligation subject to disciplinary action. In this aspect and under Art. 187, item 5, a violation of OHS rules constitutes a disciplinary offense. On the other hand, the employee's obligation to comply with OHS rules is enshrined in the newer types of employment contracts. For example, Art. 107e of the Labour Code, which governs Work from Home Contracts, prescribes that in performing the home-based work agreed to with the employer, the employee is obliged to observe the existing OHS rules. Similarly, Article 107k of the Labour Code, which regulates remote work, introduces the principle that an employee who performs work remotely is responsible for compliance with the policy of the employer on the organization of the work process and on the safety and health at work. In this regard, the control on the proper application of and compliance with the standards and requirements for occupational health and safety is to be carried out by the employer and/or its representative, representatives of trade unions, representatives of the employees under Art. 7, Par. 2 and the supervisory bodies of the Labour Inspectorate are entitled to access to the workplace in accordance with the terms and conditions of the individual and/or collective agreement, upon compulsory prior notification and with the consent of the employee who performs work remotely. It is obvious that self-control, commitment and responsibility of employees in the exercise of their rights is being permanently established as a norm and best practice, as well as the involvement with the system and interdependence in the fulfilment of OHS obligations.

Based on the above analysis of the current legislation on occupational health and safety and in view of the commitments of employers, certain conclusions and generalizations can be made:

1) Bulgarian labour law uses various instruments to regulate social relations in the field of safety and health at work.

2) Bulgarian legislation is on the one hand based on historical continuity, and on the other hand follows the achievements of the international community in the study area.

3) There are permanent legislative trends of updating the legislation both in order to harmonise and synchronise it with European and international norms and to align the specifics of its norms with the dynamics in the development of social relations.

4) Ensuring occupational health and safety is established as employers' responsibility and commitment, and is ever more often associated with the increasingly important forms of involvement of employees in specific forms of assistance in the implementation of the norms in practice, behavioural self-control and responsibility, and participation in the establishment of standards through the bodies of tripartite cooperation.

5) There is a growing culture of employers taking a due care to apply the norms in practice.

Conclusion

The occupational health and safety system, viewed in terms of the legal framework, monitoring, implementation in practice and level of commitment of the parties involved, is an absolute prerequisite for the proper development of employment relationships. At the same time the OHS system should not distance itself from phenomena typical of the social reality, namely:

1. The aging population makes it necessary to adapt the working environment to older employees and to make even greater efforts to ensure healthy and safe working conditions.

2. The advent of digitization in industrial relations and the extraordinary dynamics of the recognition of new forms of employment create unusually high levels of new risks for the physical and mental health of employees: stress, tension, mental fatigue and depression.

3. There is still a persistent practice of sporadic, superficial or even lacking application of OHA rules, which creates an environment of risk behaviour at work, low commitment on the part of employers and generally low capacity to respond to monitoring and controlling bodies.

In this regard, it is more than necessary for organizations to be convinced of the benefits of developing an OHS system and integrating it into their overall strategy. When comparing the costs and benefits of improving the working conditions, profitability, capital and economic aspects are important but not exclusive factors influencing the decision whether

or not to make such an investment. Overall, the system ensuring occupational health and safety creates conditions which are favourable to both the social well-being of employees and the competitiveness of companies. As such, the system is a basis for a stable social and economic development of society. In that sense, some of the more typical generalizations are as follows:

- Need for responsible adaptation of legal norms to a stable strategy for safety and health at work, whose results should be tied to the overall business results;

- At the same time, its adequate application should not be viewed separately from the requirement for precise performance of the duties of the relevant actors and the need for a new standard of work and effective monitoring and control over their activities;

- Adopting the understanding that compliance with OHS is an important factor for the competitiveness of individual economic operators and for mitigating the increasing costs of the social security system;

- There is a need for urgent adaptation of the norms to the dynamics of the changing economic and social environment, where new and different forms of employment are emerging with differing requirements in terms of healthy and safe working conditions;

- The positive legislative approach is to permanently establish as a norm and practice self-control, commitment and responsibility of employees in the exercise of their rights as well as the involvement with the system and interdependence in the fulfilment of OHS obligations.

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Jordan Jordanov[1]

KEY CHARACTERISTICS AND SCOPE OF THE BULGARIAN CORPORATE BOND MARKET

The aim of this paper is to investigate the main Bulgarian corporate bond attributes, such as: size of issue, industry, currency, maturity and floating rate occurrence, from 2004 to 2014. In addition, important parameters such as the object of allocations of funds, collateral and the ownership concentration of issuers are exposed. Examples of prospectus clauses undermining corporate bond safety and soundness are also detailed and evaluated.

Bulgaria's corporate bond legislation is analysed in relation to the potential of loopholes allowing for issuers' actions being taken against the interest of bondholders. The possibility of the former stems from loose norms of a regulation permitting an ease alteration of base loan parameters. Finally, the sample corporate bond performance is analysed in terms of defaulted and restructured bond issues from 2016 perspective.

JEL: G10; G23; G28; G30

Introduction

The existence of a well-functioning corporate bond market is crucial for the efficiency of financial markets and real economy funding. Corporate bonds provide advantages to corporations, investors and the economy as a whole. Through corporate bonds, corporations are able to raise steady amounts of financing at a lower cost and reduced dependency on loans from the banks. An additional cost advantage is provided by means of a reduction of disintermediation fees.

Because of the services associated with the corporate bond market, investors are able to gather information, and thus, to value corporate entities more precisely and diversify their portfolios with yet another class of assets. Corporate bonds reduce the burden on other sources of financing of business, promote investors' vigilance and reduce the vulnerability of the economy at times of cyclical downturn.

The Bulgarian corporate bond market emerged a decade after the democratic changes of 1989. This was not just a "new era" or "re-emergence" of the country's domestic corporate

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bond market, but essentially its birth as it was almost non-existent prior to 1989 during the communist regime.[2]

The corporate bond issuance in recent Bulgarian history commenced in 2000. The face value of non-financial corporate bonds amounts to 1.3% of the country's GDP for this year. The outstanding principal of corporate bonds grew and peaked at 4% of Bulgarian GDP in 2006 (Eurostat, 2018). Such an extent of corporate bond financing is obviously insufficient for a growing economy to reach a momentum.

Bulgaria's late arrival in the corporate bond market was far from unique in European terms. In fact, the lack of developed and well-functioning corporate debt markets was the norm throughout continental Europe up until the mid-1990s despite the dominance of different forms of the market economy. The latter is mostly a consequence of bank lending being a dominant form of debt intermediation (Schinasi and Smith, 1998). Here contemporary Europe differs from the United States where financing through corporate bonds has been much more prevalent. Europe's relative 'gap' with the US is attributable to a range of factors, notably historically evolved cultural and legal practices and the dominance of bank lending over that from the corporate bond market. This situation, however, is changing. The 2009 post-crisis trend shows a growth in corporate bond financing across Europe, while bank lending remains rather stagnant (Kaya and Meyer, 2013). Thus, the importance of corporate bond financing will increase as long as bank lending continues to lessen in the future (ICMA, 2013).

The second important factor driving these changes is the EU effort to develop an integrated capital market. Compared to the US approach to corporate bond market, EU law – in an attempt to boost the market – seems to favour bond issuers over bondholders. The differences are mostly evident in the mandatory information disclosure regime, published in the prospectus. EU corporate bond prospectuses do not contain information about the remuneration and benefits paid to corporations' administrative, management, or supervisory bodies. The EU Prospectus Directive[3] has a more loose structure that shields issuers from the massive shareholder class actions so widespread in the United States. However, "when issuers are not haunted by the spectre of potential litigation by investors for disclosures they make in a prospectus, the disclosure framework can provide issuers with more leeway to determine what information is material to investors and must be disclosed (Kung, 2005)." These concessions may motivate borrowers to resort more often to the bond market, but on the other hand, assuming some degree of opportunism, may erode the lenders' base.

Turning back to Bulgaria and having in mind the substantial stock of bank deposits at virtually zero interest rates and Bulgarian entrepreneurs' inclination toward debt financing, this study addresses the problematic areas of the Bulgarian corporate bond market. An ideal

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[2] „Although incomplete, data for firm bonds are gathered from the State Gazette balances. The interest rate is averaged of the interest rates of the two bond issues known prior to 1945 – Electric Power Sofia and Electric Power Bulgaria, i.e. 4.25%." (Ivanov, 2004).
[3] Directive 2003/71/EC of the European Parliament and of the Council of 4 November 2003 on the prospectus to be published when securities are offered to the public or admitted to trading and amending Directive 2001/34/EC.

type corporate bond market would suggest more efficient allocation and enhancement of the lending base, as well as barring access to the market of deceptive issuers. The first part of the article summarises the key characteristics of Bulgarian corporate bonds, i.e. – the newly issued debt and its interest rate, the nominal value, maturity, fixed or floating interest rate and covenants. The second part analyses the issuers' profile features, drawn from bond prospectuses, such as the purpose of the loan, collateral and issuer ownership concentration. The final part investigates the legislative basis for the renegotiation of debt, and subsequently bondholders wealth expropriation

Key characteristics of corporate bonds

There are two main methods for issuing corporate bonds – public offer and private placing. The public offer requires a mandatory information disclosure, reckoning with certain regulatory provisions and publishing a prospectus *inter alia*. The private placement does not call for publishing a prospectus, when securities are offered to a limited number of investors or to professional investors.

The prevailing number of corporate bond issues in Bulgaria have been carried out through private placing. For the period 2004-2014 the sample consists of 138 issues in total with 135 of them privately executed. However, within a year of inception, these 135 issues gained a public status through a procedure known as an "admission to public listing". The latter is legislated through an EU directive (***Directive 2003/71/EC***) and transposed into the Bulgarian law, aiming at "boosting the market liquidity". That change led to unprecedented growth of the Bulgarian corporate bond market, taking into consideration the embryonic stage of development, lack of previous experience and a stagnant, virtually fibrillating stock market.

Fig. 1 attempts to answer the question: "Who does issue corporate bonds in Bulgaria?" Most issues are Euro denominated and other – in the local currency, the Bulgarian lev (BGN)[4]. The face value of the newly issued debt is expressed in Bulgarian lev. The right-hand axis depicts the average yield to maturity (YTM) of issuers, at the moment of issue.

It emerges that the banks are leaders in issuing corporate bonds, followed by Real Estate Investment Trusts (REITs) and Holding companies for the period 2004-2014. They also appear to have a competitive cost advantage, borrowing at lowest interest rate (less than 5% pa), in contrast to the rest of the issuers. Note the large volume of issues is accomplished by financial intermediaries. Besides banks, the latter include REITs, financial companies and lease companies. This trend of corporate bond issuance does not correspond to the worldwide pattern of dominance by non-financial corporations.

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[4] The exchange rate of the Bulgarian lev (BGN) is fixed to 1, 95577139 BGN per 1 Euro, since the adoption of a currency board in 1999.

Figure 1

New Corporate Debt and YTM for the period 2004-2014
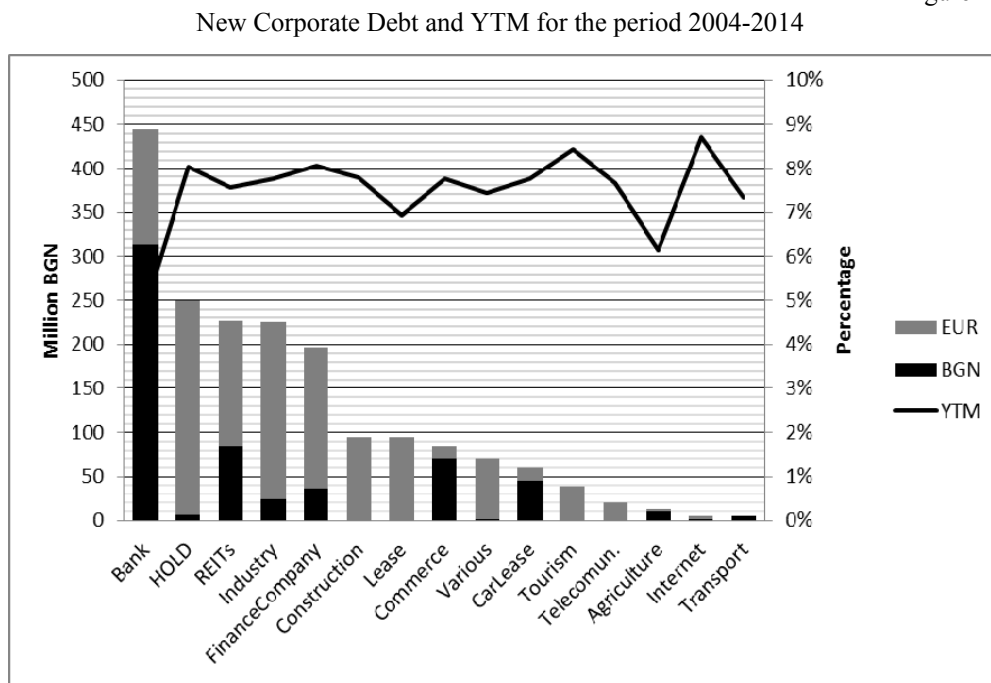
Source: Bond issue prospectuses, Author's calculation.

The YTM has 2 fractions – coupon yield and capital gain or loss. For the purpose of this study, the yield to maturity is derived from the bond prospectuses at the moment of the sale to qualified (professional) investors, by a private placement. At this moment, the corporate bond yields consist only of a coupon yield, as they are sold at par, so that the capital gain is zero. The market interest rate fluctuates, which causes fluctuations in the bond prices, after corporate bonds are admitted to the secondary market trading. The coupon rate, as a fraction of YTM, should be constant until maturity as a general rule. However, as regulatory norms allow alterations in the parameters of corporate bonds, including the coupon rate, the YTM for the issuers (alternatively, cost of capital) may not be the same as that originally laid out in the prospectuses. Thus, the issuers who have succeeded in reducing the original coupon rate, have enjoyed a lower cost of borrowing. On the other hand, investors in corporate bonds with a reduced coupon, will not be able to achieve the envisaged YTM, even if they hold these bonds until maturity. Table 1 presents the corporate bonds, whose coupon rate underwent a fall.

Inasmuch as some corporate bonds have experienced a coupon rate reduction, the original YTM presented in Figure 2 will be further lowered.

Table 1

Corporate Bonds with reduced coupon rates

Year	ISSUER	Currency	Principal (million BGN)	Original Coupon rate	Date of issue	Original maturity date	Altered Coupon rate
2006	East Gas Company	EUR	2.94	0.082	26.6.2006	26.6.2011	0.05
2007	Intercapital REITs	EUR	9.79	0.09	14.8.2007	14.8.2010	0.06
2009	Auto Union Group	EUR	14.69	0.095	14.4.2009	14.4.2014	0.0625
2009	Assen's Fortress	EUR	11.75	0.11	30.1.2009	30.1.2015	0.072
2010	Specialised Logistic Systems	EUR	3.92	0.075	4.5.2010	4.5.2015	0.06
2011	Azzalya	EUR	11.75	0.08	15.12.2011	15.12.2019	0.045
2011	Astera	EUR	9.79	0.08	14.3.2011	14.3.2018	0.045
2011	JPS Control	EUR	7.84	0.07	10.1.2011	10.1.2016	0.05
2011	VEI Project	EUR	1.96	0.085	2.12.2011	2.12.2016	0.055
2012	Gipsum	EUR	9.79	0.08	5.4.2012	5.4.2019	0.03
2012	Auto Union	BGN	6.8	0.0675	10.12.2012	10.12.2017	0.0625

Source: Bond issue prospectuses, Bulgarian Stock Exchange News Platform, Author's calculation.

Tendulkar and Hancock (2014: 24) provide evidence of the global trend of corporate bond issuance by financial and non-financial corporations. In 2000 the value of issued corporate bonds by financial and non-financial corporations was more or less equal. Financial corporations formed a larger share of corporate bond issuance (59%) by 2007, but with the evolution of the financial crisis, their percentage dwindled. During the period 2007-2013 financial corporations reduced the volume of newly issued debt from $1.2 trillion in 2007 down to $1.1 trillion in 2013, despite the record-high $1.4 trillion in 2009. Over the same period of time non-financial corporations nearly doubled the value of bonds they issued, reaching $2.1 trillion, or 66 percent of the total issuance in 2013.

On that account, it seems compelling to trace the issuance activity, as well as the average yield year-by-year. Figure 2 provides these details.

The largest volume of newly-issued corporate debt was issued in 2007. This was the year when Bulgaria finally acceded to the European Union, and that naturally led to a standard of living and GDP growth higher expectations. In the run-up to EU accession, everything grew – FDI, real estate prices, deposits and bank loans, GDP and last but not least – interest rates. The global financial crisis hit Bulgaria with a lag in 2008, but the corporate bond market did not experience a severe drop, rather a gradual contraction. That might be due to several reasons. One is the momentum – issues which gained access to the public trading in 2008 had been privately placed and negotiated a year earlier. The other reason is the competitive cost of servicing the debt, compared to the cost of bank lending. Thirdly, the

globally ongoing phenomenon of disintermediation along with the deleveraging of banks also mattered to some degree.

Figure 2
Newly Issued Corporate Debt, Average YTM and Bank Interest rate by Year[5]
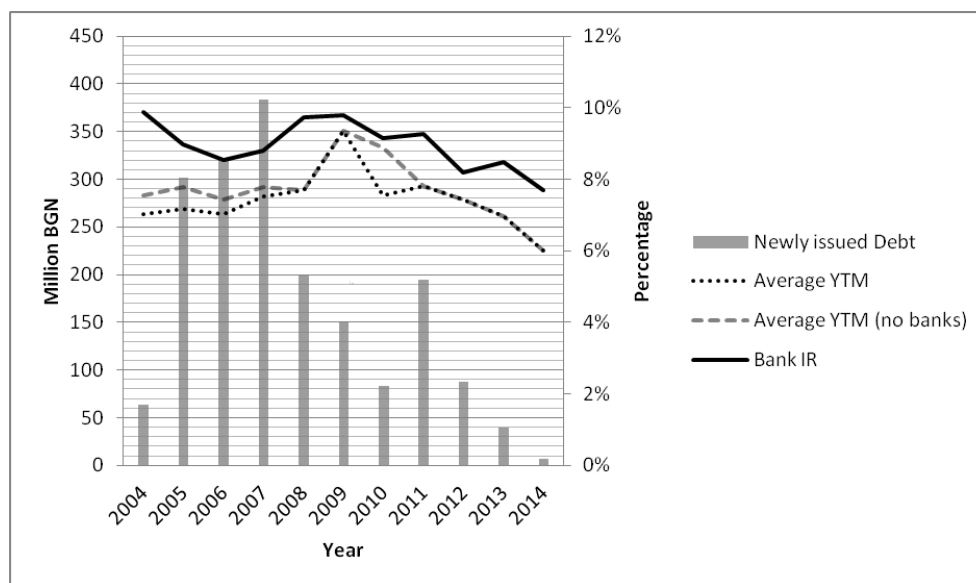
Source: Bond issue prospectuses, Bulgarian National Bank Interest Rate Statistics, Author's calculation.

In order to compare the cost advantage of corporate bonds to commercial bank loans an equally weighted average yield and interest rate at the moment of issuing are calculated.[6] The data of fixed coupon (or spread over benchmark) rates and interest rates on commercial bank loans to non-financial corporations is obtained from prospectuses and Bulgarian central bank statistics.[7]

There is a considerable cost of debt divergence in favour of corporate bonds from 2004 to 2009. Subsequently, the variation narrows, due to diminishing demand for bank loans while the saving base widens just as the Global financial crisis takes hold. Note that the cost advantage of corporate bonds over bank loans abates somewhat, when bank issues are excluded from the sample. As a whole, the volume of issued corporate bonds subsides after

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[5] 2014 is not representative, due to delayed publication of bond floatation.

[6] The commercial bank lending rates are referred at the moment of allowing credit, for terms from 1 to 5 years. The yield to maturity of corporate bonds are taken from their prospectuses. Note that corporate bond yield may vary after IPOs, due to fluctuation in benchmark reference rate or amendments in coupon rate.

[7] Interest rate statistics, Bulgarian National Bank.

2011, though 2014 data is not representative, as some issues may be omitted, due to time lags in publication.

However, such a deduction can be deceptive due to several factors. First of all, it does not take into account the transaction costs. Such costs apply to corporate bonds and bank loans. While the transaction costs of bond issues can be derived from prospectuses, the transaction costs of bank loans are not revealed by banks. Second, the average numbers conceal the difference in terms of size, duration and currency denomination of corporate bonds and bank loans. However, something can be done with respect to the currency denomination. The Euro Denominated Average Bank interest rate is exhibited in the last row of Table 2. The first row of the same table shows the YTM on Euro denominated corporate bond issues.

Table 2

Average YTM on Euro and Lev Denominated Corporate Bonds and Average Interest Rate on Euro Denominated Bank Loans (2004-2014)

Year / YTM/ Interest rate	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Euro denominated corporate bonds (%)	7.00	7.75	7.44	7.76	7.13	8.96	8.98	7.69	8.15	7.22	
Lev denominated corporate bonds (%)	7.37	7.93	7.69	7.33	8.09			7.07	6.43	6.69	6.00
Number of Euro to Lev issues	1:4	12:3	19:3	21:1	10:6	10:0	4:0	11:04	5:4	5:2	0:2
Euro Denominated Average Bank interest rate (%)	8.81	7.91	7.89	8.17	8.84	8.99	8.26	8.91	7.78	7.53	7.38

Source: Bond issue prospectuses, Bulgarian National Bank Interest Rate Statistics, Author's calculation.

It is evident that a cost advantage on Euro-denominated corporate bonds compared to Euro-denominated bank loans prevailed until 2009. However, the difference is mitigated or reversed in the period after the financial crisis.

Choosing the face value of corporate bonds implies two considerations. Larger denominations hamper small investors in buying corporate bonds. Note that the average salary in Bulgaria is approximately 500 Euro per month, and nominals over 100 Euro or 200 BGN may be an obstacle for small investors.

Smaller denominations, on the other hand, will increase the issuing cost (Central Depositary services) as well as secondary trade costs. In our sample, most issues are denominated in Euro, and over 98% of the bond value outstanding have a face value €1000. Issues denominated in BGN constitute nearly a third of the total bonds outstanding. The preferred face value is 1000 BGN. Two extreme issues are 1 BGN and €50000 face value.

Table 3

Nominal (Face) Value and Currency Denomination of Corporate Bonds

Issues Denominated in BGN				Issues Denominated in EUR		
Face Value (BGN)	Number of issues	Total principal in millions of BGN		Face Value (EUR)	Number of issues	Total principal in millions of BGN
1	1	5.25				
10	1	3		100	1	19.59
100	2	43.6		1000	103	1304.79
1000	29	452.05		50000	1	1.96
Total	33	503.9		Total	105	1326.34

Source: Bond issue prospectuses, Author's calculation.

Figure 3 represents the maturity structure of newly issued corporate bonds each year from 2004 to 2014. Longer maturity implies that bondholders are confident that the issuer is safe and sound. Unsurprisingly, at the early stage of bond market activity in Bulgaria (2004, 2005) issues with short maturity prevailed, namely 3 years. As the market evolved, 5 years and longer maturities become dominant. The latter include 6, 7 and 8-year terms. 2011 saw even a 10 years maturity issue.

Figure 3

Maturity Structure by Year
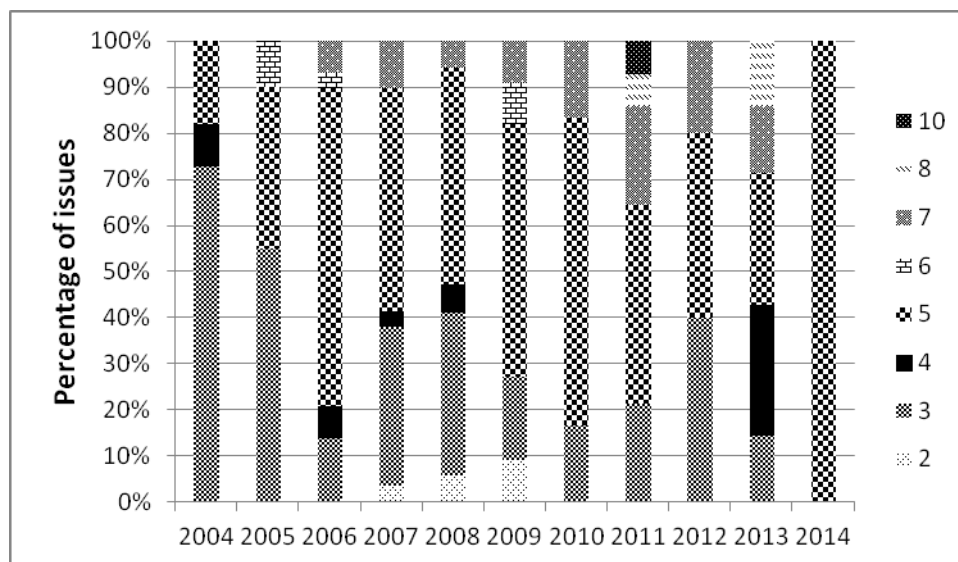
Source: Bond issue prospectuses, Author's calculation.

The practices within the Bulgarian corporate bond market do not preclude the application of floating interest rates. In this instance, the coupon rate floats depending on some index value. So far, the indices used are 3 and 6 months Euribor to Euro-denominated issues and 3 and 6 months Sofibor – to BGN denominated issues. Floating rate bonds reduce the price risk for both borrowers and investors. The coupon fluctuates, so it is less likely to differ substantially from the current market yield-to-maturity. In addition, the coupons may have a "collar" – the rate cannot go above a specified "ceiling" or below a specified "floor".

Table 4

Floating rate corporate bond in Bulgaria by Issuer and Year

Issuer	Year										
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Bank	2	1	2	2							
HOLD	0	1		1							
REITs	0		1	1						1	
Industry	0	2	3	1	1						
FinanceCompany	0	4	1	1	1						
Construction	0	1	1								
Lease	0		3	2	1					1	
Commerce	0		1	1							
Various	0				1			1			
Car Lease	0		1	3							
Tourism	0		1								
Telecom	0										
Agriculture	0		1								
Internet	0		1								
Transport	0										
Total Floating	2	9	16	12	4	0	0	1	0	2	0
Percentage of Total	25	50	64	50	24	0	0	7	0	29	0

Source: Bond issue prospectuses, Author's calculation.

It is remarkable that floating rate bonds (FRB) were fashionable from 2004 to 2008, and virtually disappeared afterward. The reason for the evaporation of new issue Floating Rate Bonds after 2008 may relate to the stark fall in Interbank Rates, amid the Financial Crisis. Out of 46 FRB, 12 are issued with floors – Euri/Sofi-Bor, but not less than the specified fixed rate.

A bond indenture is likely to contain a number of *protective covenants*, especially when a bond has no collateral. *Protective Covenants* are restrictions designed to protect bondholders, and in general appear in a form of a negative and positive covenant. A *negative covenant ("thou shalt not") for example* is when the firm cannot pay dividends to stockholders in excess of what is allowed by a formula based on the firm's earnings. A *positive covenant ("thou shalt") example* is when proceeds from the sale of assets must be used either to acquire other assets of equal value or to redeem outstanding bonds.

Table 5

Financial Covenants of Bulgarian Corporate Bonds from 2004 to 2014

Covenants	Number of issues	Smaller or greater than:							
		<1	<0.95	<0.9	<0.85	<0.8	<0.75	<0.7	<0.65
Ratio L/Assets	50	4	17	14	2	3	6	1	3
			<1.1	<0.4					
Ratio L/Equity	2		1	1					
			>0.2						
Ratio Equity/Assets	1		1						
			<0.02						
Arrears/Lease portf.	1		1						
		>4	>3	>2	>1.5	>1	>0.2		
Interest Coverage	44	1	1	4	5	30	3		
New Debt	Most Issues								
Dividend Restrictions	3								
Retention ratio	1								

Source: Bond issue prospectuses, Author's calculation.

Positive covenants specify things that a borrower must do. Some of the most common positive covenants commit the borrower to maintain a minimum level of net working capital. Inadequate liquidity is a common precursor to default. The borrower is often considered to be in default on all debts if it is in a default on any debt to any lender (cross-default covenant).

Negative covenants specify what a borrower must not do. Common negative covenants often set restrictions on the fixed assets of the firm with respect to liquidation and acquisition. Many debt agreements prohibit borrowing additional long-term debt or require additional borrowing to be subordinated to the original claim. Most Bulgarian corporate indentures include cross-default covenant and prohibit borrowing additional long-term debt or require additional borrowing to be subordinated to the original claim.

Table 5 shows a detailed outline of the financial covenants of the sample corporate bonds, issued from 2004 to 2014. It is interesting to note that covenants are applied not only to debentures (unsecured loans), but in some cases – to secured loans too. Out of 55 bond issues with covenants, 50 include restrictions on the ratio Liabilities/Assets. In 35 cases that ratio must be less than 0.9, implying that the equity capital ratio may not be less than 11% of the liabilities, corresponding to a leverage ratio up to 9!

There are 4 bond issues that dare even to impose "restriction" of less than 1, which means that *the borrower has no requirement to maintain any equity*. It seems, the threshold of these restrictions are somehow "arbitrary", chiefly set because "there must have" such covenants because of regulations. The preposterous values of Liabilities/Assets covenants instigate at least some important questions. Are investors, (most of which are institutional – for example, pension and insurance funds) unable to spot a palpable ploy? Does the regulator's (Financial Supervision Commission) prospectus overhaul care only for the formal presence of the mandatory information?

The other popular financial covenant restriction is interest coverage, or the ratio Earnings Before Interest and Taxes (EBIT)/Interest. The true level of the minimum acceptable interest coverage ratio varies across sources. According to the Corporate Finance Institute (CFI, 2019), as a general benchmark, an interest coverage ratio (ICR) of 1.5 is considered the minimum acceptable ratio. An ICR below 1.5 may signal default risk and the refusal of lenders to lend more money to the company. Another scientific source (Ross, 2006:120) states that a ratio of 2.5 times or so is generally the minimum acceptable level. A more sophisticated approach is applied by Bhattacharya (Bhattacharya: 181), who distinguishes between developed and developing markets. He states: "In developed countries, it is widely held that the (coverage) ratio should be between 5 and 7. Such a high coverage is possible there because of a low debt-equity ratio. In developing economies like India, where the debt-equity ratio is generally high, a lower coverage is nothing but expected. Generally, for a manufacturing firm in India, a coverage of 3 is a reasonable standard." A short screening survey[8] on the interest coverage ratio of the public stocks listed at the Bulgarian Stock Exchange – Sofia, has shown that 71 stocks have a ratio above 3. Between 2 and 3 are 18 stocks, between 1 and 2 – 34 stocks, and finally – 77 stocks have an interest coverage ratio below 1.

In our sample, only 6 out of 44 issuers declare a ratio above 2. At the extreme, 33 issues impose a ratio above 1, which means an EBIT of just enough to pay the interest! An interesting point is that 44 issues with covenants are also collateralized.

Corporate bond funds allocation, collateral and issuer ownership concentration

As mentioned earlier in the text – there are two routes through which a prospective corporate bond issuer may gain a public status. These are through a public offer and a private placing. No matter which path is chosen, an issuer must meet first the statutory requirements set in the Bulgarian Commercial Law. According to the above (Commerce Act of Bulgaria) Debentures[9] may only be issued by a joint-stock company. The issuance of debentures by public offering may be done at least two years after the company's recordation in the commercial register at the earliest, and provided it has two annual financial statements that have been approved by the general meeting.

Note that the issuer is not necessarily a publicly traded company, nor a company that operates on profit two years prior of the corporate bond issue. In addition, a confusion erupts from the peculiar legislation and misleading interpretation of the form of business organisation, i.e. 'joint-stock company'. The English-speaking world will probably regard it more as a "Private Limited Liability Company"[10]. An important feature of the 'joint-stock

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[8] Survey has been performed on 9/03/19 with the aid of Infostock.bg screening services.

[9] Debentures is incorrect translation. The original in Bulgarian language refers to 'Bonds'.

[10] The Bulgarian Commercial Low recognises two major form of non-publicly traded limited liability business organisations. These are 'Art. 113. A *limited liability company* may be formed by one or more persons who shall be liable for the company's obligations to the extent of their share contributions to the company's capital.' and 'Art. 158. (1) A *joint-stock company* is a company the capital of which is divided into stocks. The company shall be liable before its creditors with its assets.' There are several substantive differences between them:

company' that possibly can affect the rights of bondholders is that a joint-stock company *may be founded by one or more natural or legal persons. That will potentially secure an influential standing of the borrower, in case of loan renegotiation.*

Accessing public trading, no matter whether directly by IPO or in a roundabout way *of private placement followed by admission to public trade, is channelled according the requirements of the European (**Directive 2003/71/EC**) and national (Financial Supervision Commission, FSC, 2003) legislation.*

Almost all issuers resort to the second option – private placement targeting institutional and professional investors, followed by an application to FSC and Bulgarian Stock Exchange (BSE) for public listing. Only at this stage must the issuer conform to the public trading requirements and minimum information disclosure set by Prospectus Directive.

Obviously, accessing corporate bond public trading after private placing is a way for an easier entry – and possibly a way to circumvent the law. The latter is acknowledged by the regulatory body, the Financial Supervision Commission (FSC) and will be further expounded.

Having in mind the above-underlined peculiarities of the Bulgarian corporate bond market, the present paper attempts further to analyse some important parameters, concerning the public interest, such as the aim of the issue (purposed allocation of the raised capital), corporate governance of the issuer and type of collateral. The information is derived from the prospectuses of issuers in Bulgaria from 2004 to 2014.

The object of the issue delineates the allocation of the funds raised by the corporate bond subscription, implying the risk and expected return from the undertaking. Out of the total 138 issues, 30 have a clearly defined object, 72 – ambiguous and 36 either lack any or are so obscure that it makes setting the allocation of funds difficult. For instance, the last group includes objects stated as: "funding the accomplishment of the signed contracts' or 'funding the basic activity of the firm". The issues with a lacking object were reduced down to 16, after associating the basic activity of the issuers, as described in their financial reports, Summarisation of the allocation of funds as declared in prospectuses is exhibited in Table 6.

- A *limited liability company* requires a minimum initial capital paid by owners of 1 Euro. For the *joint stock company* this amount is much larger – about 25000 Euro. However, in order to start its operation, the *joint stock company's* stockholders are solicit to pay only 25% of the statutory minimum capital in;
- A *limited liability company* owners are involved in everyday running of the firm, while the *joint stock company* owners – not.
- A *limited liability company* owner needs a consent of the rest of owners in order to sell/transfer its ownership, while the *joint stock company* owners – not.

Table 6

Bond Issue Object as declared in Prospectuses

Object of the Issue	Number of issues	Percentage of total
Repaying loan outstanding	37	26.81
Finance Company Credit/Financing	23	16.67
Land/Construction/Machinery/General Repair	22	15.94
Asset (land) Securitization	9	6.52
Lease (Cars and Consumer Appliances)	6	4.35
Purchasing accounts receivable	7	5.07
Leveraged Buyouts (LBOs)/asset restructuring	7	5.07
Financing Working capital and Long Term Assets	7	5.07
Others	4	2.90
No Object	16	11.59
Total	138	100.00

Source: Bond issue prospectuses, Author's calculation.

Table 6 shows that the prevailing number of issues allocate funds towards some form of "restructuring" (repaying debts outstanding, Leveraged Buyouts and asset restructuring), financial intermediation (bank loans, consumer financing, purchasing accounts receivable, consumer leasing and factoring) or asset securitization – land and tangible property. Particular attention has to be paid to consumer financing and purchasing accounts receivable, due to the excessive risk-taking of the issuers' nature of business. In addition, the collateral for these corporate bonds is the first order special pledge of present and future cash receivables, exposing bondholders to a risk, incommensurate to the promised yield. Furthermore, extending consumer credit with the proceeds from corporate bonds, may be viewed as a circumvention of bank legislation by non-bank financial intermediaries, besides the moral matter of an excessive interest charge.

Guy Standing (2016:151) refers to the proponents of so-called 'payday loans' as a lever for boosting economic growth: "This revival of Faustian bargain has stimulated growth, but it is unsustainable. It is scarcely the model of the prudent housewife, on which the Thatcherite economics was based. It has increased the fragility of the economy and the probability of another financial crash." And even after imposing a legislative APR cap of no more than 5 times the legitimate overdue interest on the payday loans in Bulgaria (State Gazette №35, 2014), the restriction is circumvented by applying various hoaxes, such as "guarantor's" fee (Toshev, 2016).

Yet for a true liberal economist, justifying the demand side of payday loans as a "personal choice", there is great difficulty accepting the fact that part of our prospective pensions will derive from corporate bonds issued by financial companies that thrive on preying on (often poor) individuals and communities.

Only 22 out of 122 issues report investments in land, buildings, machinery and general repair. This corporate bonds' objective entails investments in projects that will provide goods and services, generate income and – eventually – reduce unemployment.

Nonetheless, even issues with genuine "productive" allocation of resources show some clashes with the interest of bondholders. For instance, "Florina – Bulgaria' issued corporate bonds with a face value of 8 million euro in 2007. The object of the issue, disclosed in the prospectus resume, is the purchase of property and equipment, currently leased from Piraeus Leasing Bulgaria. There would have been nothing irregular with this transaction, if, the trustee – Bank Piraeus Bulgaria was not a parent company of the lessor – Piraeus Leasing Bulgaria! Bank Piraeus Bulgaria is also a merchant bank of the issuer – Florina – Bulgaria. As such, the trustee-bank may have had a direct interest to clinch the issue, especially, if solvency problems cropped up, jeopardizing the lease payment to its subsidiary. The subsequent events validated the above hypothesis. From 2010, when the debtor should have started redeeming the principal, the problems arose. There were restructurings and delays of the debt payments, followed by the default of the issuer Florina – Bulgaria in 2013.

So far there is no conclusive empirical evidence of how the *shareholder ownership concentration* affects the interests of bondholders. On the one hand, the greater concentration of ownership may reduce the costs of monitoring and control of the management, alongside the improved loan collateral evaluation. This curbs the probability of default and buttresses the value of corporate bonds. Shareholders can exercise their rights in order to restrict the management perks, malingering and management empire-building trough precarious investments. (Jensen and Meckling, 1976).

On the other hand, according to the *Bondholders' Wealth Expropriation Hypothesis*, concentrated shareholding can be a premise for an expropriation of bondholders' wealth. The wealth transfer from bondholders to shareholders can be completed by three major approaches (Renneboog, 2012: 93): 1. An unexpected increase in investment projects' risk. 2. A hefty dividend payout. 3. An unexpected new debt issue, with higher/equal seniority, or shorter maturity.

This hypothesis presents a major puzzle regarding the Bulgarian Bond market. There is a strong argument to suggest that Jensen and Mecklings' hypothesis is more applicable to capital markets with more disperse stock ownership, strong protection of minority shareholders interest and bondholders' rights and last but not least – efficient and enforceable law to underpin market exchange[11].

Further, Jensen and Mecklings may subconsciously assume the markets to be exclusively of the Anglo-Saxon type of stock markets, which differ to a great extent to those in developing countries and continental Europe.[12] The Bulgarian Stock Market features characteristics of

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[11] In spite of the harmonization of Bulgarian law with the EU directives, the lender protection is still deficient of speed and efficiency. "In general, the regulatory environment in Bulgaria is characterized by a complex regulations, lack of transparency, and arbitrary or a weak enforcement. These factors create incentives for public corruption and, as a result, foreign investors may experience a cumbersome investment climate." (International Business Publications 2016, p.73)

[12] A study of the publicly held corporations around the world finds that rights of minority shareholders are better protected in Common Law countries, where shareholder concentration is more disperse. (La Porta, Lopez-de-Silanes and Shleifer 1999).

developing markets adopting the German/French style of regulation with a typical high ownership concentration where opaque outside and offshore firms create (or potentially can create) a (largely invisible) controlling chain. Thus, the prevailing high ownership concentration in the Bulgarian Stock Market, coupled with the legal possibility of bond indenture amendments render favour of the *Bondholders' Wealth Expropriation Hypothesis.*

To address the foregoing conjectures, it is worth examining the ownership structure of the bond issuers. The sample consists of 137 bond issues, admitted to public trade for the period from 2004 to 2014.

Table 7

Ownership concentration of corporate bond issuers[13]

	Outside firm owner	
	Yes	NO
	105	32
Majority stake (over 50%)	85	16
including Offshore registered	24	0
Board member with ownership stake over 10%	21	19

Source: Bond issue prospectuses, Author's calculation.

As shown in Table 7, 105 out of 137 corporate bonds have been issued by companies whose larger (dominant) shareholder is an outside public or (in most cases) private firm or a holding company. In eighty-five out of these 105 companies, the majority shareholder have a stake above 50%, which implies an outright control of the whole business. Thirty-five corporate bond issues are done by companies in whose ownership structures outside firms are not majority shareholders. But again – half of the issuers (16) are owned by a large shareholder, with a stake above 50%. Thus, it can be deduced that the prevailing number of issuers have a high ownership concentration, which is, in turn, a premise for colluding against the interest of bondholders. A further impetus for such a scenario is facilitated by the legislative amendments (see below) allowing for *inter alia* coupon rate alteration, after the public floatation of bonds. The latter may further be exacerbated by the lack of transparency of those bondholders who are shareholders of the bond issuer simultaneously.

The collateral of corporate bonds is essential, especially when the issue is not rated. All issues in our sample have no credit ratings. This fact contradicts the stipulation made by Miller (2008: 336), i.e.: "Virtually all leveraged loans and some of the more risky investment-grade credits are backed by pledges of collateral".

Another publication further specifies: "The results of the analysis of creditor rights show a pattern similar to that for shareholder rights. Common law offers the best protection, and French civil law the worst." (La Porta, Lopez-de-Silanes, Shleifer and Vishny 1997).

[13] The sample consists of 137 firms, as one firm, Enemona JSC, does not reveal its ownership structure.

Despite the high leverage in a number of corporate bond issues, Table 8 emphasises the detailed stratification of the collateral. Out of the 138 corporate issues, 68.12% (94) are backed with a collateral, while the remaining 31.88% (44) are debentures.

Table 8

Corporate Bonds Collateral

Type of Collateral	Number of issues	Percentage
Real estate (property lien)	38	27.54%
First order special pledge of present and future cash receivables	18	13.04%
Real estate and machinery	5	3.62%
Machinery and Equipment	2	1.45%
Leased Vehicles (Cars, Vans, Trucks)	7	5.07%
First order special pledge on leased movables	7	5.07%
Issuer's shares	1	0.72%
Loan Insurance	16	11.59%
Debentures	44	31.88%
Total:	138	100.00%

Source: Bond issue prospectuses, Author's calculation.

Most of the collateralized issues are backed with real estate mortgages (38), followed by a first pledge on receivables[14] (18) and loan insurance (16).

There are some cases which cast a shadow on the prospective bondholders' confidence. A bond issue of 'Finance Consulting' Ltd. with a face value of 10 million euro is backed with a pledge on the company's receivables. The alarming detail, however, is that these receivables are overdue over 120 days! (Finance Consulting Ltd 2009: 21).

Another puzzling case is Álen Mack Ltd corporate bonds, with a face value of 592, 000 euro, where for collateral "shares of the issuer and objects of industrial and intellectual property, i.e. patents" are used (Alen Mack Ltd., 2009: 60, 61). It is somehow absurd to use borrower's shares as a pledge of collateral. Shares are actually a title of ownership of the physical assets of the company. As the latter are a general collateral of the loan, it is immaterial to use their financial title as a pledge. Of course, shares and other securities may serve as a pledge of collateral, providing that they belong to a company other than the issuer. An example of such a good practice is the bond issue of Spectar Net Ltd. of 2009, with a face value of 4.25 million euro, where the shares of the acquired company Orbytel Ltd are lodged as collateral.

The legislative loophole premises to bondholders' wealth expropriation

Current legislation norms and regulations allow for Indenture amendments. According to the Good Practices of the Bulgarian FSC, (Protocol № 11, 2011) amendments to the bond

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[14] Most of the companies whose business is a quick credits (no credit check loans) disbursement, use debtors' liabilities as collateral. This practice exposes bondholders to a greater risks, as debtors default risk is transferred to the former.

contract characteristics can be made by exception, after fulfilling the necessary requirements and in respect to the following parameters:

The maturity date can be extended, but for no more than 10 years from the settlement date. During the extension period, it is possible to defer or reschedule repayments of the principal. It is permissible to alter the interest rate (coupon rate), frequency and other provisions referring to interest payments, as well as terms and conditions for exercising call options by the Issuer.

It is also permissible to alter the corporate bond covenants and the collateral. Last, but not least, the regulator permits amendments to the collateral or a pledge of additional collateral for the loan outstanding.

These lax regulations are in breach of best practice in relation to developed financial markets. Although the possibilities for corporate bond characteristic alterations are not the exception in developed markets, the Bulgarian regulations are alarming. The change in bond indenture parameters can be granted by the General Meeting of Bondholders (GMB). The GMB can be called by the bondholder trustee or by 10% of the bondholders (Commerce Act, Art. 214, para 1 and 2 and Public Offering of Securities Act, Art. 100a, para 7). The third party that can call the GMB is the General Meeting of Shareholders (GMS) under article 214, paragraph 3 of the Commerce Act.

GMB can legitimately alter indenture parameters if there is 1/2 representation (quorum) of the outstanding debt.[15] Then, in order for changes to take an effect, the vote must be 2/3 or over of the bonds presented at GMB (Commerce Act, Art. 214, para 5). The GMB date must be announced at least 10 days prior to the date of the convention.

What are the implications concerning bondholder rights and subsequently – the operational efficiency of the corporate bond market?

Firstly, the date of the GMB is at least 10 days after its announcement. Surely, if the meeting is even 15 days after the announcement date, the turnout would hardly be 100%. If the GMB attendance is 100, then a 67% vote would be enough to change such important parameters of the indenture such as the interest rate and maturity. If 50% attend, then only 34% of the outstanding debt issue would be enough for imposing changes in the indenture.

But that's not the end. Secondly, if there is no quorum, "In the absence of such quorum in the cases referred to in paragraphs (1) and (2) a new meeting date may be set which shall not be sooner than in 14 days, and the general meeting at such latter date shall be valid regardless of the equity represented. The date of such second meeting may be stated in the original notice as well." (Commerce Act, Art. 227, para 3).

As a consequence of the above legislative settings, as well as the deviating examples mentioned above, it is possible to state a hypothesis on the *ex-post* status of corporate bonds' servicing. In a nutshell, the current practice of issuing and supervision of corporate bonds in Bulgaria provides legal and economic premises, which may lead to *mal*-practices, such as suspensions in loan servicing, alteration of the bond interest rate, maturity and other

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[15] Note, representation is not 1/2 of the bondholders, rather 1/2 of the outstanding bonds.

parameters, last but not least – loan default. And this is in spite of the now more than decade-long harmonization of the Bulgarian law, relating to bond issuance, with EU legislation.

There are several grounds on which the already stated conjecture may come about. Firstly, the proposition of Article 204 1) of Commerce Act (amend. SG 114/99; amend. SG 58/03): "Debentures may only be issued by a joint-stock company. The issuance of debentures by public offering may be done at least two years after the company's recordation in the commercial register at the earliest, and provided it has two annual financial statements that have been approved by the general meeting"

This legal stipulation of the first statement is practically in vain, as Article 159 of the same Act allows a joint stock company to be established by one person. (Article 159 (amend. SG 84/00) 1) "A joint stock company can be found by one or more individuals or corporate bodies.") In addition to two annual accounts approved by the general meeting, there is no prerequisite of profit records for these 2 mandatory years.[16] Further, as Table 7 shows, most companies are dominantly held by one person or one outside company. In many cases, one person is not just a majority holder, but 100% owned by proxy companies. Table 7 also shows, that issuers with more than 50% stake are 85 held by individuals and 16 by an outside company, totally 101. Out of these 101, 23 issuers are owned by an absolute majority of 100%. The high concentration of the issuer ownership provides opportunities for strong bargaining power and eventually – adverse action against the interest of disperse bondholders.

Secondly, the possibility of major loan characteristics changes, like interest rate and maturity. In an attempt to deal with this contentious point the state regulator, the Financial Supervision Commission (FSC) issued a good practice guidance (Protocol № 11, 2011) on the contents of bond prospectuses for admission to public trading. It states a further requirement of declaring the possibility of bond characteristic alteration at the earliest possible stage of a security offering, i.e. a private placement offer. It also recognizes that the Commercial Law does not explicitly state the possibility of loan characteristics alteration, notably lacking case law. Together with the fact that the bondholder configuration at the private offering is not known, and after secondary admission to public trading is a secret kept by Central Depository that exposes the unwary bondholder to an extreme risk.

The above-stated obstacles to the Bulgarian corporate bond market have not passed unnoticed by some investment intermediaries, such as Mr. Kamen Kolchev, CEO of Elana Financial Holding: We have legislative loopholes, which must be closed, for instance, the general legislation of the bond market. Such legislation provides issuers with opportunistic incentives, not to proceed ethically with their investors. We had several cases in Bulgaria, publicly flagged in the media. In the last one, with Bross Holding, the loopholes in the legislation were used, so that [corporate bond] money was not redeemed. (Investbook Programme, 2015).

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[16] In fact, a number of issuers reveal in their prospectus either losses or losses and negligible profit for the last 3 years prior going public.

Our preliminary review of the corporate bond sample confirms Mr Kolchev's supposition. At January 31-st, 2016, the entire sample of 138 bond issues falls into 5 categories:

1. Repaid corporate bond issues. These are issues with regular servicing and which has been fully repaid at its original maturity date. This group is denoted as ***fully paid-up.***

2. Repaid and restructured corporate bond issues. These are issues whose parameters, i.e., loan amortization schedule, maturity, coupon rate, have been altered, but repaid by January 2016. This group is denoted as ***paid-up restructured***.

3. Certain issues that either have "Call option" to indenture or obtained the bondholders' consent have been repaid earlier than the maturity date. This group is denoted as ***early repayment***.

4. Restructured issues. These are bond issues whose maturity must have occurred by January 2016, but due to loan parameters alteration, the maturity date was shifted forward. In this group are included also issues with original maturity after January 2016, whose maturity was extended. This group is denoted as ***restructured***.

5. Defaulted issues. When issuer ceases to pay the principal and/or interests on a loan within the original or extended maturity. Formally followed by BGM resolution to file a court case. This group is denoted as ***defaulted***.

6. Last, but not least are regularly serviced issues, within its original maturity. These issues did not bear any restructurings, and are denoted ***no change***.

Table 9 delineates the distribution of the above defined four categories corporate bonds.

Table 9

Ex-post status of corporate bond issues 2004-2014 at January 2016

Fully paid-up	Paid-up restructured	Early repayment	Restructured	Defaulted	No change	Total
62	11	13	26	8	18	138
44.93%	7.97%	9.42%	18.84%	5.80%	13.04%	100.00%

Source: Bond issue prospectuses, Bulgarian Stock Exchange News Platform, Author's calculation.

At first glance defaulted corporate bonds are 5.8% of the sample, but assuming the subsample of matured issues (94), then the actual defaulted rate rises to 8.51%. However, in terms of value the default rate of Bulgarian corporate bonds is 3.76%. The defaulted corporate loans rate for the whole Bulgarian bank system is 11.52%[17] of the outstanding principal at the end of 2016, a rate three times higher than that of the corporate bonds. However, a closer look at the corporate bond issues where default occurred reveals a pattern. For the entire sample of corporate bonds, 37 out of 138 issues have as their object "Repaying loan outstanding". For the defaulted issues however the figure is 7 out of 8. Are some of these corporate bonds a "last resort" for restructured bad bank loans? That question opens an opportunity for much needed further research in this area.

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[17] Bulgarian National bank, Reference on nonperforming loans and advances and the accumulated impairment.

It seems though that restructured issues pose a greater threat compared to defaulted ones. Firstly, their weight is comparatively higher, 18.84%. Secondly, bondholders can pledge their cash flow from the collateral of defaulted issues, despite often lengthy and protracted court procedures. With the restructured issues they can only wait, in many cases being compensated with a reduced coupon rate.

The prevailing number of corporate bond issues in Bulgaria have been carried out through private placing. For the period 2004-2014 the sample consists of 138 issues in total with 135 of them privately executed.

It emerges from this research that the banks are leaders in issuing corporate bonds, followed by Real Estate Investment Trusts (REITs) and Holding companies for the period 2004-2014. However, that trend was evident prior to 2009, but abated somewhat afterwards. Inasmuch as some corporate bonds have experienced a coupon rate reduction, the original YTM presented in Figure 2 will be further lowered.

The preferred currency of Bulgarian corporate bonds is Euro, constituting more than 2/3 of total principal value outstanding. In the earlier period under review issues with 3 years maturity were prevalent, while in the second half of the period 5 years or longer maturity became a norm. Floating rate bonds (FRB) were fashionable from 2004 to 2008, and almost disappeared afterward. Out of 138 issues consisting of the total sample of corporate bonds, 55 bond issues have covenants. In many instances, issues with covenants attached are also collateralized. However, the prevailing number of covenants are set at inadequately low levels, typical for distressed firms.

The predominant volume of issues allocate funds towards some form of "restructuring" (repaying debts outstanding, Leveraged Buyouts and asset restructuring), financial intermediation (bank loans, consumer financing, purchasing accounts receivable, consumer leasing and factoring) or asset securitization – land and tangible property. The object of funds allocation turned out to be an important indicator discriminating defaulted issues – 7 out of 8 defaulted issues, raised bond money to repay former (mostly bank) loans.

Most of the collateralized issues are backed with real estate mortgages (38), followed by the first pledge on receivables (18) and loan insurance (16). Generally, the pledge on receivables may pose some risks. Companies whose businesses involve consumer and goods credit, or debt collecting, declare their (present and future) receivables as a collateral. In fact, these are the bondholders' money, but in a much riskier position. There are also problems with real estate mortgages.

It is also worth noting the thin trading[18] of the corporate bonds on the secondary market. The idea of opting for private placing across institutional investors first, and then gaining access to the secondary market to create liquidity of corporate bonds does not seem to work. The trade activity and the wide involvement of small investors in the secondary corporate bond market is hampered by lax legislative settings, allowing for bondholders'

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[18] As of October 2018, the total value outstanding of corporate bonds was 739 million BGN, as Euro denominated ones accounted for over 80%. For 2018 the average trade of corporate bonds varies between 2.1 and 2.4 million BGN a month. (Infostock, 2018).

wealth expropriation. The latter does not take place without the complaisant assistance[19] of the major bondholders – fiduciary institutions such as pension and mutual funds.

These facts unequivocally call for legislative amendments to corporate bond regulation, most important *inter alia*, stipulating that alteration of the major parameters of corporate bond indenture, such as interest rate, maturity and collateral require 100% votes of bondholders. This is supported by Wilson and Fabozzi (1995: 31): "changes of a substantive or essential nature require a 100% vote. The latter category includes changes in the maturity, interest rate, redemption premium, place of payment, currency in which the debt is payable, or any provisions which would impair the right to start a legal suit for the enforcement of any defaulted payment." It is undoubtedly strange that norms accepted as "industry standard" can be circumvented. Another measure may be to cease the practice of private placement first and then access to public trading.

Both proposals aim to protect bondholders. Such measures, however, could actually provide a higher degree of protection for bondholders, but, on the other hand, higher protection may bring about lack of flexibility and other problems for the bondholders. That is why more appropriate actions can be directed towards setting higher standards for collateral and covenants in prospectuses as well as higher scrutiny, when the regulatory body (FSC) approves prospectuses. In addition to measures aiming at reducing the possibility of conflict of interest from fiduciary institutions – pension funds, mutual funds and insurance companies, it would be prudent to insist that stakes in bond issues over 10% be publicly announced before admission to public trading, in a manner similar to shares of stock.

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[19] The conflict of interest problem, where pension fund(s) belonging to a financial group buys corporate bonds of an issuer located within the same group is not unfamiliar to Bulgarian lawmakers. The latter became a public fact, owing to the "Trud" (Labour) newspaper inquiring in the Bulgarian Parliament Budget and Finance Commission and FSC. The Trud newspaper question (one of 15 questions) was "What is the information available to the FSC in respect to the funding of Mr. Ivo Prokopievs' businesses by corporate bonds and stocks held by pension funds?" From the FSC's (Republic of Bulgaria Parliament, 2015) answer became clear: 24% of issue BG2100007033, Kaolin JSC, 40% of issue BG 2100010094, Alpha Finance Holding, 27.54% of issue BG2100021091, Alpha Energy Holding JSC are bought by Doverie pension fund.

However, the newspaper Capital (close to Mr. Prokopiev) replies in turn (Capital, 22.01.16): "What the [pension] funds of Himimport and Eurohold undertook, was to exchange stacks of shares and bonds of their companies. For instance, Suglasie (pension fund) and CKB – Sila (pension fund) became investors in companies tied to Eurohold, including its majority owner – Starkom Holding. In return, Budeshte [pension fund] invested in Velgraf Asset Management and Web Finance Holding (the biggest shareholder in Suglasie [pension fund]. This is not an entirely new strategy. Prior to 2015 such cross-deals were carried out by Budeshte [pension fund] and Toplina [pension fund]. Now simply the scale is up."

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Svitlana Achkasova[1]

THE SCALE MEASUREMENT OF THE INDICATORS OF THE STRESS RESISTANCE ASSESSMENT OF INSURANCE COMPANIES IN UKRAINE

The article analyzes a method for measuring the indicators of the stress resistance *of the insurance company by means of microprudential indicators that provide an objective assessment of the sensitivity of insurance companies to various crisis situations. Detailed analysis of existing indicators of the assessment of the stress resistance of insurance companies is given and the characteristics of their application during the scale measurement are described. The author has justified the effect of the level of stress resistance of insurance companies on the level of their risks.*
JEL: G20; G22; G28; G31; G32

1. Introduction

In Ukraine, the insurance market is in a phase of active growth and more and more citizens are using the services of insurance companies, in addition to mandatory legislation. However, legislation regulating the activities of insurance companies was changed, and the result of these changes was the imposition of more stringent requirements to the terms of insurance companies, which led to the elimination of some of them. That is why the question of assessment of the stress-resistance of an insurance company is relevant now, because it provides an opportunity to analyze the company's ability to operate under various unforeseen circumstances, which indicates a certain level of preparation for crisis situations and the ability to protect the interests of the client in any conditions.

The entry of Ukraine into the global financial system requires a gradual transition to state supervision and regulation based at international principles set by the agreements and standards of international organizations. Thus, the study and implementation of a range of activities and innovations at the state level aimed at introducing new conditions in the insurance industry, which does not change the fundamentals of the system but leads to the elimination of problems and contradictions in the insurance market is relevant (Achkasova, 2015).

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The use of the formed indexes' composition of assessment of the insurance companies' stress resistance involves the development of a scale measurement of these indicators for evaluation.

The purpose of the article is to construct microprudential indicators, which are the basis of the diagnostic tools for micronutrient supervision for its implementation, considering the indicators of assessment the stress resistance of insurance companies in Ukraine.

To achieve this goal, the following tasks need to be addressed:

1. To construct the scale of the micro-prudential indicators considering indicators of the assessment of the stress resistance of insurance companies.

2. Analyze the impact of the stress levels of insurance companies on the level of its risks.

The novelty of the study lays in the used methodology based on analysis of the scale of indicators for assessing the stress-resistance of insurers. The described approach is designed to provide retrospective and perspective assessments of insurance companies under the influence of risk factors, reducing time and resources, aimed at assessing the position of micro-prudential supervision over the activities of insurers (regardless of branch affiliation).

2. Literature overview

Such researchers as O. O. Nedosekin (2002, 2003), V. I. Lyametz (2004) and others have made the greatest contribution to the mathematical theory of measurement and scaling. Significant input is also made by S. Stevenson (1960) in the theory of measuring scales.

The Concept for introduction of prudential supervision of non-bank financial institutions for the purpose of prudential supervision is to protect the interests of consumers of financial services, prevent insolvency and ensure the stability of financial institutions through the identification of the risks of their activities; control over the level of solvency, liquidity and profitability; prevention of cases of systemic crisis; forecasting of financial results based on reports of the current period. That is why assessing the stress resistance of insurance companies has a significant potential for use in prudential supervision.

Stress testing assessment of insurance companies was examined in the papers of: Jobst (2014), Komarkova and Gronychova (2012), Ong and Pazarbasioglu (2013) and others.

The question of considering the peculiarities of the operation of insurance companies in crisis situations is also relevant. Ong and Pazarbasioglu (2013) studied the features of conducting crisis stress testing on the governmental level by a thorough examination of their banking system using scales, monitoring and taking action when valuations have fallen to certain levels.

Stress testing assessment in the banking and insurance sectors is similar. This thesis was justified by Komarkova and Gronychova (2012). The authors determined that both sectors face similar risks; however, there are some differences in the regulatory regimes based on the nature of insurance company's activity. Thus, stress testing methodology for bank

sector cannot be applied for insurance companies but can be transformed considering their special aspects.

The issue of ensuring the resistance of financial institutions was studied by authors: R. Blanchard (2012), Yu. L. Borko (2008), E. V.Boronina (2011), Bruder B. (2009), Gersl A. and Hermanek J. (2006), Rosch D. and Scheule H. (2008), R.Pukała (2017), IMF specialists (2012), EIOPA (2003; 2010) and others.

For example, according to Bruder B. (2009) risks are difficult to quantify in terms of probability distributions. Therefore, banks use a scenario-based approach (i.e. stress test scenarios), which can either be: repetition of a historical event, hypothetical crack scenario.

According to the publication of Gersl A. and Hermanek J. (2006) the methodology of selected financial soundness and financial stability indicators, including the attempts to construct an aggregate financial stability indicator are described. Rosch D. and Scheule H. (2008) considered that the stress of exposure at default and loss given default or exposure at default are modelled based on economic downturn conditions.

The theoretical and methodological support for assessing the stress resistance of insurance companies, as well as the methodical tools of prudential supervision for improving its efficiency, are not sufficiently developed. Apart from the issue of assessing the insurer's sensitivity to the risk factors, based on a prospective assessment of the financial situation, considering the adverse factors of risk, aimed at increasing the riskiness of the insurance company's performance during stress testing, remain questions. This necessitates the development of methodological approaches and practical recommendations for assessing the stress resistance of insurance companies, which proves the relevance of the study topic.

3. Methodology

The insurer's stress resistance is the ability of an insurance company to maintain a state of equilibrium under the influence of stress factors in the case of crisis situations. That is why assessment of the stress-resistance of insurance companies remains a relevant question, and requires a further research.

Stress resistance assessment of insurance companies is relevant as stress testing procedures are outlined by separate methodological recommendations from national regulators of countries and international practices for controlling the activities of insurers.

The foreign experience of state regulation of the insurance market involves the use of a wide range of instruments, which are conventionally divided into preventive, health and diagnostic.

Recreational instruments are aimed at correcting the negative states and trends in the activities of the insurance company and the insurance market in general.

Diagnostic tools are used by supervisors during field and off-site inspections of insurance organizations.

Preventive measures are used to prevent a particular type of risk or its reasons.

It is precisely the preventive instruments used by the state regulatory authorities to implement prudential supervision over the activities of insurance companies. The concept of stress resistance arose in physiology to denote a non-specific generalized reaction of the body in response to any adverse effect. The concept of "stress" was first introduced in science by the doctor of the Montreal University Hane Selye in 1946 to determine the impact of various nonspecific factors or "stressors" on the human body. Later, the concept of stress was expanded and became used to characterize the features of the states of financial institutions, insurers. To assess the willingness of insurers to deal with potential crisis situations, in particular, the Authorized Regulators, Insurers' Stress Testing, which is a tool for verifying their preparedness for probable crisis situations, the size of the required capital to cover possible losses in the event of a risk when using prospective impact assessment methods, are used on their financial state of stress factors.

The stress resistance of the insurer enriches the conceptual and terminological apparatus of prudential supervision over the activities of insurers, whose main objective is to protect the property interests of consumers of insurance services and to ensure confidence in the insurance market. The assessment of stress tolerance will confirm that the insurer is able to maintain a state of equilibrium under the influence of stress factors in the event of crisis situations. The presence of material financial losses of the insurer in the amount of not less than 10 percent of the amount of assets on the balance sheet indicates crisis situations.

Micro-prudential supervision of the activities of insurance companies involves the use of certain tools: microprudential indicators of insurance companies, stress testing, determining the adequacy of the capital of insurance companies.

Practical implementation of microprudential supervision is especially relevant as further diagnostic monitoring of macroprudential indicators is carried out based on aggregated microprudential factors, which determines the direct dependence of the insurance market indicators in general on the performance of individual insurance companies.

The main objectives of exercising microprudential supervision: protecting the interests of financial services consumers, preventing insolvency and ensuring financial stability of financial institutions through the application of appropriate corrective measures by: identifying increased risks in the activities of financial institutions; control over solvency, liquidity and profitability of a financial institution; minimizing bankruptcy and systemic crisis of financial institutions; forecasting of future financial results based on reports of the current period.

Taking into account the presence of a significant number of risks to the insurance companies: accounting risk, business risk, credit risk, operational risk, underwriting risk, loss risk, reinsurance risk, reputational risk, market risk, insurance risk, technological risk, and the risk factors that determine their onset, the current risk management system will not be fully effective, since the introduction of stress testing (the ability to identify key risk factors and assess their impact on the financial condition of the insurer) is at an early stage and its practice application is insignificant.

The rational use of information, namely, the importance of indicators for assessing the stress resistance of insurance companies, may be conditional on its transformation into a

form suitable for further analysis, aimed at making decisions by the heads of insurance companies, the national regulator and consumers of insurance services. In this regard, before moving on to the description of the mathematical and statistical methods used to process this information, it is necessary to consider the main possibilities and limitations of its formalization. Depending on the nature of the indicator, it can be measured according to the appropriate type of scale (V. I. Lyametz, 2004): the nominal scale is a simple type of measurement in which numbers or symbols are used only for the classification of objects. The scale does not allow any operations with numbers.

The order scale of objects of one class is in some respects with the objects of another class (more than; preferable; stronger, etc.); If [A]> [B] for some (but not all) objects of classes A and B, then we have a partially arranged scale. The rank order allows you to calculate the scale, the median, the percentage, and the ratios of the rank correlation.

The interval scale is a sequence plus the known distances between two any numbers on a scale (zero point of the scale and the unit of measurement are chosen arbitrarily). Known relation of any two intervals. The indicator of variation (Gromyko, 2002) can not be determined.

Scale ratio (absolute) - interval plus real zero point (the ratio of any two points of the scale does not depend on the unit of measurement) of any two intervals. The relationship between any two points is determined. For this scale, all statistical and arithmetic operations are admissible (Gromyko, 2002).

Rational use of information involves the need for formalization of information. Indicators used in assessing the stress resistance levels of insurance companies are metric.

Metric scales include the scale of the intervals and the scale of the ratio. Scale ratio is used when an absolute reference point exists. For scoring indicators, it is advisable to apply an interval scale, since this scale allows measuring the values of the indicators at the appropriate intervals, in addition, it allows to determine the magnitude of the difference between the intensities by the indicators and the zero point of the reference is set arbitrarily.

Methods of constructing interval scales are based on the axiom of normality. Estimates are distributed in the economy according to Gauss's normal law, when the extreme intensity of the index occurs less frequently than the intensity close to the average. For the most part, the indicators are not distributed according to normal law (Gromyko, 2002).

The symbolic designation and formulas for calculation of the indicators presented in table 1.

Table 1

Indicator	Symbolic designation	Formula of calculation	Economic content
Receivables ratio	I_1	Receivables / Capital	Shows the specific weight of receivables in the insurer's capital, the ability to repay debts in the short term
Risk factor of assets	I_2	Accounts receivable: (Insurance premiums + Amount of reimbursement received from reinsurers)	Characterizes the credit policy of an insurance company and its potential ability to risk the deterioration of asset quality
Insurance risk factor	I_3	Net Awards / Capital	Shows how many net bonuses per unit of capital
Loss ratio of insurance operations	I_4	Insurance indemnity / Insurance premium	Characterizes the level of payments and makes it possible to compare the costs of repayment of the insurer with the assumed liability insurance
The level of capital in total assets	I_5	Capital / Assets	Indicates the ability to absorb the risk of loss
Risk factor Independence indicator from reinsurance	I_6	Net insurance premiums / Insurance premiums	It serves as a feature of insurance risk management policies
Indicator of insurance reserves adequacy	I_7	Net insurance reserves / Average amount of insurance premiums received over the past 3 years	Evidence of the adequacy of the existing insurance reserves in view of the receipt of insurance payments
The indicator of independence	I_8	Equity / Equity capital	Characterizes the independence of the insurance company from external sources
Actual solvency margin		Assets – intangible assets liabilities, including insurance	-
Statutory margin of solvency	-	(Insurance premiums - $0,5 \times$ Insurance premiums transferred to reinsurance) $\times$ 0,18	-
Statutory solvency margin	-	(Insurance indemnities - $0,5 \times$ Insurance indemnities received from reinsurers) $\times$ 0,26	-
Stability factor	I_9	Statutory margin of solvency/Statutory solvency margin	Characterizes a financial condition in which an insurance company is able to fulfill its obligations
The indicator of profitability of the insurance activity	I_{10}	Net profit (loss) / Insurance premiums	Displays the effectiveness of insurance activity in relation to turnover, or the profitability of sales
Management stability factor	I_{11}	Administrative expenses / Insurance premiums	Characterizesthelevelofexpensesinthetotalinsurancereceipts

In Table 2 are the quantitative characteristics of indicators of assessing the stress resistance of insurance companies, and in Figures 1-3, the frequency distribution of stress-rating indicators for insurance companies with direct normal distribution calculated on the data of annual financial statements of 80 insurance companies and with the elimination of non-typical or rare values (cases) that significantly deviate from the distribution of other values indicators.

Figure 1

Histogram of the 4 indicators' distribution for assessing the stress resistance of insurance companies

Receivables indicator (I_1)

Indicator of asset risk (I_2)

Indicator of insurance risk (I_3)
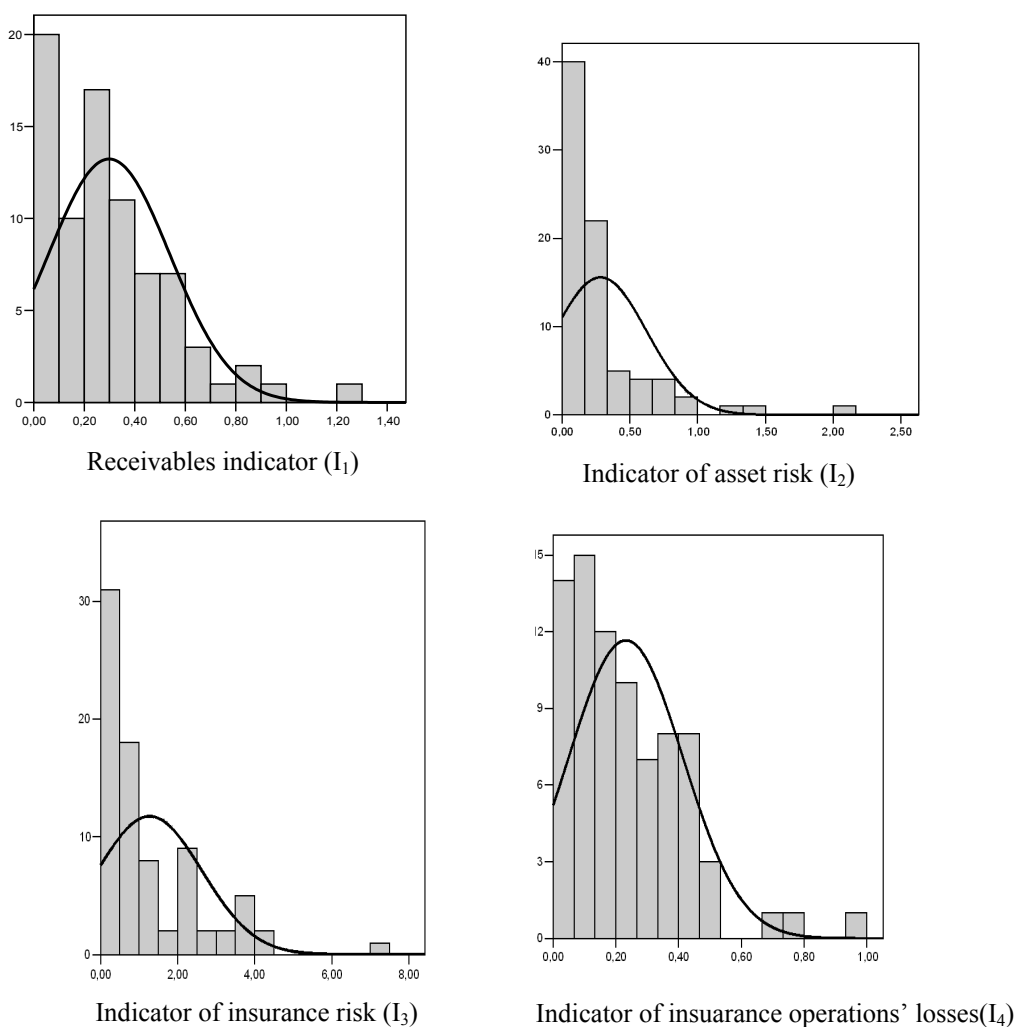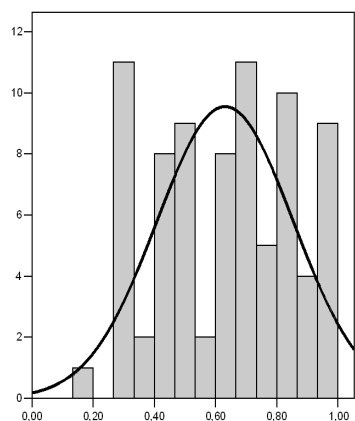
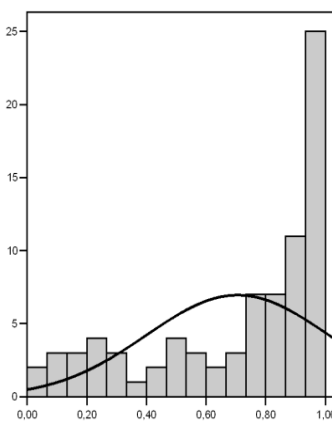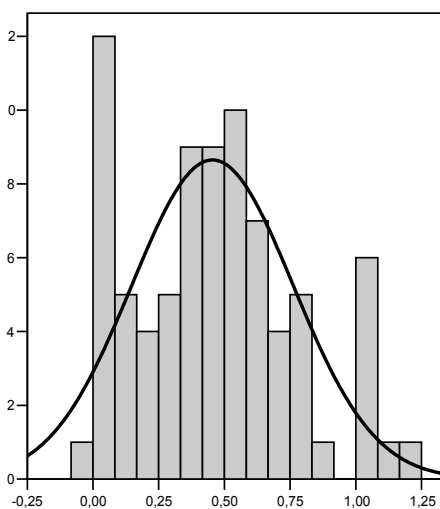Indicator of insuarance operations' losses(I_4)

Figure 2

Histogram of the next 4 indicators distribution for assessing the stress resistance of insurance companies
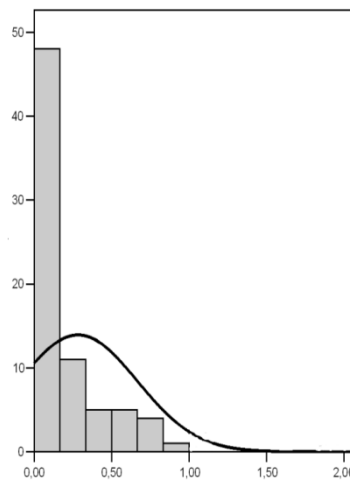

The specific weight of capital in total assets (I_5)

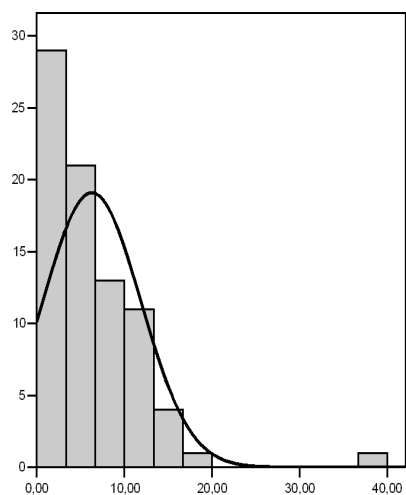Indicator of riskretention (I_6)

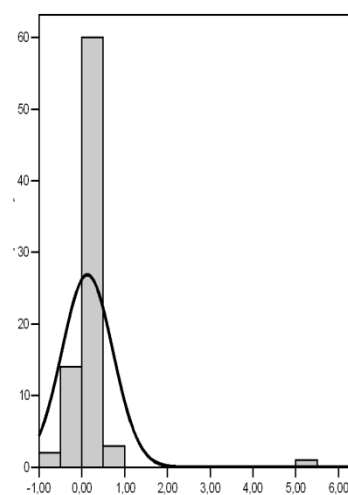Indicator of insurance reserves' adequacy (I_7)

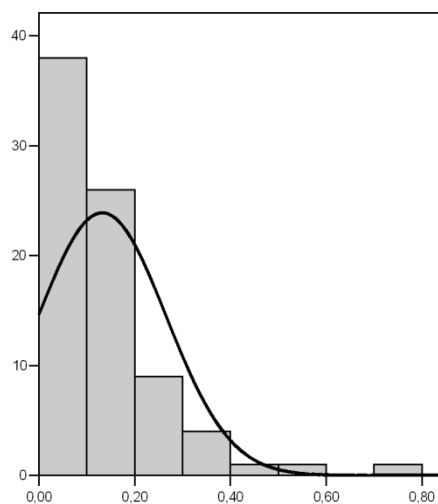Indicator of independence (I_8)

Figure 3

Histogram of the next 3 indicators distribution for assessing the stress resistance of insurance companies

Indicator of solvency margin (I_9)

Indicator of insurance activity's profitability (I_{10})

Management stability indicator(I_{11})

Table 2

Quantitative characteristics of indicators for assessing the stress resistance of insurance companies

Indicator	Symbols	I_1	I_2	I_3	I_4	I_5	I_6	I_7	I_8	I_9	I_{10}	I_{11}
Medium	x	0.298	0.283	1.194	0.232	0.631	0.706	0.4546	0.284	6.29	0.130	0.132
Median	M	0.253	0.164	0.715	0.195	0.66	0.8	0.4485	0.13	4.75	0.036	0.106
Mode	Mo	0.07	0.1	0.4	0.03	0.72	1.0	0	0.1	1	0.02	0.00
Standard deviation	δ	0.241	0.341	1.411	0.182	0.223	0.306	0.307	0.381	5.573	0.593	0.132
Asymmetry	A	1.370	2.9	1.278	1.408	-1.138	-0.854	0.363	2.204	2.644	7.359	2.176
Average square deviation of asymmetry	δa	0.269	0.269	0.269	0.269	0.269	0.269	0.269	0.269	0.269	0.269	0.269
Assessment of asymmetry	$\dfrac{\lvert A \rvert}{\sigma_a}$	5.093	10.781	4.751	5.234	4.227	3.175	1.3494	8.193	9.83	27.357	8.0855
Value of probability by Kolmagorova-Smirnovacriterion	p	0.019	0.000	0.000	0.041	0.044	0.000	0.000	0.000	0.000	0.000	0.000

As shown in Figures 1 and 2, some indicators are not distributed according to the normal distribution law. The histogram gives an opportunity to evaluate qualitatively the various characteristics of the distribution, but the obtained distribution of indicators must be confirmed by the quantitative characteristics of the indicators, which are given in Table 1.

As can be seen from Table 1, under the normal distribution law, the value of the mod, median and mean coincide (Zhuravka, 2010). However, some indicators for assessing the stress resistance of insurance companies are not distributed according to the normal distribution law, that is, there is a discrepancy between the values of the mod, the median and the mean value, indicating the asymmetry of the distribution of indicators.

The asymmetric distribution is characterized by the fact that most of the values of the indicators are on the one hand from the mean value, and the other part is located on a large distance from the other side (Prytula, 2008).

Based on the data of Table 1 it is possible to further scale the indicators, taking into account the right-hand and left-hand side asymmetry, if the indicators are not distributed according to the normal law.

With the asymmetric distribution of the intensity of the indicators, the most informant is the median represented in Figure 4 (Prytula, 2008).

As can be seen from Figure 4, based on the discrepancy between the values of the mode, the median and the mean value in the presence of asymmetry in the distribution of the intensity of the indicator when constructing the interval scale, it is more appropriate to use the median instead of the mean value (Prytula, 2008).

Figure 4

Right-hand distribution asymmetry with fashion, median and average values
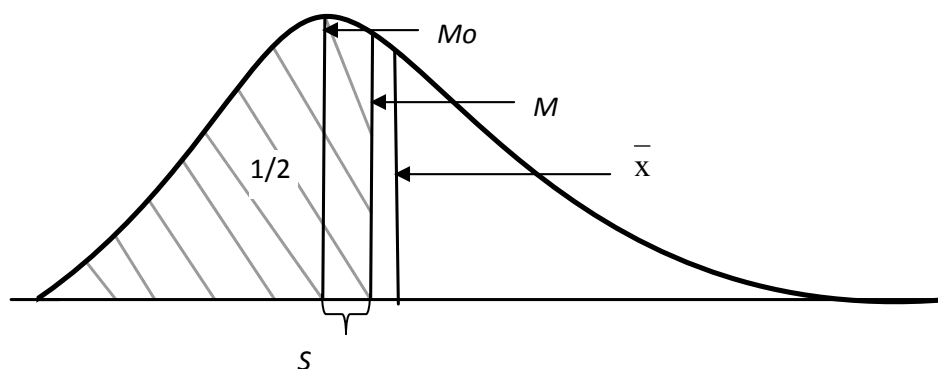
In the rightmost asymmetry the intensity to the left of the median are denser than each other to the value S, and to the right – the distance between them increases (Fig. 4). In the left-hand side of the asymmetry there is a reverse.

In order to determine how far the distance between the intensities in the asymmetric distribution changes with respect to the values in normal distribution, it is proposed to introduce a correction factor equal to S, reduced in proportion to the number of divisions of the scale lying to the right and left of the median (n = 5/2 = 2,5) (N.I. Prytula, 2008):

$$k = \frac{S}{n},$$ (1)

$$S = \frac{M - Mo}{M}$$ — in case of right-sided asymmetry; (2)

$$S = \frac{Mo - M}{Mo}$$ — in case of left-sided asymmetry (3)

When constructing an interval scale according to the rule of "three sigma" with the right asymmetry, the scale has a range of values (M - 2σ к, M + 2σ (k + 1)), with the left-hand side asymmetry - (M - 2σ (k + 1), M + 2σ k). In fig. 5 a scale with right asymmetry is depicted.

Application of Fig.5, when constructing scales with the correction indicator (k) and the median, it is possible to obtain the values of scales intervals for indicators I_1, I_2, I_3, I_4, I_7, I_8, I_9, I_{10}, I_{11} with right asymmetry (Table 2) and for indicators I_5, I_6 with a left-sided asymmetry (Table 3).

Figure 5

Construct a scale with right asymmetry
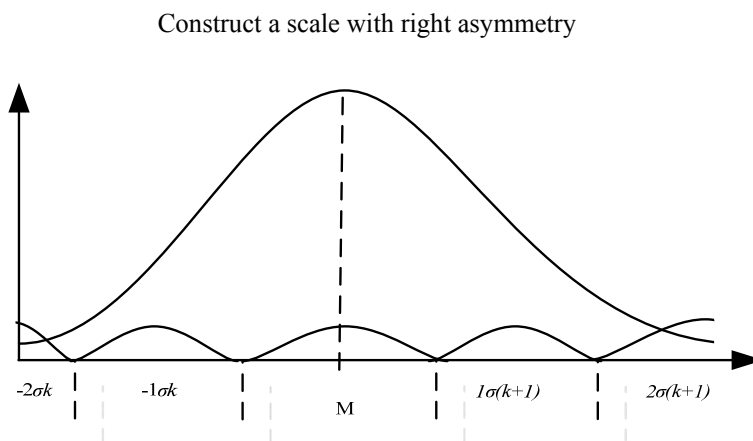
The determination of the intervals of the values of indicators took place in the following sequence:

1. The calculation of the distance between the mode and the median by the formula (2) for the indicators I_1, I_2, I_3, I_4, I_7, I_8, I_9, I_{10}, I_{11} and by the formula (3) for indicators I_5, I_6 is made, adding the corresponding values for this from Table 1.

2. The value of the correction factor (k) by the formula (1) for each of the indicators is calculated.

3. Based on Fig. 5 intervals of values of indicators are calculated.

The intervals of values of the scale of indicators for right-hand asymmetry are given in Table 3.

Results data in Table 3 indicate the use of these intervals separately for each indicator, as well as for an integrated assessment of the financial condition of insurance companies.

Scale measurement of stress resistance of insurance companies was conducted by using methods of mathematical statistics (Pukala, 2017).

The intervals of values of the scale of indicators for the left-hand side of the asymmetry are given in Table 4.

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Table 3

Intervals of values of the scale of indicators with right-sided asymmetry

Calculation procedure	Interval value								
	I₁	I₂	I₃	I₄	I₇	I₈	I₉	I₁₀	I₁₁
[-∞; M - 2σk)	[0; 0,114)	[0;0,058)	[0; 0,240)	[0; 0,072)	[0;0,203)	[0; 0,059)	[0; 1,23)	[-∞; - 0,175)	[0;0,0004)
[M-2σk; M – 1σk)	[0,114; 0,183)	[0,058; 0,111)	[0,240; 0,487)	[0,072; 0,170)	[0,203; 0,325)	[0,059; 0,095)	[1,23; 2,99	[- 0,175; - 0,069)	[0,0004; 0,053)
[M – 1σk ; M + 1σ(k+1)	[0,183; 0,564)	[0,111; 0,558)	[0,487; 2,341)	[0,170; 0,439)	[0,325; 0,878	[0,095; 0,546)	[2,99; 12,083	[- 0,069; 0,734)	[0,053; 0,291)
[M + 1σ(k+1) ; M + 2σ(k+1)	[0,564; 0,874)	[0,558; 0,952)	[2,341; 3,946)	[0,439; 0,682)	[0,878; 1,308)	[0,546; 0,962)	[12,083; 19,416	[0,734; 1,432)	[0,291; 0,476)
[M + 2σ(k+1); +∞)	[0,874; 1)	[0,952; 1)	[3,946; +∞)	[0,682; 1)	[1,308; 1)	[0,962; 1)	[19,416 ; +∞)	1,432; +∞)	[0,476; 1)

Table 4

Intervals of the scale of indicators for left-sided asymmetry

Calculation procedure	Interval value	
	I₅	I₆
[0; M – 2σ(k+1)	[0;0,139)	[0;0,199)
[M – 2σ(k+1); M – 1σ(k+1)	[0,139; 0,470)	[0,199; 0,429)
[M – 1σ(k+1) ; M + 1σk)	[0,470; 0,824)	[0,429; 0,667)
[M + 1σk; M+2σk)	[0,824; 0,849)	[0,667; 0,675)
[M+2σk; +∞);	[0,849; 1)	[0,675; 1)

So, in Tables 3-4 is shown the intervals of the values of the indicators of the assessment of the stress resistance of insurance companies. The urgency of this study led to the need for identifying the main indicator indicators, which are related to the stability of insurance companies. The use of selected estimates of the stress resistance levels of insurance companies, based on the calculation of insurers' financial statements, can reveal trends in cumulative and increased risks of insurers. The technique of analysis is based on quantitative indicators, their limits and a qualitative interpretation of the information obtained in the process of assessing the stressors of insurers.

Investigating the conditions for micro-prudential supervision over the activities of insurance companies, it became clear that the approach to assessing the problems of insurance companies in the early stages, the definition of risk-based diagnostic risk-based tools and a thorough analysis of the impact of risk factors have not been adequately developed. This made it possible to conclude that it is necessary to construct scales of microprudential indicators, which will help to improve the national regime of prudential supervision, reduce its fragmentation.

To solve the problem of the scale measurement of microprudential indicators, which form the composition of the indicators for assessing the stress resistance of insurance companies, the main indicators of their activities have been derived from data from 80 insurance companies. Representativeness of this sample has been checked (the concentration indicator and the sample share in insurance premiums and insurance indemnities in the market is more than 70%).

According to the results of calculations of the indicators of stress resistance assessment, it is established: these indicators are not distributed by Gauss law, which indicates the asymmetry of their division, that is, there is a discrepancy between the values of the mode, the median and the mean value. Their scale measurement is taken into account, taking into account the correction factor for right and left-hand side asymmetry of the distribution of the values of the indicators, since the methods of constructing interval scales are based on the axiom of normality. The determination of the intervals of the values of the indicators of the assessment of the stress resistance of the insurance companies is carried out in the following order: the calculation of the distance between the mode and the median with the right-hand asymmetry for the indicators I_1, I_2, I_3, I_4, I_7, I_8, I_9, I_{10}, I_{11} and for indicators I_5, I_6 in the left-hand side asymmetry The value of the adjustment indicator for each of the indicators is calculated.

The scales and criteria of the indicators of the assessment of the stress resistance of insurance companies by scaling method based on the rule of "three sigma" with the right and left-hand distribution asymmetry were obtained (Table 5).

Table 5

Scales and criteria for assessing the stress resistance levels of insurance companies

Symbol of the indicator	Criteria for assessing the stress resistance levels of insurance companies by levels:				
	very low	low	medium	high	very high
I_1	[0,874; +∞)	[0,564; 0,874)	[0,183; 0,564)	[0,114; 0,183)	[0; 0,114)
I_2	[3,946; +∞)	[2,341; 3,946)	[0,487; 2,341)	[0,24; 0,487)	(0,0; 0,24)
I_3	[0; 0,139)	[0,139; 0,470)	[0,470; 0,824)	[0,824; 0,849)	[0,849; 1)
I_4	[0,962; 1)	[0,546; 0,962)	[0,095; 0,546)	[0,059; 0,095)	[0; 0,059)
I_5	[0, 1,23)	[1,23; 2,99)	[2,99; 12,083)	[12,083; 19,416)	[19,416; +∞)
I_6	[-∞; -0,175)	[-0,175; 0,069)	[0,069; 0,734)	[0,734; 1,432)	[1,432; +∞)
I_7	[0; 0,072);[0,682; +∞)	[0,072; 0,170)	[0,170; 0,439)	[0,439; 0,682)	-
I_8	[0; 0,199)	[0,199; 0,429)	[0,429; 0,667)	[0,667; 0,675)	[0,675; +∞)
I_9	[0,952; +∞)	[0,558; 0,952)	[0,111; 0,558)	[0,058; 0,111)	[0; 0,058)
I_{10}	[0; 0,203)	[0,203; 0,325)	[0,325; 0,878)	[0,878; 1,308)	[1,308; +∞)
I_{11}	[0; 0,0004)	[0,0004; 0,053)	[0,053; 0,291)	[0,291; 0,467)	[0,467; +∞)

The developed scales and criteria of indicators of stress resistance of insurance companies as microprudential indicators are an integral part of the diagnostic tools of microprudential supervision.

Based on the classification of risks, the author substantiates the trends of changes in indicators and individual components of these indicators. The economic components according to the proposed classification of risks coincide with the components of the indicators in the formulas for calculating the indicators of stress resistance assessment.

The determination of the conformity of economic components to the proposed classification of risks and component indicators in the formulas for calculating the stress indexes of insurance companies is given in Table 6.

Table 6

Influence of negative tendency of change of indicators' components on risks of insurers

Risk group	Indicator	I_1	I_2	I_3	I_4	I_5	I_6	I_7	I_8	I_9	I_{10}	I_{11}
Risks related to responsibility and insurance activities	Insurance payments ↓	-	-	+	-	+	+	+	-	+	+	+
	Insurance payments due to reinsurers Unbalanced ↑	-	-	-	-	+	-	-	-	+	-	-
	Net insurance premiums (insurance premiums less bonuses belonging to reinsurers)	-	+	+	-	-	-	-	-	-	-	-
	Insurance indemnity	-	-	-	-	+	-	+	-	-	-	-
	Insurance payments received from reinsurers	-	-	-	-	+	-	-	-	-	-	-
	Net insurance indemnity (insurance compensation reduced by the amount of insurance reinsurance from reinsurers) Unbalanced ↑	-	-	-	-	-	-	-	-	-	-	-
	Operating Expenses Unbalanced ↑	-	-	-	-	-	-	-	-	-	+	-
	Insurance reserves Unbalanced ↓	-	-	-	-	-	-	-	-	-	-	+
Risks related	Investment Income Unbalanced ↓	-	-	-	-	-	+	-	-	-	-	-

with assets and investment activities	Assets ↓	+	+	-	+	-	-	-	+	-	-	-
									+			
	The share of a reinsurer in insurance reserves ↓	-	-	-	-	-	-	-	-	-	-	+
	Receivables↑	+	-	-	-	-	-	-	-	+	-	-
Supplemented by the formulas of indicators	Responsibilities	+	+	-	-	+	-	-	+	-	-	-
	Equity	-	-	-	+	-	-	-	-	-	-	-
Negative trend of indicator change		↑	↓	↓	↑	↓	↓	↓	↓	↑	↓	↑

Symbols :						
Used in numerator formula -	[hatched]	Supplemented by the formulas of indicators -	[shaded]	Indicator of independence -	I₄ — The specific weight of capital in total assets -	I₈
Used in the denominator formula -	[vertical hatch]	Indicator of receivables -	I₁	Indicator of solvency margin -	I₅ — Indicator of assets' risk -	I₉
Magnification -	↑	Indicator of insurance risk -	I₂	Indicator of insurance activity profitability -	I₆ — Management stability indicator -	I₁₀
Reduction -	↓	Indicator of risk retention	I₃	Indicator of insuarance operations' losses -	I₇ — Indicator of insurance reserves' adequacy	I₁₁

As can be seen from Table 6, for the insurance companies, there are the following significant risk factors: reducing the amount of insurance premiums and increasing the amount of insurance indemnities. However, this list is not exhaustive.

To determine the expert opinion about the possibility of using individual indicators characterizing the financial condition of insurance companies to determine the risk exposure of insurance companies, a questionnaire was conducted. The expert opinions received are considered in determining the correspondence between risks and indicators of manifestation. Indicators for assessing the stress resistance of insurance companies form a system of indicators of the risk exposure of insurance companies. Generalized information on risks and manifestations is given in Table 7.

Table 7

Correspondence between the risks of insurance companies and indicators of manifestation

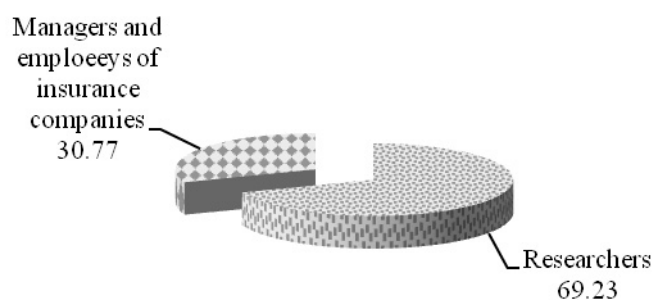| Indicators	Risk						
	Insurance	Market	Credit	Liquidity	Operation	Group	System
Indicator of receivables (I_1)	-	-	+	-	-	-	-
Indicator of insurance risk (I_2)	-	-	-	+	-	-	-
Indicator of risk retention (I_3) (Indicator of independence from reinsurance)	-	-	+	-	-	-	-
Indicator of independence (I_4)	-	-	-	-	-	+	-
Indicator of solvency margin (I_5)	+	-	-	-	-	-	-
Indicator of insurance activity profitability (I_6)	+	-	-	-	-	-	-
Indicator of insuarance operations' losses (I_7)	+	-	-	-	-	-	
The specific weight of capital in total assets (I_8)	-	-	-	-	-	-	+
Indicator of assets' risk (I_9)	-	-	+	-	-	-	
Management stability indicator (I_{10})	-	-	+	-	-	-	-
Indicator of insurance reserves' adequacy (I_{11})	+	-	-	-	-	-	-

Results, at Table 7, indicate the uneven distribution of indicators for assessing the stress resistance of insurance companies and the risks proposed in accordance with the Methodological recommendations on the use of stress tests by insurers, in particular, market and operational risks are difficult to determine through the indicators of manifestation.

The expert group included executives and employees of insurance companies, as well as researchers investigating the problems of insurance companies and the organization of risk management of insurers (Figure 6).

As can be seen from Figure 6, all experts were grouped into two groups; the largest share in the structure of respondents was made by researchers (69.23%). It should be noted that to more accurate and qualitative determination of the indicators of the insurance company's risks, it is necessary to increase the number of interviewed experts, since the results of the methodological recommendations depend on the subjective opinion of the experts, their experience and knowledge, that is, they have a subjective character (Achkasova, 2013).

Figure 6

The composition of the expert group to determine the correspondence between risk and indicator of manifestation

E. V. Boronina (2011) proposed issues of stress testing of the insurance company, which most fully characterized the groups of risks and were accompanied by economic indicators – numerical indicators of shock situations:

Market risk: How does an insurer's asset devalue when a national currency is devalued? How will the effectiveness of investment operations change if interest rate growth depends on the refinancing rate of the Central Bank?

Credit risk: What will be the proportion of risks with reinsurance cover in the overall risks taken for insurance? How will the insurance company fulfill its obligations in case of default by the reinsurer, which is its partner for the three biggest risks?

Liquidity risk: How will the insurance company operate at the simultaneous occurrence of such events: the reduction of cash flows from insurance premiums and the occurrence of insurance incidents for the three largest portfolio risks?

Operational Risk: How will an insurance company work, if problems arise in interactions with intermediaries (brokers and agents – legal entities) and their share in the provision of contractual insurance contracts, will decrease sharply? How will change the proportion of company losses with increasing fraud: a) in the middle of the company; b) intermediaries; c) insured persons?

Risks of the group: What are the insurer's actions in the event of a financial support from the parent company? What are the insurer's actions in case of the return of financial support to the parent company?

Systemic risk: What are the insurer's actions in the event of deterioration in the position of the main banks servicing its operations associated with the placement of insurance reserves?

Considering the E.V. Boronina (2011) and the author's proposed test questions, the information on the correspondence between the insurer's risk and the possible indicator of estimation is presented (Table 8).

Table 8

The correspondence between the insurer's risk and possible assessment indicator

| Risk	Test questions	Indicators of stress resistance assessment
Insurance	How will the insurance company operate at the simultaneous occurrence of such events: reduction of cash flows from insurance premiums and occurrence of insurance events of the largest portfolio risks?	Indicator of solvency margin (I_5), Indicator of insurance activity profitability (I_6), Indicator of insurance operations' losses(I_7), Management stability indicator(I_{11}).
Credit	How will the insurance company fulfill its responsibilities in case of default by the reinsurer, which is its partners at the three highest risks?	Indicator of receivables (I_1), Indicator of risk retention (Indicator of independence from reinsurance)(I_3), Indicator of assets' risk (I_9), Indicator of insurance reserves' adequacy (I_{11}).
Liquidity	What are the insurance company's actions in reducing investment income and lack of fast liquid assets and increasing insurer expenses?	Indicator of insurance risk (I_2)
Group	What are the insurer's actions in case of a financial support from the parent company?	Indicator of independence (I_4)
System	What are the insurer's actions in the event of deterioration in the position of the main banks serving its operations related to the placement of insurance reserves?	The specific weight of capital in total assets (I_8)

Applying the results of Table 8 provides for the use of marginal intervals for indicators of stress resistance. Table data results testify to the possibility of using separate indicators for assessing the stress of insurance companies depending on the target approach of its use, that is, to determine the impact risk factors for a separate group of risks, and not for all together. It is advisable to carry out the actuaries, since under current conditions the actuaries are an integral part of the system of prudential supervision, their activities must be certified and should include the compilation and submission of a mandatory annual actuarial report on the assessment of the insurance portfolio, tariff policy and policy formation of reserves, capital adequacy and solvency, investment policy, risk analysis and management mechanisms, stress testing results, etc.

To justify the effectiveness of the offered approach its preferences and difficulties need to be determined (Figure 7). Jobst (2014) highlights three main issues of existing stress testing practices such as: the risk factors may change over time and therefore disfigure the results of stress testing; the usefulness of quantitative measures may be limited by non-recurring

shocks that can not be considered by the valuation model; there are difficulties in early interpretation of signals and providing early warnings without hindsight bias.

By considering the mentioned and adding more difficulties of assessment of stress resistance of insurance companies the justification of its effectiveness by the proposed scales and criteria is shown in Figure 7.

Figure 7

SWOT-analysis of the use of indicators for assessing the stress resistance of insurance companies
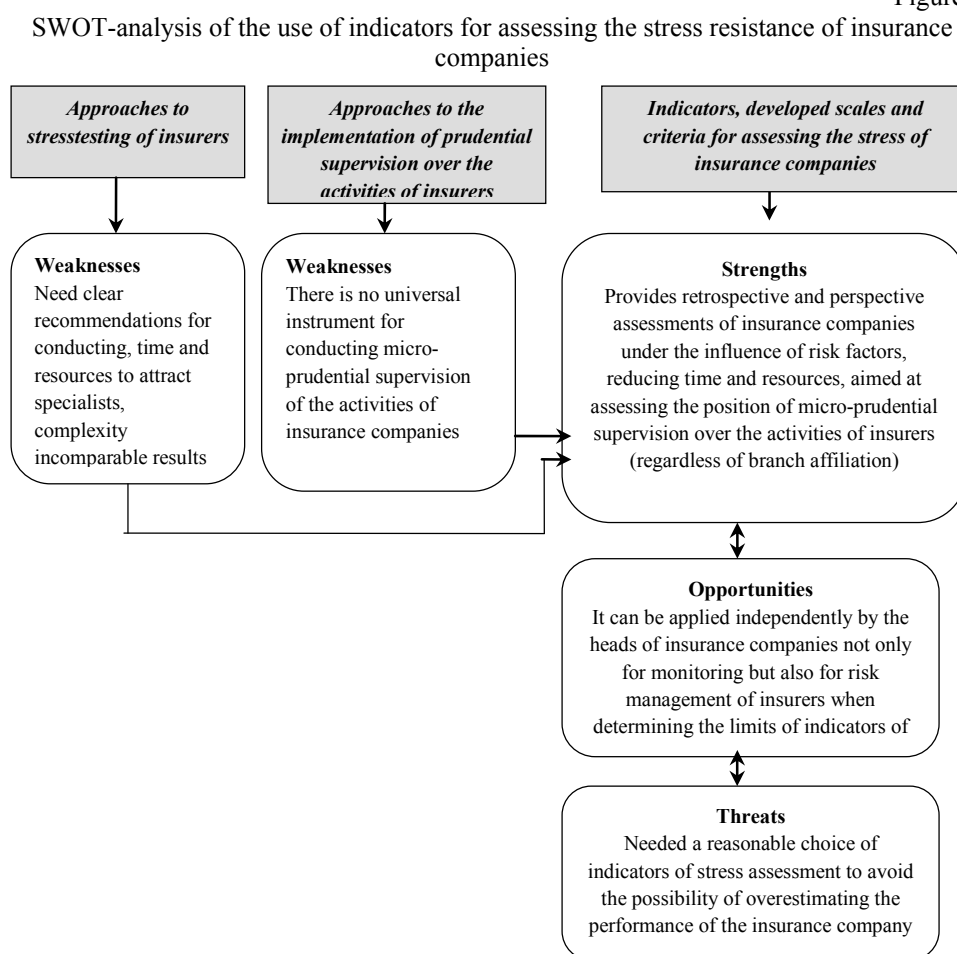
As can be seen from Figure 7, the author's approach to assessing the stress resistance of insurance companies makes it possible to determine the assessment of the stress of insurance companies under the influence of risk factors, reduce the time and resources for attracting specialists, is acceptable for self-application by managers of insurance companies, in contrast to the approaches to stress testing and the exercise of prudential supervision is universal, since it is aimed at assessing the position of micro-prudential

supervision over the activities of insurers and can be applied independently supervise insurance companies not only for monitoring, but also for risk management of insurers in determining the limits of the indicators of assessment of stress resistance.

Research materials can be used to build a stress assessment index for insurance companies, which is the subject of further research.

4. Empirical results

The empirical results of the use of indicators for assessing the stress of insurance companies are given by the example of PJSC "European Insurance Alliance" according to the data of 2011 (Table 9).

Table 9

Conducting an assessment of the stress resistance of insurance companies

Indicator	I_1	I_2	I_3	I_4	I_5	I_6	I_7	I_8	I_9	I_{10}	I_{11}
Value	0,502	1,057	0,835	0,587	4,783	0,001	0,340	0,584	0,397	0,207	0,571
The level of a scale	Average	Average	High	Low	Average	Low	Average	Low	Average	Low	Very high

As can be seen from Table 9, the indicators of the assessment of the stress resistance of insurance companies and their symbols:

with the average level of the following: the indicator of accounts receivable (I_1), the insurance risk factor (I_2), the factor of the solvency margin (I_5), the indicator of losses of insurance operations (I_7), the risk factor of assets (I_9), indicator of stability management (I_{11});

with a high level: the risk factor (I_3),

with low and very low: indicator of independence (I_4), indicator of profitability of insurance activity (I_6), level of capital in total assets (I_8), adequacy of insurance reserves (I_{10}).

For the latter group of indicators, it is advisable to develop a program of tactical, operational and strategic measures to improve these indicators.

To standardize the information required for conducting micro-prudential supervision over the activities of insurance companies, it is proposed:

* to define a retrospective assessment for summing up the results of previous years and determining the trends of the insurer;

* to determine the perspective assessment of stress resistance to determine the key risk factors and risk profile of the insurer to level these factors;

- identify the most significant risk factors for determining capital adequacy to cover losses from exposure to risks;

- determine the planned measures to increase the level of stress (content, timing) to achieve the limit values of indicators of stress assessment in accordance with the manifestation of risks;

- identify responsible executors, as the risk monitoring carried out by the risk management unit includes monitoring of changes in the values of risk indicators and the maximum allowable limits.

5. Concluding remarks

Improved diagnostic tools for microprudential supervision, the basis of which are built scales and defined criteria for microprudential indicators, their margins for their scales at very low, low, medium, high and very high levels depending on the risks insurers used in assessing the stress resistance of insurance companies. The use of established scales and criteria allows us to assess changes in indicators and to improve micro-prudential supervision.

Micro-prudential supervision of the activities of insurance companies involves the use of certain tools: microprudential indicators of insurance companies, stress testing, determining the adequacy of the capital of insurance companies.

Practical implementation of microprudential supervision is especially relevant as further diagnostic monitoring of macroprudential indicators is carried out based on aggregated microprudential factors, which determines the direct dependence of the insurance market indicators in general on the performance of individual insurance companies.

The necessity of assessing the stress resistance for raising the level of risks (insurance, credit, liquidity, group, system) is substantiated. It can be used independently by managers of insurance companies not only for monitoring but also for risk management of insurers when determining the limits of indicators of assessment of stress resistance.

Research materials can be used to build a stress assessment index for insurance companies, which is the subject of further research.

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SUMMARIES

Xavier Richet
Xieshu Wang

CHINA AND GLOBALIZATION: INTERNATIONALIZATION OF FIRMS AND TRADE IN SERVICES

Our contribution focuses on the transformations of the Chinese economy, on its growth trajectories, notably its internationalization, which was made possible by the adoption of an export-led growth model followed by a catch-up and export of good to higher value-added.
Foreign direct investment played a decisive role in this process. Inbound capital has contributed to the development of new sectors (automotive, information technology) and new specializations. Financial resources accumulated by China, then, fueled the outflows of capital in the form of acquisitions and greenfield investments around the world, especially towards developed market economies.
After recalling the phases of the transformation of the Chinese economy, the importance of Chinese outgoing FDI and their contribution to the evolution of trade in services between China and the rest of the world, the recent development of trade in services, which are heavily dependent on FDI is analyzed.
JEL: F21; F43; O1; O4; 053

Yadawananda Neog

DOES FISCAL SPENDING PROMOTE ECONOMIC GROWTH IN INDIA? AN APPLICATION OF TODA-YAMAMOTO CAUSAL APPROACH

After the 25 years of economic reform, a restless debate is still going on that is fiscal policy still has a major role to play in Indian economy or not ? This paper tries to find out the short run and long run relationship of fiscal spending with the growth of India. For estimation, we have applied Auto Regressive Distributed Lag (ARDL) model and augmented causality test of Toda-Yamamoto. Results reveal that Gross Fixed Capital Formation is positively related to growth in the long run. In Short run, Military expenditure, tax revenue and inflation are negatively associated. The Causal analysis reveals that (i) Growth causes gross fixed capital formation, (ii) Military expenditure causes growth, (iii) Growth causes tax revenues and (iv) Inflation causes growth. Based on the results, suitable policy measures also discussed in the last section of the paper.
JEL: E62; O4

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FINANCIAL WEALTH INEQUALITY DRIVERS IN A SMALL EU MEMBER COUNTRY: AN EXAMPLE FROM BULGARIA DURING THE PERIOD 2005-2017

In this scientific paper financial wealth inequality (FWI) in Bulgaria during the period of 2005:Q4-2017:Q4 has been analysed. Households' bank deposits are the best-known and most popular means for storing financial wealth (FW) among local individuals, assuming to be relevant proxy for calculating FWI measures. By using real data on quarterly bank deposit's distribution we calculate Gini coefficients, Top 1 percentile and Top 10 decile FWI indicators. Using these variables as dependent variables several econometric models have been developed using the ARDL bound testing approach of Pesaran and Shin (1999) and Pesaran et al. (2001). Long-term and short-term drivers of the FWI has been identified. Econometric results suggest that financial deepening, stock prices, interest rates and inflation contributes to FWI in the long run. Some of those variables help however decrease the wealthiest decile and percentile's financial wealth. House prices are having limited negative impact on the FWI. In the short term higher FWI in the past is indicative for higher values of the FWI measures in the future. Also, positive short-term relationship is maintained by the stock market performance Higher financial deepening is in negative association with the quarterly change of the FWI in the short-run. Amon the important short-term determinates of the FWI are also: interest rates on loans, general price level, introduction of flat tax rate of 10%, the Great recession, and Corporate commercial bank default on liabilities. Some of these factors have the opposite meaning for the FWI measured through the wealthiest percentile and wealthiest decile.
JEL: C32; D31; D63; E21

Donka Zhelyazkova

ENERGY CONSUMPTION IN THE TRANSPORT IN BULGARIA IN THE CONTEMPORARY CONDITIONS

In the present paper, the author aims to theoretically highlight the transport in logistics and to focus on some options for optimal solutions and based on analysis of the dynamics in the development of the final energy consumption in the transportation sector of Bulgaria, to reveal the role of technologies as a means of improving energy efficiency in the country's transport. In order to achieve this goal, transport is theoretically defined in the context of the overall reproduction process, its role in the supply chain is highlighted, and in this relation the system approach is reviewed as a way of optimizing transport costs. The different modes of transport are compared, as the comparative characteristic is one of the approaches that will allow to be taken transport solutions in line with the current requirements of economic efficiency and environmental friendliness.

The analytical part follows the dynamics in the development of the final energy consumption in the transport sector of Bulgaria for the period 2001-2017, differentiated by type of transport, in order to be able to highlight the specifics of the different transport alternatives with regard to the used energy sources. On the basis of the analyses made, conclusions are drawn that emphasize the established trends and the localized problems.

In the third part, the technological achievements in the field of automotive industry are presented as the main sources for improving the energy efficiency in the transport of Bulgaria.
JEL: L62 ; L91 ; Q01 ; Q49

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Valentina Lebedeva
Margarita Yaseva

THE INTELLECTUAL-INFORMATIONAL GOOD: VALUE AND MARKET PRICE

In this article, specifics of the intellectual-informational product are reviewed based on a system and structural method: its binary structure and specifics of appropriation process are determined. The advantages of free licenses for authors of the intellectual products (employees) that appear in the possibility of receiving additional income from services of the intellectual-informational goods are determined. Theoretical and methodical basics of value and price formation of the intellectual-informational good are justified. The triple value-creating substance of the intellectual-informational good that represents abstract humanization, specific humanization and utility, that the consumer receives, is determined. A cost and result nature and direct connection of elements of the value-creating substance of the intellectual-informational good are determined. The forms of value of the intellectual-informational good are analyzed. A term "functional of complex valuation of the intellectual-informational good" that consists of cost function of essential efforts of the author of the intellectual product, growth function of essential efforts of the author of the intellectual product, cost function of essential efforts of producer of the storage medium and utility function of the intellectual-informational good for the customer is proposed. Recommendations for improvement of current methods of valuation of the intellectual-informational good are given.
JEL: B41; D11; D23; D46; J24; O34

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OBLIGATION AND RESPONSIBILITY OF EMPLOYERS TO PROVIDE HEALTH AND SAFETY AT WORK – PRINCIPLES, CURRENT REGULATION AND PROSPECTS

The paper examines the specifics of the obligation and responsibility of employers to provide occupational health and safety in terms of their current state, the requirements, trends and the characteristics of the legal framework. A comprehensive analysis of the issues has been performed in their economic and labour law aspects and the corresponding conclusions and generalizations have been put forward with the aim to improve the practice of enforcing this legal construct.
JEL: J81; K31

Jordan Jordanov

KEY CHARACTERISTICS AND SCOPE OF THE BULGARIAN CORPORATE BOND MARKET

The aim of this paper is to investigate the main Bulgarian corporate bond attributes, such as: size of issue, industry, currency, maturity and floating rate occurrence, from 2004 to 2014. In addition, important parameters such as the object of allocations of funds, collateral and the ownership concentration of issuers are exposed. Examples of prospectus clauses undermining corporate bond safety and soundness are also detailed and evaluated.

Bulgaria's corporate bond legislation is analysed in relation to the potential of loopholes allowing for issuers' actions being taken against the interest of bondholders. The possibility of the former stems from loose norms of regulation permitting an ease alteration of base loan parameters. Finally, the sample corporate bond performance is analysed in terms of defaulted and restructured bond issues from 2016 perspective.
JEL: G10; G23; G28; G30

Svitlana Achkasova

THE SCALE MEASUREMENT OF THE INDICATORS OF THE STRESS RESISTANCE ASSESSMENT OF INSURANCE COMPANIES IN UKRAINE

The article analyzes a method for measuring the indicators ofthe stress resistance of the insurance company by means of microprudential indicators that provide an objective assessment of the sensitivity of insurance companies to various crisis situations. Detailed analysis of existing indicators of the assessment of the stress resistancef insurance companies is given and characteristics of their application during the scale measurement are described. The author was justified the effect of the level of stress resistance of insurance companies on the level of their risks.
JEL: G20; G22; G28; G31; G3