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- creation of an in-demand information platform to make public the results of studying socio-economic and other consequences of taxation reforms and analysis of expected effects from various tax transformations;
- increase of scientific and theoretical knowledge in the field of taxes and taxation as a science aimed at searching new constructive solutions in the taxation sphere;
- development of a package of measures of practical, organizational and legal, information character increasing efficiency and justness of taxation and tax transformations;
- comprehensive international cooperation of representatives of scientific community, public, business and various governmental bodies in improving the taxation system.

Strategic tasks:

- comprehensive and complex analysis of international and domestic experience of reforming national taxation systems;
- development of constructive measures on topical issues of counteraction and tax evasion prevention;
- support of the inter-disciplinary approach to studying such hardest phenomena as taxation and tax reforms;
- cooperation of scholars of various sciences (economics, mathematics, law, sociology and psychology) in the process of improving national taxation systems.

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Administrative and managerial issues of tax reforms

Административно-управленческие проблемы налоговых реформ

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Robot vs. tax inspector or how the fourth industrial revolution will change the tax system: a review of problems and solutions

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ABSTRACT

The Fourth Industrial Revolution and the accelerated development of cyber-physical technologies lead to essential changes in national tax systems and international taxation. The main areas in which taxation meets cyber-physical technologies are digitalization, robotization, M2M and blockchain technologies. Each of these areas has its own opportunities and problems. Three main approaches towards possible solutions for these new problems are identified. The first is to try to apply taxation to new cyber-physical technologies and products of their application. This approach includes the OECD's Action 1 Plan on Base Erosion and Profit Shifting. It also includes the spread of traditional taxes on new objects – personal data, cryptocurrencies, imputed income of robots. The second is to replace digital transactions and shortfalls in revenues by traditional objects of taxation in the form of tangible assets and people and / or increase tax pressure (including by improving tax administration with use of Big Data) and the degree of progressiveness of taxes already levied on such objects. The third approach is to set a course on building a new tax space with smart taxes based on real-time principles, smart contracts and Big Data. This implies a transition to automatic taxation using blockchain technologies, which focus on the functions of applying distributed ledgers of business transactions in real-time. At present, the general trends are such that the first and second are prevalent, which is manifested in an increase in the relative importance of property, sales and employment taxes. Concerning the third approach, any movement in this direction is still facing a number of technical and other problems and is thus being discussed mainly at the conceptual level

KEYWORDS

Cyber-physical technologies, digitalization, blockchain, taxes on digital goods, taxes in Big Data, taxes on robots, taxes on cryptocurrencies

JEL H20, H30

HIGHLIGHTS

1. Production technologies and taxes are dialectically linked. Therefore, the accelerated development of cyber-physical systems leads to substantial transformations of national taxes and international taxation
2. It is established that there are three main areas where taxes meet new cyber-physical technologies and where new fiscal opportunities and problems arise – digitalization, robotics, M2M and blockchain technologies
3. Three main approaches to solving emerging problems of taxation are stressed: the first entails extended tax coverage of new cyber-physical technologies and products

of their use; the second involves the replacement of digital transactions and shortfalls in revenues by objects of taxation in the form of tangible assets and people; while the third envisages the construction of a new tax space with smart taxes based on real-time principles, smart contracts and Big Data

УДК: 336.2

Робот против налогового инспектора, или как изменит налоговую систему четвертая промышленная революция: обзор проблем и решений

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АННОТАЦИЯ

Четвертая промышленная революция и ускоренное развитие киберфизических технологий ведут к существенным изменениям национальных налоговых систем и международного налогообложения. Основными сферами, где налоги пересекаются с киберфизическими технологиями, являются цифровизация, роботизация и М2М, технологии блокчейн. В каждой из этих сфер есть свои возможности и проблемы. Существует три основных пути возможного решения этих новых проблем. Первый путь — попытаться охватить налогами новые киберфизические технологии и продукты их использования. Этот путь включает План действий 1 ОЭСР по противодействию размыванию налоговой базы и выводу прибыли из-под налогообложения. Он также включает распространение традиционных налогов на новые объекты — персональные данные, криптовалюты, вмененные доходы роботов (электронных лиц). Второй путь заключается в замене цифровых транзакций и выпадающих доходов традиционными налоговыми объектами в виде материальных активов и людей и / или увеличении налогового давления (в том числе путем совершенствования налогового администрирования с использованием больших данных) и степени прогрессивности налогов, уже взимаемых с таких объектов. Третий путь — взять курс на построение нового налогового мира с умными налогами, основанными на принципах реального времени, умных контрактах и больших данных. Речь идет о переходе на автоматическое налогообложение с использованием блокчейн-технологий, которые ориентированы на функции применения распределенных регистров хозяйственных операций в режиме реального времени. В настоящее время общие тенденции таковы, что преобладают первый и второй пути, что проявляется в росте относительного значения налогов на имущество, продажи и занятость. Что касается третьего пути, то движение в этом направлении все еще сталкивается с рядом технических и других проблем и обсуждается в основном на концептуальном уровне

КЛЮЧЕВЫЕ СЛОВА

Киберфизические технологии, цифровизация, блокчейн, налоги на цифровые товары, налоги в сфере больших данных, налоги на роботов, налоги на криптовалюты

ОСНОВНЫЕ ПОЛОЖЕНИЯ

1. Производственные технологии и налоги диалектически связаны. Поэтому ускоренное развитие киберфизических систем ведет к существенным трансформациям национальных налогов и международного налогообложения

2. Установлено, что существуют три основных сферы, где налоги встречаются с новыми киберфизическими технологиями и где возникают новые налоговые возможности и проблемы — дигитализация, роботизация и M2M, технологии блокчейн

3. Выделены три основных пути решения новых проблем налогообложения: первый — охват налогами новых киберфизических технологий и продуктов их использования; второй — замена цифровых транзакций и выпадающих доходов налоговыми объектами в виде осязаемых активов и людей; третий — построение нового налогового мира с умными налогами, основанными на принципах реального времени, умных контрактах и больших данных

Introduction

A growing body of research in economic digitalization, robotization and cyber-physical systems development raises questions as to how the new industrial revolution will affect the rate of tax revenues for the treasury and the whole tax system yet more often. This issue has already been featured in many publications, not just in work by individual researchers (M. Bacache-Beauvallet and F. Bloch [1], S. Gupta, M. Keen, A. Shah, and G. Verdier [2], J. Crémer [3], X. Oberson [4], R. Shiller [5], etc.), but also in the official publications of influential international organizations and companies. For instance, the papers of Pricewaterhouse Coopers (PWC) analysed tax incentives for Industry 4.0 [6–8]. The publications of McKinsey Global Institute and Deloitte, the multinational professional audit services network, reflect the interconnection between taxes and new manufacturing technologies [9–11]. Ernst & Young has produced publications devoted to issues of taxation in the digital economy, including the possible use of blockchain technology [12; 13]. In the publications of OECD committees and working parties, much attention is being paid to tax evasion in the digital economy and tax administration, including using the Big Data capabilities [14–16]. However, all these studies require systematization and critical re-thinking, thus constituting the topic of the present article.

Increasing attention paid to taxation issues in terms of industrial revolution resulted from the fact that taxation and production technologies are in a dialectical and interdependent relation. *On the one hand*, the specific nature of taxes lev-

ied at a given place and given period of time is determined by the development level of technologies and those economic institutions formed on their basis. In order to levy a tax, there must be an object capable of being uniquely identified and quantified. In times of dominant agrarian and handcrafting technologies of pre-industrial societies and their corresponding institutions, it was relatively easy to identify and quantify the population, property (land, buildings, animals, etc.) and goods for the purposes of taxation. These comprised the objects for imposing poll taxes, real taxes on certain types of property, excise taxes and duties on goods.

Income became an object of taxation during times of domination of technology over mass manufacturing at enterprises formed as legal entities, obliged to keep accounts and to maintain public records, including those relating to the income of personnel, the reliability of which could be confirmed by independent auditors. At this point, the concept of taxing the income of individuals and legal entities started to become increasingly widespread. Subsequently, the development of new communication technologies, the international division of labour and global value chains led to the emergence of VAT, which is imposed along these chains and facilitates international settlements.

Currently, in the age of ICT, in which exponential increases in productivity are facilitated [17], digitalized cyber-physical manufacturing generates new assets and objects (digital) and transforms existing ones, leading inevitably to significant changes in tax systems, which arise and quickly spread worldwide (Figure 1).

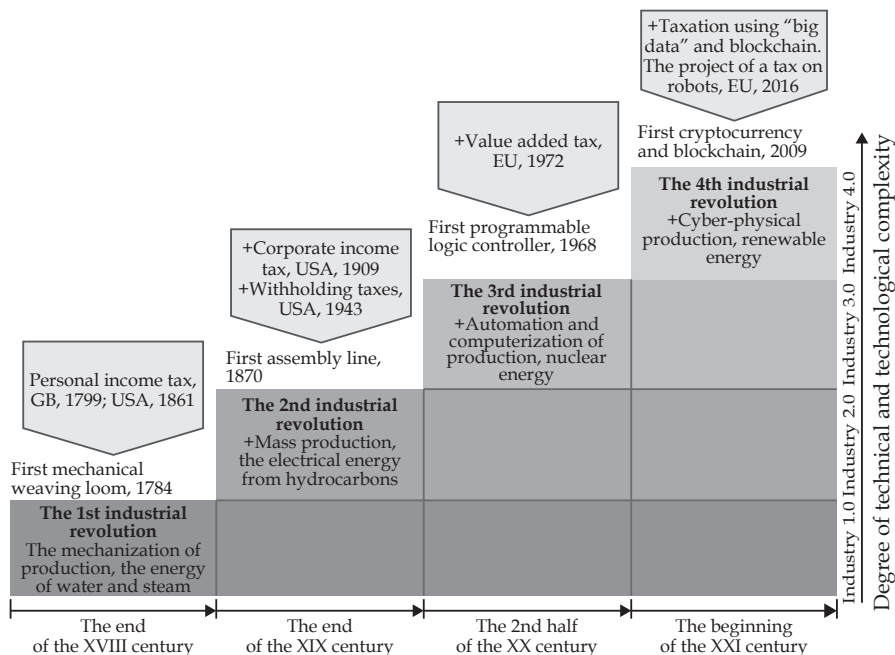


Figure 1. Interconnection of industrial revolutions and taxes

According to the IMF experts: "By transforming the way countries collect, process, and act on information, digital technology can reshape the way governments design and implement their tax, spending, and macro-fiscal policies" [18, p. vii].

On the other hand, taxes themselves and public expenditures financed at their expense predetermine the accelerated development of production technologies and economic institutions. Taxation significantly affects people's behaviour and the activities of the enterprises they create, correcting negative externalities and accumulating resources which may be used to finance public and quasi-public goods, the development of science, human and physical capital, infrastructure, including digital infrastructure, etc. It is sufficient to note that the expenditures on R&D, a significant part of which is financed by taxes, increased globally from \$1 trillion in 2000 (Constant 2010 US \$) to \$1,7 trillion in 2015¹.

¹ The World Bank. World Development Indicators. Available at: <http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators#>.

Key areas where taxes meet cyber-physical technologies

The analysis of the results of researches on the transformation of taxation in the context of the new industrial revolution, as well as the main technical and technological features of the cyber-physical systems [19–21], allowed the main directions of the expected changes in the economy and taxation to be determined (Table).

It should only be noted that, since new technologies appear and develop very rapidly under the conditions of the contemporary industrial revolution, the provisions presented therein are a priori incomplete. For example, although until recently, artificial intelligence was in the realm of science fiction, participants in the Beneficial AI 2017 conference have already developed and adopted a list of 23 basic principles that should be followed when developing it². Fifty years ago, the first industrial robot was manufactured; today the issues of interaction of robots in a challenging environment and problems

² Future of Life Institute. AI Principles. Future of Life Institute, 2017. Available at: <https://futureoflife.org/ai-principles/>.

**Interconnection between technological and tax transformations
in the Fourth Industrial Revolution**

Technological changes	Implications		Possible tax policy measures
	economic	tax	
Digitalization	Growth in sales of digital goods and services	Reduction in taxation base due to cheap digital products, reducing amount of taxes on sales and consumption of conventional (non-digital) goods and services	Introduction of special taxes on sales and/or consumption of digital goods and services, and/or raising employment and real taxes (on property, electric power transmission, etc.)
	Growth in sales of digital labelled goods	Expansion of the tax base due to better control over the production and products sales, a reduction in the "shadow" turnover	Introduction of digital labelling and its usage in tax administration, including for forming the international registries of information on unified means of goods labelling identification
	Growth in volumes of cross-border online transactions	Taxation base erosion due to increasing amount of "stateless" incomes and operations with affiliated parties in low-tax jurisdictions, and due to using of specific contractual payments and the imposition of holding companies	Development of international measures to counteract e-strategies of tax evasion (incl. through transfer pricing), which use the loopholes and inconsistencies in tax regulation of different jurisdictions
	Exponential growth in volumes of generated and used data (Big Data)	Emergence of new opportunities and risks related to use of Big Data in tax administration. Extension of taxation base owing to digital data	Use of Big Data to increase tax revenues and improve taxpayer services. Introduction of a tax on personal data collection and use
Robotization and M2M	Reduction in number of under- and semiskilled jobs, STEM-personnel shortages	Necessity of compensating the social tax losses to the budget due to the reduction of under- and semiskilled jobs	Determination of the need and possibility of introducing new forms of compensating taxes: robot taxes, universal basic dividends, etc. Provision of tax incentives for retraining and advanced training of personnel
	Increased wealth disparity	Increased importance of tax regulation in the sphere of income inequality	Increased progressivity of the tax system
Development of blockchain technologies	Growth in the emission volume and the areas of the crypto-currencies usage, which are out of the regulatory scope of national banks	Increased complexity of the tax administration and the transformation of the tax base due to increasing number of cryptocurrency transactions and token emission	Possible introduction of special taxes on cryptocurrency mining, buying and selling, Initial Coin Offering
	Transparency of operations, online access to transaction data, safe and reliable real-time transaction recording (worldwide ledger)	New opportunities of improving tax administration. Opportunities and risks of fundamental changes in the tax system based on decentralized transactions recording, online tax calculations and payments	Determination of the need and possibility for using blockchain technologies for transactions recording, automatic calculation and collection of taxes. Possible shift from the current tax system based on the comparison of income and costs for the reporting period, to a system based on the real-time accounting of income and costs

related to robots' ability to teach themselves are being studied [22]. In 2009, the first Bitcoins were generated [23, p. vii]; as of 31 December 2017, their market capitalization already exceeded \$200 billion.

Consequently, we provide a more detailed analysis of only the main points presented in the table, which we consider to be the most important, although many other tax aspects of the development of the digital economy and cyber-physical systems may be equally interesting research directions.

Digitalization

The many of modern scientific and technological advances, which drastically change our ways of living (mobile internet, automation of knowledge work, the Internet of Things, cloud technology, advanced robotics, autonomous and near-autonomous vehicles, etc. [24]) are based on digital technologies, which in turn were based (technically) on representing the signals as discrete frequencies of analogue levels (but not the continuous spectrum); thus, digitalization consists in the conversion of this information into digital form. In public finance, these technologies mostly affect the spheres of G&S taxation, cross-border online-transactions and use of Big Data.

Taxes on digital goods and services. Digital transformations in the global economy, related to converting information into a digital form, are very active, but unevenly spread. This is true for both digital tech-

nologies and products. These products include digital goods and services³, which exist in intangible forms, as well as physical goods with digital labelling.

Some innovative companies already widely use digital technologies at all stages of the product life cycle – from development to technical maintenance, while others are still only investigating the benefits and costs of implementing them. Nevertheless, almost all enterprises use Internet environment for marketing their products and services, both in digital and material form, such that volumes of e-commerce are increasing at a rapid pace (Figure 2).

It is therefore relevant to identify those companies using digitalization for introduction of Industry 4.0 technologies. According to PricewaterhouseCoopers, the companies they surveyed, which combine investments and advanced digitization, plan to cut the costs by 3.6 % for 5 years and annually increase revenues by 2.9 % [6, p. 4].

From the taxation standpoint, such digital transformations can be seen positively since an increase in business revenue may increase tax revenues. However, as noted by the experts from the Finnish innovation fund Sitra [25], digital goods can also reduce the tax base. There are several rea-

³ The term “digital goods” or “e-goods” usually refers to the intangible goods that exist in digital form, and the term “digital services” usually refers to the electronic delivery of information including data and content across multiple platforms and devices.

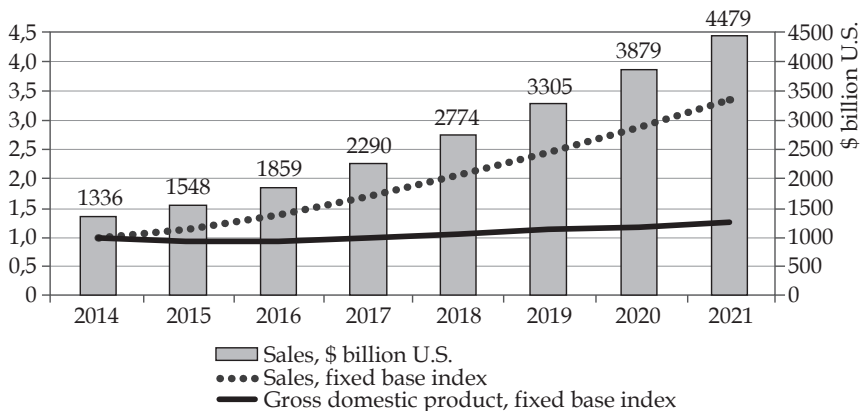


Figure 2. Retail e-commerce sales worldwide and global GDP from 2014 to 2021
Compiled from: Statista.com. (2018); Imf.org. (2018)

sons for that: first, the cost of digital goods is usually different from that of their physical originals (for example, digital books are cheaper than paperbacks [26]); second, the payment for digital goods and services may be not monetary, but in various forms of barter (subscription to advertising, distribution of various digital products, etc.); third, due to the growth of cross-border trade through the Internet, part of the income of economic entities is being left out of the national tax legislation.

Therefore, in not relying on the passive expectation of the growth of tax revenues from trade in digital goods and services, some countries have been already reviewing their tax systems from the perspective of adapting them to conditions of total digitalization, which opens up wide access for IT-companies to domestic markets.

Following legal proceedings on issues of tax evasion involving such digital monsters as Google, Facebook and Amazon [27], the European Union started working on the protection of tax systems and minimization of the risks of digital companies and platforms not meeting their tax liabilities. One of the possible solutions is the use of special taxes, which close the loopholes for digital business (for example, a turnover tax on all untaxed or insufficiently taxed income generated from Internet-based business activities and a withholding tax on payments made for goods or services online) [28]. Alternatively, one can initially refrain from trying to capture income from digital assets in the “tax net”, but instead focus more on tangible assets (for example, on property or electric power transmission), or even switch to taxation in kind (for example, in robotics, or the capacities of server rooms) [25].

A number of countries have already introduced special provisions into their tax codes concerning the taxation of the digital goods and services imports at the location of the customers. Thus, e.g. in Australia, all digital goods and services provided by foreign companies have been subjected to an indirect Goods and Services Tax of 10 % since 2017; in New Zealand, the tax rate is 15 %; the Japanese Consumption Tax is 8 %; VAT in Taiwan

is 5 %⁴. The EU suppliers of digital goods and services pay VAT in the buyer’s country at the rate established by national legislation. Russia also introduced a “Google tax” in the form of value-added tax on digital goods and services sold online by foreign IT-companies [29].

Taxes on digitally labelled goods. One of the latest tools employed in the fight against tax evasion and shadow commodity circulation is digital (smart) labelling. The total labelling of goods using digital technologies is assumed to reduce the number of counterfeits, protect business and consumers and increase tax revenues [30]. Another reason for the rapid spread of smart labelling was the growing demand of consumers for transparency of data on products – from manufacturing to purchasing.

IoT (Internet of Things) technologies, which have been used for many years in aircraft manufacture, medicine, and power industry, are used to track data on the functioning of devices and equipment in real time. However, it was only with the development of the smart industry that there appeared a need for developing smart labelling of consumer goods as an effective tool for providing real-time information about the product’s authenticity, its location, storage conditions, relocation, etc. [31].

Using the latest technologies, including blockchain, smart labels can provide interested parties with information about the entire supply chain – from the supplier to the end consumer, accumulating data and providing brand protection and safety of product consumption. With the help of mobile devices (smartphones, tablets, etc.), the consumer receives all the information about the product provided by the manufacturer [32].

Naturally, the introduction of digital marking technologies is also associated with certain challenges and risks, including taxation. This concerns the increase in administrative costs for the formation of information resources for the labelling of

⁴ SurveyMonkey. Taxes on SurveyMonkey Purchases. help.surveymonkey.com, 2018. Available at: <https://help.surveymonkey.com/articles/ru/kb/Taxes>.

goods, unified international approaches to the means of identification⁵, the training and remuneration of the personnel for working with producers, as well as the costs of the producers themselves, the transfer of information to unified registries, etc. Hence the increasing product values, the risks of negative economic consequences, especially for small businesses and the emergence of new schemes of corruption.

Taxes in cross-border online-transactions. One of the key characteristics of the digital economy is increased cross-border business activity, which appears in regard to "... (i) the intangibles on which the digital economy relies heavily, (ii) users, and (iii) business functions as a consequence of the decreased need for local personnel to perform certain functions as well as the flexibility in many cases to choose the location of servers and other resources" [33, pp. 33–34].

This has important tax consequences, for several reasons.

First, the subjects of the digital economy are often located outside the jurisdictions of the national tax authorities. In the case of operating the cross-border online transactions which do not require their physical presence in the country, the incomes of such entities are usually not subjected to its legislation (the phenomenon of "stateless income"⁶) [35, p. 7].

Second, the enterprises can use transfer pricing to reduce their tax liabilities. This is the case when digital assets from certain tax jurisdiction are transferred to the affiliated parties operating under the lower tax regimes of other countries.

Third, the transition from traditional forms of trade to new ones based on digital

platforms affects the ability of tax authorities to levy taxes based on sales and financial transactions (corporate income tax, VAT, etc.). The taxation base, determined by the activities of digital platforms, is narrowed both because of the emergence of "stateless income" and because the use of personal data uploaded by users does not result in financial transactions [36, p. 15].

At the same time, it is important to take into account that modern digital technologies allow foreign operations to be carried out not only by and between large transnational companies, which are always "in sight", but also to numerous small enterprises comprising parts of value chains, which unite the development of digital products and material production. According to the Deloitte experts [37, p. 5], taxation in such chains can be relatively simple if the intellectual property is developed in one jurisdiction (country) and licensed in another. Then, according to transfer pricing rules, production units must pay a fair market price for an intangible digital asset. However, in the case of the uniqueness of such an asset, it is very difficult to accurately determine this price. In addition, it is always possible to come up with special schemes for minimizing taxes, for example, by using cost-contribution arrangements (see "E-commerce structure using a two-tiered structure and transfer of intangibles under a cost-contribution arrangement" [38, pp. 74–76] or "Transfer of manufacturing operations together with a transfer of supporting intangibles under a cost-contribution arrangement" [38, pp. 76–79]).

The problem becomes even more complex if, for example, a smart link is established between the information centre in one territory and the factory floor sensors in another. Traditional transfer pricing models developed for intellectual property licensing cases may not be automatically transferred to other cases, such as smart-linked factories [37, p. 5].

To address these and some other problems, the OECD adopted the Action Plan on Base Erosion and Profit Shifting (BEPS). This refers to instruments of "soft law" that are not legally binding but can

⁵ Eurasian Economic Commission. Labeling System to Ensure Control over Circulation of Goods within the EAEU. Eurasiancommission.org, 2018. Available at: <http://www.eurasiancommission.org/en/nae/news/Pages/6-02-2018-1.aspx>.

⁶ Edward Kleinbard (the University of Southern California), one of the authors of "Stateless income" concept, points out that such income "... can be understood as the movement of taxable income within a multinational group from high-tax to low-tax source countries without shifting the location of externally-supplied capital or activities involving third parties" [34, p. 703].

be used in countries who have common requirements in this field [39]. According to experts from PWC, the implementation of the Action Plan introduces the most significant changes to the system of international taxation in the last 30 years [40].

The Action 1 report [41] is specifically dedicated to mitigating tax problems arising from the digital economy. This final report includes an overview of the principles underlying corporate income taxes and VAT in the context of both domestic law and international tax treaties, the analysis of information and communication technologies and their impact on the economy, recommendations for solving tax problems of cross-border incomes on the basis of CFC (Controlled Foreign Capital) rules, double taxation in cross-border income distribution and the taxation of PE's (Permanent Establishments) under tax treaties.

However, it is already clear that the presented Action Plan needs further improvement. For example, the conceptual provisions for creating value in the digital business that underpin the transfer pricing rules [34, pp. 41–42] and the rules of taxation applying to royalties [42] require further clarification.

Taxation and Big Data. The development of the digital economy and cyber-physical production systems is associated with the real-time processing of huge volumes of information – the so-called Big Data [43]. As noted in the article [44, p. 654], the name “Big Data” refers to a new generation of technologies and architectures designed to derive economic benefits from very large volumes of a wide range of data, through their high-speed capture, detection and/or analysis. This definition describes four distinctive features of big data: volume, variety, velocity and value. As a result, the definition of “4Vs” is widely used to characterize big data.

It is important to note that the volumes of data being generated and accumulated in the world are growing exponentially: during 1970s–80s from kilobytes (2^{10} bytes) and megabytes ($2^{10} \cdot 2^{10}$ bytes) to gigabytes ($2^{10} \cdot 2^{10} \cdot 2^{10}$ bytes); during the 1980s–90s from gigabytes to terabytes ($2^{10} \cdot 2^{10} \cdot 2^{10} \cdot 2^{10}$ bytes); during the 1990s–2000s from tera-

bytes to petabytes ($2^{10} \cdot 2^{10} \cdot 2^{10} \cdot 2^{10} \cdot 2^{10}$ bytes); and at the present time from petabytes to exabytes ($2^{10} \cdot 2^{10} \cdot 2^{10} \cdot 2^{10} \cdot 2^{10} \cdot 2^{10}$ bytes).

The tax authorities of many countries have already realized the importance of Big Data technologies for solving the tasks assigned to them [45]. They offer ample opportunities for using the newest methods of data storage and processing by tax authorities, as well as automation of their basic functions, which will allow them to reduce routine operations and focus on solving the most important tasks: improving the practice of tax audits based on the development of databases on compliance with tax legislation; more accurate planning of tax revenues and liabilities; improving the effectiveness of the fight against tax fraud and tax evasion by better identifying and assessing risks; improving the auditability and accuracy of regulatory reporting [46].

In general, as the OECD specialists note [15, p. 102], the Big Data technologies providing improved access to data in real-time or near-real-time, as well as the ability to combine data and analytics, open new perspectives for tax authorities – on the one hand, to increase tax revenues – and, on the other hand, to improve the support of taxpayers in fulfilling their tax obligations, promote tax compliance, reduce the taxpayers burden and increase the level of their trust.

At the same time, security risks, breaches of confidentiality and intellectual property rights are simultaneously increasing. The use of Big Data objectively creates a wide field for the growth of various kinds of offenses and crimes⁷. Therefore, the issues of preventing leakages and maintaining the integrity of their data, protection of intellectual property rights rise for enterprises, as well as issues of privacy, protection of personal and family secrets and the use of information to ma-

⁷ According to estimates of the Cybersecurity Ventures, cybercrime will cost the world \$6 trillion annually to 2021, compared to \$3 trillion in 2015. This is the largest transfer of economic benefits in history that undermines incentives for innovation and investment and will be a more profitable business than, for example, global trade of all major illicit drugs combined [47].

nipulate behaviour, are exacerbated for people generally [48, pp. 105–106].

In this regard, it is important to emphasize that the personal data provided, for example, by users of social networks, are an asset that can generate income [49]. As users of these networks, people actually pay for access to communication not generally with money, but rather with information. Then there are the companies specializing in the collection, processing and sale of this information, for example, to provide credit scores for borrowers⁸. Obviously, commercial enterprises should not be the sole beneficiary of these financial benefits (since market distortions will arise as a consequence). Instead, these revenues should be shared with the wider society and used to adjust externalities; for example, to create a more socially just and responsible Internet.

Various fiscal instruments can be used to address this problem, for example, a small tax (e.g. less than 1 %, so as not to create large distortions in the behaviour of economic agents) on the income of companies from the sale of personal data [51]. France has already tried introducing a personal data collection tax: a pilot reform was represented in the form of the tax upon the biggest contributors (only above a certain threshold in the number of users) in the form of a single tariff per user, which could vary according to the behaviour of the business (e.g. compliance towards data protection, data security and data portability) [52]. However, for various reasons, it has not yet been implemented.

⁸ This can lead, among other things, to the emergence of a conflict of interest. Here it is possible to refer to one of the latest examples from the Russian economy. The Double Data company, which specializes in the development of software for analyzing Big Data, collected information about users of the social network VKontakte: names, places of work and study and other open information, and then used it for commercial purposes (selling the received data to banks, which, in turn, used the information to assess the credit-worthiness of borrowers). VKontakte filed a lawsuit against this company. The Arbitration Court of Appeal granted the claim in part and banned the collection and analysis of information about users of the social network for commercial purposes [50].

Robotization and M2M

The Fourth Industrial Revolution has led to the acceleration of processes of automation and robotization, especially in such areas as robotic human augmentation and the use of industrial robots [24, p. 73]. Over the past few decades, industrial robots have taken over many production tasks, especially those which are difficult, dangerous or impractical for humans. Recent scientific and technological achievements have led to robots carrying out an increasingly wide range of tasks which were once considered the prerogative of human, for example, picking and packing or manipulating small electronics parts [24, p. 68]. Moreover, M2M (machine-to-machine) technologies which allow machines to exchange information and perform actions without human help, are also becoming more common. This leads to a simultaneous reduction in production costs and an accelerated growth in the production of robots worldwide (Figure 3).

Compiled from: *Statista.com*. (2018). Such technical and technological innovations can lead to profound transformations in the labour market. According to McKinsey Global Institute estimates, 30 % of the constituent work activities of 60 % of current jobs are capable of being automated. It is anticipated that by 2030, 75–375 million current employees (from 3 to 14 % of their total number) will have been forced to change their professional categories. In addition, all employees will need to upgrade their skills to adapt to new working conditions in cooperation with robots [53, p. ii]. Under such conditions, the base for labour taxes can be significantly narrowed and the paradox of plenty will arise, in which the society at large becomes richer, but income and/or property stratification grows, and the situation worsens for the majority.

In order to avoid such an unfavourable scenario, additional tax regulation aimed at correcting the negative externalities of robotics and M2M processes is required. For this purpose, traditional tax instruments can be used alongside new ones, which are only presently being discussed, but already attracting attention and causing heated discussions, can be used.

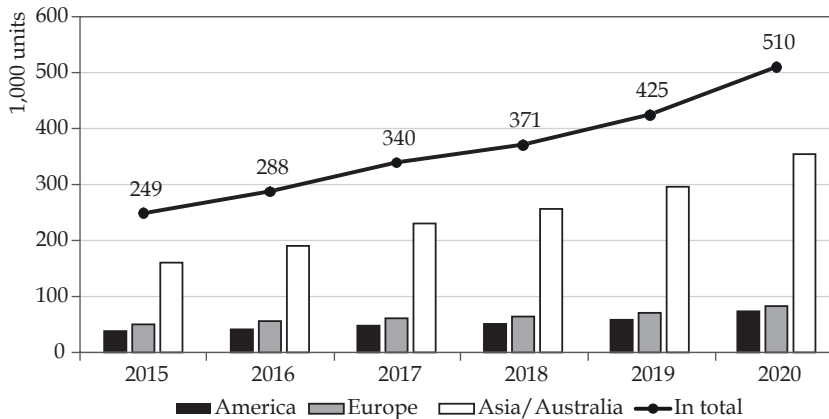


Figure 3. Estimated annual industrial robot shipments in selected regions worldwide

Taxes on robots. A robot tax – or, more precisely, a tax on using robots for the automation of production – has until recently only been a futuristic hypothesis. However, already in 2016, the European Parliament working report, prepared by the Committee on Legal Affairs, put forward the idea of such tax. One of the arguments for this tax involved the concern about the future employment of the population and the viability of social security systems if the current taxable base is to be maintained in the law, thus laying the ground for increasing inequality in the distribution of wealth and influence [54, p. 3].

One of the main ideas of the report is to grant “... a specific legal status for robots, so that at least the most sophisticated autonomous robots could be established as having the status of electronic persons with specific rights and obligations, including that of making good any damage they may cause, and applying electronic personality to cases where robots make smart autonomous decisions or otherwise interact with third parties independently” [54, p. 12]. This is evidently a very unusual and controversial idea, which has both supporters and detractors [4, p. 248].

Anyway, endowing robots with such a specific legal identity implies an acknowledgement of the phenomenon of electronic paying capacity to be used for taxation. In particular, it can be taxes on imputed wages or on income received from the activities of robots (such that the

tax is being levied not on a robot as such, but rather on the use of robots). Moreover, since robots can sell goods or provide services, they also potentially comprise an object for VAT [4, p. 254].

The idea of imposing a robot tax got the support of Microsoft founder Bill Gates [55]. Therefore, this fiscal instrument is sometimes referred to as the “Bill Gates Robot Tax”. According to the Nobel laureate R. Shiller [5], robot taxes could slow down the processes of rapid robotization (at least for a while) as well as ensuring the receipt of income necessary for financing retraining programs for redundant workers.

In August 2017, The Korea Times published an article entitled “Korea takes first step to introduce ‘robot tax’” [56]. It noted that the government, within the framework of the proposed revision of the tax legislation, would introduce the restrictions on providing tax incentives for investments in the automation of production by the end of the year. These restrictions were aimed at compensating for the loss of income tax and providing social payments to dismissed workers who had been replaced by robots. Although it is impossible to directly refer to this fiscal instrument as a robot tax, nevertheless they share the same goal that is to reduce the loss of state revenues due to the robotization of production and to cut the labour tax base.

Around the same time, in California, the “Jobs of the Future” fund was created

alongside a campaign for introducing robot taxes in response to the fear that they would gradually completely replace human labour [57]. The main objective of the fund was to study the state of the tax system in the process of changes in the labour market and to develop countermeasures (“pay-roll” tax on job-stealing machines), to make future M2M more comfortable for people.

Naturally, the idea of a robot tax meets with considerable opposition. The main stated objection is that it will interfere with innovation. From this point of view, taking into account global problems of productivity growth and sustainable development, there are not too many robots, but too little: the taxation of new technologies is not the best, but the worst solution. Here it is important to take into account the fact that the robot tax is a tax on capital that not only contradicts the theory of optimal taxation but will introduce additional distortions in connection with various tax regimes with respect to robots in individual countries. It is equally important from the fiscal point of view that the obvious problems of determining what a “robot” is for tax purposes can in practice turn this tax into a logical and legal nightmare [58].

Universal basic dividends and progressive income redistribution. The vulnerabilities of the idea of introducing a robot tax stimulate the search for other approaches to solving the problem of robotics and M2M. For example, the former Minister of Finance of Greece, Y. Varoufakis [59], who considers that the fundamental disadvantage of this tax is the complexity of defining the term “robots” and their imputed income, sees the way out in the redistribution of return on capital through the creation of a state trust.

The purpose of such a trust would be to receive the so-called universal basic dividend (UBD), paid out at the expense of return on the entire capital of the enterprise, which is the paraphrase of the known idea of unconditional basic income. For this purpose, according to the author, it is necessary to adopt a special law requiring the transfer of a certain percentage

of corporate shares at each initial public offering (IPO) into a Commons Capital Depository (in fact, this will be the law on the tax-in-kind on the IPO), and to finance the payment of a UBD at the expense of the stock dividends [60]. If this proposal is implemented, then the increase in the production robotization and automation will result in an increase in the incomes of enterprises and an automatic redistribution of profits to the solution of social problems will take place through the state trust that owns a part of their shares.

A similar idea, put forward earlier by the American economist M. Kimball (an economics professor at the University of Michigan), entailed the creation of a sovereign wealth fund [61]. However, the source of financing of its assets, according to M. Kimball, should not be the forced transfer of a part of the securities issued to the state trust, but rather the current tax revenues, which are being used for purchasing shares and real estate with subsequent distribution of profits to the population. This approach will also allow part of the revenues generated by robots to be redistributed, giving each citizen his or her share in the new cyber-physical economy. In addition, in order to avoid undesirable concentration of property, the sovereign wealth fund can be divided into several small parts, each having different managers.

However, it is easy to notice that, ultimately, we are talking about different forms of income redistribution in a society, whose economic growth is dependent on the replacement of labour with capital. For this purpose, it is also possible to use traditional time-proven tools.

More simple and traditional solutions to the undesirable socio-economic consequences of robotization and M2M are, for instance, the greater degree of progressiveness of certain forms of corporate profit taxation and increases in property taxes, combined with the financing of assistance programs for those who lose out from robotics. However, it should be kept in mind that progressive income taxation contradicts the principles of optimal taxation and can introduce additional distor-

tions in the behaviour of economic entities, leading to losses in public welfare.

The proposal to subsidize the wages of workers with low incomes serves the same goal. The simplest way to do this is to reduce payroll taxes that disproportionately burden the low-wage workers [62]. This will mean financing a part of national, regional and local programmes from other sources of income, such as higher taxes on income and wealth and/or value-added tax.

Finally, the previously discussed measures of preventing the tax evasion from capital income through transfer pricing and the use of tax havens (the BEPS action plan) can be included here.

Tax implications of blockchain technologies

Blockchain technologies or distributed ledger technologies are considered to be one of the breakthrough inventions of the 21st century. They have the potential to dramatically transform much of what we now know and do, as well as how we do it [63]. From an engineering point of view, blockchain is a digital technology as well. Additionally, perhaps, it would be logical to discuss it among the problems of taxation in the digital economy, for example, in conjunction with the taxation of digital goods and services. In this article, however, distributed ledger technologies are allocated to a special sector, since their sphere of influence goes beyond the usual digital economic problems. Although blockchain technologies have the potential to restructure many significant aspects of the development of society on the principles of decentralization, the successful implementation of such approaches is another matter. Nevertheless, it is already possible to make some preliminary conclusions regarding the taxation of cryptocurrencies and new far-reaching principles for reconstructing the tax system as a whole.

Taxes on cryptocurrencies. Cryptocurrencies, in the usual sense, are cryptographically protected digital assets, serving as an exchange medium. They use blockchain technologies to control emissions, protect transactions and verify

the transfer of assets. Their popularity is largely due by the fact that, unlike conventional national currencies, they are not regulated by banking regulators and do not have an issuing centre.

Despite the sharp volatility of major cryptocurrencies, which is caused, among other things, by the actions of a large number of non-professional speculators, the volumes of the transactions denominated in cryptocurrencies are growing rapidly. For example, global Bitcoin transactions grew approximately 100-fold in 2017 alone – from \$300 million a day at the end of December 2016 to near \$4 billion a day at the end of December 2017⁹. Although this is still a very small number compared to the volumes of transactions in fiat currencies, the tax authorities of different countries are already naturally raising questions about tax regulation in this connection.

Unified approaches have not yet been developed. The legislation determining the legal status of the cryptocurrencies and their taxation is in the process of formation [64; 65]. A generalization of the taxation practice of individual countries shows that, in this sphere, either a variety of legal approaches and different taxes (income tax, capital gains tax, VAT) are being applied, or the issue is being largely neglected.

For example, the US Internal Revenue Service (IRS) considers crypto-currencies to be a property. This implies that crypto investments fall under the capital gains tax with different rates depending on the duration of the period during which the business entity owned the crypto currency (before receiving the profit). In neighbouring Canada, cryptocurrencies are recognized as commodities; accordingly, rules governing the imposition of business income tax or capital gain tax are applied to them.

In the EU, the taxation of cryptocurrencies and operations with them is carried out in accordance with the national legislations of member states. The excep-

⁹ Quandl.com. Bitcoin Estimated Transaction Volume USD. Quandl, 2018. Available at: <https://www.quandl.com/data/BCHAIN/ETRVU-Bitcoin-Estimated-Transaction-Volume-USD>.

tion is value added tax, since in 2015 the European Court of Justice has decided that the operations of the Bitcoin purchasing and selling for traditional fiat currencies are not subject to this tax [64, p. 34].

In some European countries the situation is as follows. The United Kingdom (UK), which does not recognize cryptocurrencies to be legal currencies (as in Canada), either imposes an income tax (for traders) or a capital gains tax (for ordinary investors). At the same time, the so-called “mining” of cryptocurrencies is considered a type of business and is subject to corporate income tax at a standard rate of 20 %. In Switzerland, however, Bitcoin was recognized as a “foreign currency” with all the resulting tax consequences [66]. In Germany, at the beginning of 2018, crypto-currencies were recognized as an alternative contractual and immediate means of payment¹⁰. Thus, digital currencies will not be taxed if they are used as a means of payment. Instead, payment for goods with cryptocurrencies will be subject to VAT at the current exchange rate at the transaction time. However, the actual act of converting cryptocurrency into fiat money or vice versa is classified as “provision of services”, so the party acting as an intermediary is not taxed. “Miners” who receive rewards in cryptocurrencies will similarly not be taxed, since their services are considered to be voluntary.

China, which is one of the main global drivers of the modern digital economy, considers cryptocurrency to be a commodity and imposes taxation in accordance with the standard rules for commodities: operations with a cryptocurrency are subject to corporate income tax and capital gains tax; moreover, its sale can be taxed with a value-added tax [64, c. 51].

It should be noted, however, that, in Q3 2017, China banned crypto exchanges and Initial Coin Offerings (ICOs) indefinitely in domestic markets [66], additionally taking measures to minimize mining

activity [67], explaining this by the need to reduce financial risks and prevent currency manipulation and tax evasion. Moreover, in March 2018, the governor of the People’s Bank of China stated that China does not recognize Bitcoin and other digital currencies as legitimate forms of payment [68].

As for the post-Soviet states, legislation on the status and taxation of cryptocurrencies and their mining is still under development in the Russian Federation [69]. A similar situation is observed in Ukraine [70].

In the field of cryptocurrencies, the phenomenon of the Initial Coin Offering (ICO) is especially worth noting. During an ICO, investors are offered tokens¹¹, usually in exchange for already established cryptocurrencies (for example, bitcoins). In fact, this is a new way of using crowdfunding methods to implement innovative projects, allowing a reduction in administrative barriers affecting conventional venture capital financing with all the ensuing advantages (lower transaction costs) and disadvantages (possible abusive activities and fraud).

In the US, for example, in 2017, over \$1 billion was raised through ICOs [72]. In this country, unlike in traditional methods of capital raising, ICOs cannot apply for tax exemption. At the same time, the amount of taxable income should be determined on the basis of the fair market value of the cryptocurrency received from the ICO on the date it ended [73]. Tokens may also be subject to VAT (in those countries where it is applied). However, according to some experts, this object occurs not on the issue of tokens, but after their subsequent use as a means of payment for specific services offered by a start-up (similar to the VAT on multi-purpose vouchers) [74].

Using blockchain for transforming the taxation system. Taxation is one of those areas

¹⁰ Digithereum.com. Germany Recognizes Cryptocurrency as a Legal Tender. Digithereum, 2018. Available at: <https://digithereum.com/news/germany-recognizes-cryptocurrency-legal-tender>.

¹¹ According to W. Mougayar, a token is “... a unit of value that an organization creates to self-govern its business model, and empower its users to interact with its products, while facilitating the distribution and sharing of rewards and benefits to all of its stakeholders” [71]. The tokens may be the digital counterparts of real (physical) assets or services (asset-backed tokens), and in this case they have little in common with the currency as such.

of the economy where the application of blockchain technologies can lead to revolutionary changes [75]. The reason for that lies in the following salient characteristics:

- *transparency* – the blockchain is a distributed database based on ledger algorithms in which all network members can see and verify data [23, p. x]. At the same time, the open, detailed and invariable nature of information in the blockchain system provides a more reliable means of recording economic transactions, ownership transfer, reconciliation of accounts receivable and payable, etc. – a full range of information that may be related to taxation;

- *self-checking* – a distributed database cannot be altered after entering the data. This makes fraud and errors far easier to detect and reduces the risks of non-compliance with tax laws [76]. The main condition for putting data into a distributed database is the confirmation of their authenticity by all network members. This requirement is the basis for smart contracts¹², the proper implementation of which does not require control inputs from intermediaries, which in this case are represented by the contracts between the providers of personalized public services and taxpayers [23, c. 44]:

- *information in real-time or near real-time* – unlike the current approach, when tax charging and mobilization are performed retrospectively, including on the basis of data on incomes and costs for the reporting period, the use of the blockchain system allows the information to be updated simultaneously for all network participants in real time. This makes it possible to use the blockchain to transparently calculate and pay taxes in step with the execution of economic transactions, *as they happen* [77, pp. 2–3];

- *efficiency* – using the blockchain can significantly reduce the costs of business and the state. Business-related blockchains

¹² Smart contract is a computer algorithm designed to conclude and maintain self-executable contracts in the blockchain environment. They are written in the form of code in a distributed ledger, which is maintained and managed by a network of computers. After the trigger happens, the contract is automatically executed in accordance with its terms.

form the worldwide ledger. This ledger can also be used for the purposes of calculating and paying taxes. Its application will help reducing the cost of compiling tax reports, reducing the number of tax inspections and saving government spending on administration and personnel [13, p. 8].

New blockchain opportunities are associated with new risks and threats [78]. Among these are the regulatory risks (gaps in legislation, lack of experience in implementing large-scale blockchain projects in a regulated environment), technical risks (problems with the bandwidth, delays in processing transactions, size and speed of data dissemination, threat of the “51 % Attack”¹³, the difference between versions and the problem of ensuring the compatibility of multiple chains), the risks of social aversion (in connection with the possibility of using blockchain and cryptocurrencies based on them for criminal purposes), etc. [80; 81].

Considering the blockchain features noted above, its tax implications can have two main directions.

The first direction is to improve tax administration. Already at the present time, blockchain technologies can be useful to the tax authorities, as it provides accurate, detailed and reliable information of wide spectrum that can be shared. This makes it possible to improve the taxation of digitally marked high-value products [32], generally improve and accelerate the charging and collection of taxes related to transactions such as VAT, withholding tax, stamp duties and insurance premium taxes, and to improve the efficiency of combating tax evasion and the quality of services provided to taxpayers [76, p. 2].

The second direction is for the prospective transformation of the tax system with the transition from retrospective tax-

¹³ The threat of “51 % Attack” is embedded in the architecture of the blockchain itself. If a coordinated group of people has under control more than 50 % of the processing power that provides the verification process for transaction logs in the blockchain, such a group will be able not to confirm the other’s transaction blocks, but only to confirm its own, which means it will be able to receive all newly issued bitcoins and block at its discretion any transactions [79].

ation for the reporting period to the taxation in real-time. If tax administrations have open access to company transactions *as they happened*, then the state computer programs can immediately calculate the amount of tax and automatically withhold it from the bank account of the company immediately after the transaction settles. Under such a scenario, advance payments will be eliminated, and the functions of the tax departments will be largely replaced by blockchain maintenance, the secure, real-time transaction ledger and related software. Potentially, the incidence of errors and fraud in this sphere thus can be eliminated [77, p. 3].

Of course, this is only a conceptual statement, not a proposal for immediate practical implementation. Given that besides the abovementioned risks and threats, a lot of undecided questions arise: on the location of the transaction for tax purposes (taking into account that in a distributed ledger a transaction is recorded in many places simultaneously and the identity or location of the counterparty may remain unknown); on barter taxation; on determining the taxable value if the transaction occurs in a digital currency; on what element does the VAT have to be accounted for and whether its rate depends on the counterparty location, etc. [75].

In this regard, it is important to understand that the blockchain is one of the new tools for solving the age-old problem of taxation, which allows a fresh look to be taken at it from a new point of view, but not the decision itself.

Conclusions

In terms of the Fourth Industrial Revolution, emerging and disruptive technologies are developing very quickly. However, these do not merely consist of physical and digital objects combined with ways of interlinking them into production chains. Objects and chains are created by people who themselves change during the interaction, and this eventually leads to the transformation of the system of socio-economic – including fiscal – relations.

Somewhat exaggerating, we can say that taxes are the main attribute of the

State. Taxes mean that the economic actors comply (in a voluntary or forced manner) to authorities and it expresses the consent to execute transactions under the authorities' control and abandon a part of the income (property) in favor of the State. Therefore, if economic transactions are carried out without an external or internal administrator, the subjects of transactions also start to move out of State control. As a result – the State gradually fades away from these economic actors' activity and loses its significance to them

The practice is not so radical yet; hence, nation states (state alliances) which have proven their viability for centuries, have the opportunity to place disruptive technologies, including cyber-physical ones, under their control. However, the paradox remains that the very process of public relations coverage of the sphere of cyber-physical space implies an advance in a direction that "erodes" the conventional taxation base traditionally used by the authorities for centralized control over the activities of economic entities and the financing of public services. This is the one side of it.

The second consequence is the emergence of technologies that create the opportunity to facilitate the mechanism of tax administration (resulting from the replacement of periodic self-reporting of revenue, expenses and taxes owed by real-time recording of public company transactions), which reduces the need for traditional administration, transferring it into an automatic mode of "digital tax administration".

The phenomenon of digital "stateless income" can cause the phenomenon of "stateless residents" and, as a consequence, "taxless" residents (without forced payments), i.e. those residents who receive the services they need, not from the government, but from the network of decentralized and voluntarily funded suppliers [23, p. 44]. When all this concerned only the development of the digital economy (service sector), it was not so important, because the foundation of people's economic lives remains the exchange and consumption of material goods. However, now the "digit" increasingly connects and

permeates the physical processes, creating global decentralized technologies for carrying out the transactions and hybrid cyber-physical products. In other words, it is not about the goods themselves, but the fact that they are no longer just physical, but cyber-physical (like smartphones, robots, autonomous cars, etc.), resulting in an increasing proportion of their value residing in the digital content. Consequently, the principle of “statelessness” and “taxlessness” is extended at least to a part of the production cost.

There are three main approaches towards a fiscal solution for new problems associated with the development of cyber-physical systems (Figure 4).

The first approach is to try to cover with taxes new cyber-physical technologies and products of their application. Many steps are being taken in this direction, for example, the OECD’s 2015 final report on Action 1, which is designed to capture intangible digital assets and generate (primarily cross-border) revenue streams into the state’s “tax nets”. This also includes the spread of traditional taxes on new subjects – robots (electronic persons), which, figuratively speaking, come to grips with tax inspectors, where the inspectors’ side involves the establishment of the rules of the tax game (the tax legislation adjusted for the activities of new subjects), and the robots’ side has the artificial intelligence, which has already outstripped human in-

telligence in some respects. However, this is a demanding and – apparently – not very promising approach.

The second approach is to replace digital transactions and shortfalls in revenues by traditional objects of taxation in the form of tangible assets and people and / or to increase tax pressure (including through the improvement of tax administration using Big Data) and increase the degree of progressiveness of taxes already levied on such objects. This is technically simpler; however, financial theorists have long argued that, for example, real property taxes are far from being the best way to build a holistic state tax system. Proposals for switching to in-kind taxes are viewed with even more suspicion. As for increasing the degree of progressiveness of labour taxes, this contradicts the theory of optimal taxation and can have undesirable consequences from the standpoint of tax compliance.

The third approach is to set a course towards constructing a new tax space with smart taxes based on real-time principles and smart contracts. This implies the transition to automatic taxation using blockchain technologies, which focus on the functions of applying distributed ledgers of business transactions in real-time with the use of relevant software. However, the paradox is that in time these functions will also be better entrusted to the robots, which will increasingly supervise people

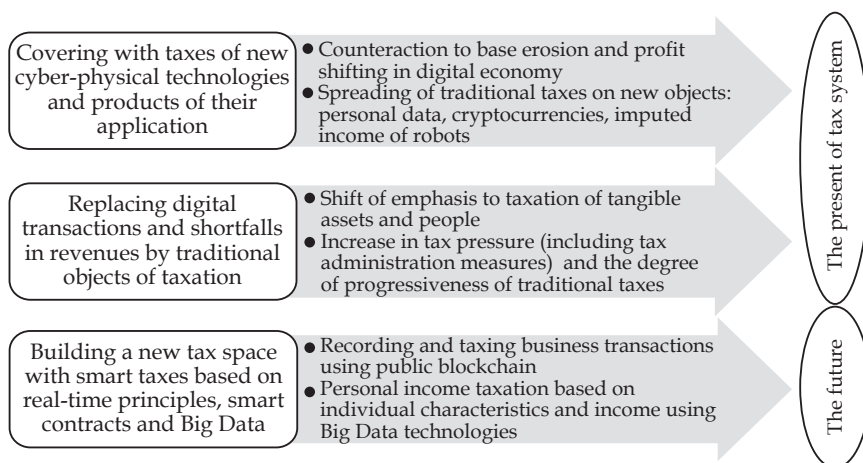


Figure 4. Approaches to tax transformations under the influence of developing cyber-physical technologies

and other robots. Of course, all this is still somewhat futuristic and there are a lot of obstacles on this path, including those still unknown. However, long-term trends are already visible and, in a certain sense, encouraging. The theory of optimal taxation asserts that the principles of a good tax system are a waiver of capital income tax, the use of flat tax, with a universal lump-sum transfer to all individuals or uniform tax on final goods, and the dependence of taxes on personal characteristics, as well as income [79, p. 147].

While advanced economies are already seeing some progress in this direction,

there is a continuing lack of confidence [79, p. 148]. Nevertheless, the situation is changing rapidly. Emerging technologies create a principal possibility for smart real-time taxation. Obviously, from the point of view of automation, this can consist of simple flat obligations such as a universal consumption tax combined with negative taxes, comprising social grants that take into account real incomes and other personal circumstances identified through the use of the Big Data. This implies that, as a consequence of new technologies, the principles of the optimal taxation theory can acquire a new lease of life.

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Tax expenditure as a problem in intergovernmental relations

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ABSTRACT

Tax expenditures are well known in all countries. However, they are of low repute, not only because politicians often use them to disguise relief for interest groups in the tax code, but also because they are seen as less targeted and less efficient than direct expenditure. In this article, two hitherto neglected aspects of tax expenditures are discussed. The first of these is tax shifting and what it implies in terms of outcomes. The second and more important is the problem caused by tax expenditures in the area of intergovernmental relations, which arises from the effects of tax expenditures in the intergovernmental system. In the article, these effects are highlighted and described in detail: (1) vertical effects of tax expenditures, reflecting the impact of tax expenditures on budgets at different levels; (2) horizontal externalities, which characterize the effects of tax expenditures on budgets at the same level; and (3) the negative impact of tax expenditures on equalization processes. All of these effects are systematized in various ways; together, they present a coherent approach for later empirical country studies

KEYWORDS

Tax expenditure, tax benefit, incidence, externalities, intergovernmental relations, equalization, horizontal equity, tax competition, tax exporting, expenditure spillovers, expenditure competition, grants, contribution, unfunded mandate

JEL H22, H23, H71, H73

HIGHLIGHTS

1. The effects of tax shifting on tax expenditure are described according to a systematic approach. The outcome of shifting consists in changes in the pattern of the intended beneficiaries
2. Criteria are developed for judging the various vertical effects of tax expenditures in the system of intergovernmental relations. A three-dimensional tax expenditure classification schema was developed in order to systematize these effects
3. Horizontal externalities from tax expenditure within intergovernmental relations are demonstrated in a comprehensive way
4. It is demonstrated that tax expenditures may disturb the intended equalization pattern. For instance, tax expenditures for personal equalization and grants for regional equalization may lead to sizable discrepancies between the outcomes of these two channels

УДК: 336.225.66:336.15

Налоговые расходы как проблема межбюджетных отношений

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АННОТАЦИЯ

Налоговые расходы как инструмент экономической политики имеют немало недостатков, в связи с чем зачастую считаются менее эффективными, чем прямые расходы бюджета любого уровня. Большинство этих недостатков весьма подробно описаны в существующей экономической литературе. Однако дискуссия, развернутая вокруг них, не затрагивает в настоящий момент по крайней мере два весьма важных аспекта этой проблемы, которым и посвящена представленная статья. Во-первых, это проблема «переложения» налоговых расходов или, иными словами, присвоения выгод от их существования лицами, на которых они не были ориентированы. Во-вторых, и что более важно, это проблемы межбюджетных отношений, порождаемые наличием у налоговых расходов особого рода эффектов, проявляющихся в условиях многоуровневой системы государственного устройства. В отношении последних в статье выделены и подробно описаны (1) вертикальные эффекты налоговых расходов, отражающие влияние налоговых расходов на бюджеты разных уровней; (2) горизонтальные экстерналии, характеризующие эффекты налоговых расходов на бюджеты внутри одного уровня бюджетной системы; а также (3) негативное влияние налоговых расходов на процессы межбюджетного выравнивания. Названные эффекты систематизированы в целях формирования целостного подхода к дальнейшим эмпирическим исследованиям влияния налоговых расходов на межбюджетные отношения

КЛЮЧЕВЫЕ СЛОВА

Налоговые расходы, налоговая льгота, налоговое бремя, экстерналии, межбюджетные отношения, выравнивание, горизонтальное равенство, налоговая конкуренция, экспорт налогового бремени, внешние эффекты, конкуренция расходов, межбюджетные трансферы, финансовая помощь, нефинансируемый мандат

ОСНОВНЫЕ ПОЛОЖЕНИЯ

1. В систематизированном виде описаны эффекты, возникающие в результате «переложения» налоговых расходов (присвоения выгод от их существования лицами, для которых они напрямую не предназначались). В результате сделан вывод о том, что в результате переложения структура бенефициаров налоговых расходов может существенно отличаться от задуманной законодателем
2. В целях оценки и систематизации вертикальных эффектов выработаны необходимые критерии, а также проведена трехмерная классификация налоговых расходов в межбюджетных отношениях
3. Описаны горизонтальные эффекты налоговых расходов в межбюджетных отношениях, возникающие в результате влияния налоговых расходов одной территории на жителей близлежащих территорий
4. Обосновано, что в ряде случаев налоговые расходы могут помешать процессам межбюджетного выравнивания. В частности, это возможно в случае, если налоговые расходы перераспределительного характера и дотации на выравнивание бюджетной обеспеченности распределяются по территории страны в соответствии с противоречащими друг другу критериями

1. Introduction

Tax expenditure, which takes place in every country, is an instrument by which governments choose to relieve enterprises and individuals of some tax burden by means of a tax exemption instead of extending direct payments to them. As compared to the use of direct expenditure, the tax expenditure is often questioned in terms of its effectiveness. Tax expenditure becomes particularly problematic when it occurs in a federal system with several layers of government. In this context, the aim of this article is to identify undesirable effects that emerge if tax expenditure is used in federal systems. Before this can be done in any larger study on a country¹, some preliminary considerations concerning tax expenditure in general – and in intergovernmental relations in particular – are required.

There is an extensive literature on tax expenditure, both on its specifics and on the difficulties of assessing it empirically. Assessments were made early in the USA, accompanied by early theoretical work on tax expenditure in general. Later assessments were made in Canada [2], Australia [3] and other countries, including Germany, where it also has existed officially for many years [4] and is the subject of regular empirical studies [5; 6]. While not taken up in detail here, this thorny issue of assessment is important for any country study. Rather, this paper will take a systematic theoretical approach to the study of tax expenditure.

In the general literature on tax expenditure, two aspects seem to have not yet been analyzed in detail:

1. What happens to tax expenditure in the process, to which any tax or tax change is subject, from announcement affects to tax shifting etc.? Knowledge of these effects is an important aspect in the study of intergovernmental relations.

2. The relation of tax expenditure to the specifics of a federal system appears to have not been the subject of any serious study.

¹ This is the case in the ongoing work by S. Bykov on tax expenditure in the Russian Federation [1].

Consequently, the first part dwells somewhat longer on tax effects, while the second part elaborates the basic issues that arise when tax expenditure occurs within a federal system. The federal system is analyzed as a three-layer system, comprising the federal government, a middle level (states, oblasts, lander etc., hereafter referred to as state level), and a local level. The local level is not further divided into a district level (rayon, Landkreis etc.) and its constituent local governments.

2. Why is tax expenditure a subject of concern?

2.1. What is a tax expenditure?

The most effective means of specifying what is meant by tax expenditure is to compare it to direct expenditures carried out to achieve the same aim. Direct expenditure provides the recipients – whether enterprises or individuals – with an amount of money. Tax expenditure tries to do the same, but in an indirect way, with the recipients being permitted to pay lower taxes than would otherwise have been the case. This can occur, for example, in the income tax system by either reducing the tax rate on the intended activity or by leaving that activity out of the tax base. Another example is VAT. In this case, one can exempt those goods from taxation that are assumed to be primarily purchased by low-income citizens. Alternatively, the tax rate can be reduced for these classes of goods, as is the case in countries like Germany, where there exist two VAT rates of 7 % and 19 %. From this comparison it is obvious that the term tax expenditure is somehow misleading, since it is not an actual expenditure, but is rather designed to achieve the same effect as the equivalent amount of direct expenditure. A term like tax subsidy might be better; however, the term tax expenditure is applied here because it is the most widely used term, including in Russia.

A more precise definition of tax expenditure is needed when data are to be analyzed. To take the example of VAT, what exactly is meant by “goods for daily use” etc., which then is subject to the lower rate? The same is true for business

taxation. There is something like a normal tax base for the tax on profits, so whatever differentiation occurs between elements of the calculated profit is not to be considered as a tax expenditure [7–10, etc.].

In empirical terms, direct expenditure and tax expenditure show up in very different parts of budget policies and statistics. When a direct expenditure is decided upon politically, it is determined during the budgetary process and becomes part of the budget. Consequently, its size can be obtained by looking into budget figures. The amount of tax expenditures, on the other hand, cannot be ascertained directly in any regular document. Rather, they are shown in the figures on tax revenue to the extent that that amount is lowered. There is no annual automatic registration of these figures, as occurs with direct expenditures. Therefore, in order to find out about tax expenditures, sophisticated work is necessary. One approach would be to assess the amount for certain individual cases, be they enterprises or private households, and then multiply by the respective group. In general, such indirect method is necessary in order to study the amount of tax expenditure in a country.

2.2. What happens to tax expenditure through shifting?

The result of the assessment is a volume of statistics on tax expenditures in a particular country. The interpretation of these figures then takes place according to various objectives – in this case, their role in a multi-layer, federal system. At this

point it is necessary to analyze what happens to them in reality – again, in comparison with direct expenditure. In order to analyze this theoretically and empirically, one has to draw on completely different sections of public finance theory. In the case of direct expenditure, the effects are relatively clear. The recipient receives directly a certain amount of money and is most probably able to use it fully. Of course, there exists in principle the counterpart shifting activity, which takes the form of “expenditure snatching” [11, p. 328] in which the recipient is deprived of certain advantages. When a considerable rise in pensions occurred in Germany, it could be observed that the price of typical goods bought by pensioners rose more in retail shops in locations near where pensioners typically lived than elsewhere, thus reducing the advantage of the higher pension. However, in general one can assume that the advantage of the direct expenditure stays with the recipient.

That is different for tax expenditures. They are part of a tax and share, so to speak, the fate of that tax on its way through shifting to “the final resting place” [12, p. 216]. Since there already exists a large literature on these taxation effects, tax expenditure has to somehow be inserted into that analysis. Some aspects of this, which have been pointed out by Burton [8, p. 116–117], are systematically inserted here. The system referred to in Figure 1 is used in a German public finance textbook in which a whole chapter is dedicated to tax effects [13, p. 123].

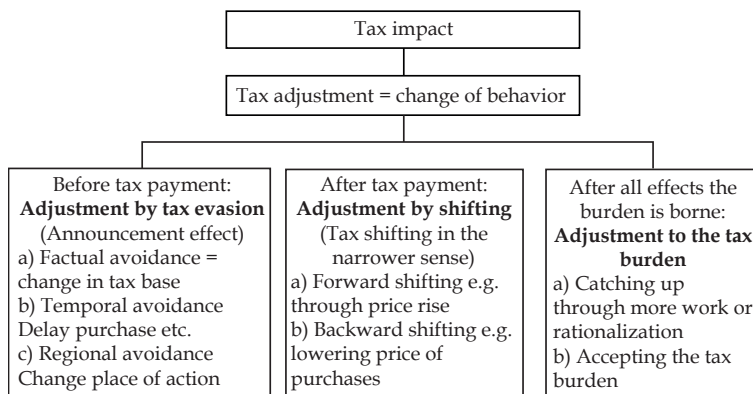


Figure 1. Types of adjustment to a tax change (tax shifting in the wider sense)

The whole process starts with a tax impact, mostly triggered by a change in the tax code. Enterprises and individuals then try to adjust to this by some change in their behavior. The system is built up as a sequence, starting from the announcement of a tax (1). At that stage, the tax can be avoided in several ways. To the degree that it cannot be avoided, a tax payment occurs. Then the tax can be shifted to somebody else (2). If that does not work, the resulting tax burden can lead to more efforts to catch up (3). And if that does not help, the tax burden has finally to be borne. It should be noted that the three "stages" in Figure 1 are shown as stages. However, in reality, they may – and often will – occur simultaneously.

1. Starting with the first stage: to the degree that the tax with the exemption is avoided (left part of Figure 1), the advantage does not reach the recipient. If the taxpayer avoids an income tax by not declaring his income, the intended special advantage does not reach him. The same is true for a subsidy to enterprises by means of a tax exemption if tax avoidance occurs in the field of enterprise taxation. However, if the avoidance took place illegally, the tax-payer-to-be has at the same time lost his legal tax expenditure in that process. It should be noted in addition that all forms of tax expenditure reach only those people who pay taxes.

2. A major issue is the possible shifting of the tax burden once the tax has been paid or is reasonably expected to be paid. Irrespective of whether the tax has been shifted forward by raising the price of sold products or backward by decreasing the price of the purchased goods, there is a question as to what tax expenditure means in this situation. Looking at forward shifting, if a sizable tax expenditure has been granted there is probably less need to shift or only the need for the remaining tax payment to be shifted. The same is true for backward shifting. To put it in general terms, the higher the tax exemption, the lower the tax load which is considered for shifting. This is particularly important in market forms where shifting is difficult, for instance because of inelastic supply.

3. The question of adjustment to the tax burden (right part of Figure 1) is similar. Only the final tax burden, which consists of the full tax minus the tax expenditure, is a tax burden and could lead to efforts to catch up one way or the other.

Summing up over all stages of tax adjustments, the result is apparent: the tax expenditure lowers the tax load and thus reduces the need for any of the three types of tax adjustment. However, compared to direct expenditure, the effects additionally further blurred. Not only are tax expenditures difficult to calculate as foregone revenue but, additionally, it remains unclear which recipient receives how much of the intended amount. This further reduces the effect of targeting a tax expenditure, which is anyway lower than for direct expenditure. If a targeted tax expenditure is meant as an incentive for an objective considered politically significant, the incentive is reduced to the degree that the tax burden is avoided or shifted. An example of this is subsidies paid to enterprises to increase their investment in poor regions.

Another aspect of the tax burden, which is intensively discussed in public finance literature, is the notion of excess burden [12, p. 277-296]. This means, that in addition to the burden of paying the tax, there exists the burden of having to adjust to the tax burden one way or the other, resulting in a loss of efficiency. Issuing a tax expenditure produces such an excess burden because it causes the taxpayer to deviate from his previous preferences. However, the existence of a tax expenditure might at the same time alleviate this problem to a degree because there is a lower tax burden to adjust to.

In addition, it is helpful in this discussion to distinguish between tax expenditure by a lower tax rate versus tax expenditure as a reduced tax base. There is a notion in optimal taxation [14, p. 527-528] that the same tax revenue raised by a high tax rate on a small tax base induces more excess burden than if the same tax revenue stems from a low tax rate on a broad tax base. So far, the difference between the effects is not clear enough because

“the same revenue” implies that a higher tax rate necessarily goes together with a smaller tax base and that a broader tax base is accompanied by a lower tax rate.

Now let us move from “the same revenue” to the politically more important case of designing a tax expenditure for a group of beneficiaries without considering tax revenue. Then the question arises whether a lower rate or a wider base is more efficient. To put it differently: What influences efficiency more: a variation in tax rate or a variation in tax base? This question is also a subject in the discussion on tax reform alternatives which, from a different angle, seem to support this notion: “Tax rate cut cum base broadening” [15]. At the same time this notion is probably behind the attitude of investors to look at tax rates first when comparing the tax systems of several countries. Therefore, whatever the outcome of this discussion, it is likely to be significant for the analysis of tax expenditure. The comparison of tax expenditure in the form of a lower tax rate versus a narrower tax base inevitably leads to the question as to which of the two instruments have less negative effects.

2.3. Why is tax expenditure chosen as instrument?

Already early in the discussion on tax expenditures, their negative aspects featured strongly, implying that they should be thoroughly assessed and reduced as far as possible [16; 17, etc.]. However, given their continuing existence, it becomes salient to ask what kind of advantages tax expenditures have compared to direct expenditure as an instrument of policy? An obvious answer here is that in case of tax expenditures the administration cost involves the simple application of a tax rule, whereas direct expenditure requires to be administratively channeled to each recipient.

However, the question concerning why a certain instrument is chosen also leads to the field of political economy or public choice theory. This approach includes the interests of the acting persons and the influence of the institutional setting, including voting procedures

etc.² Starting with direct expenditure, it can apparently be shown to be targeted much better than tax expenditure. Money handed out by government usually follows strict rules which document the recipient and the amount received, whether this be a subsidy to enterprise or social expenditure aimed at natural persons. A politician may choose this instrument for instance if he wants to demonstrate to his constituency that he provided money in a well-documented way to people who are then grateful to him, for instance in elections.

On the other hand, this direct expenditure has considerable disadvantages for the politician since the amounts show up in precise figures in the budget and underlie the annual budget revision, thus becoming the subject of criticism from parliament and the media. As a consequence, expenditure amounts are liable to be reduced or abolished in each annual budget review. Compared to this, a tax expenditure offers considerable advantages. The tax expenditure amount is not known beforehand and thus cannot be discussed precisely at the time of introduction. Ex post, the amount is only visible in tax revenue – and there with difficulty. Moreover, the fact that this tax exemption exists at all is only documented in the relevant tax law. In contradistinction to annual budgets, a tax law is in principle “for eternity”, meaning that any revision needs discrete political action.

Taken together, these arguments try to answer the question of why tax expenditure is in itself a subject of concern. Because it can be used to obscure the intentions of politicians to support certain groups, it thereby reduces the desirable quality of transparency in political processes and access of critical research into these political actions.

So far, the discussion has been rather abstract. Therefore, an example is given, which is intended to show how important these issues can be when they are the subject of research into the field of intergovernmental relations.

² For an overview see [13, p. 195-214].

Since unwilling to subsidize directly some activity, a federal government can, for example, grant equivalent nationwide tax exemptions to taxes otherwise paid to the regional and local budgets. This may be aimed at relieving the federal budget of the burden of the expenditure, which would otherwise have to be a direct federal budget expenditure. Additionally, tax benefits can be provided by a federal government for taxes that are paid to the federal budget, but for activities which have obvious territorial boundaries (e.g. mineral resource extraction, certain recreational activities, port activities etc.). In effect, this resembles a grant given to specific regions. Moreover, similar examples can be given at the state level. In this kind of situation, tax expenditures are used not only as a means of financing, but also as an element of intergovernmental relations, which forms the subject of the following section.

3. Effects of tax expenditure in intergovernmental relations³

3.1. Vertical effects from tax expenditure

3.1.1. Criteria to judge these effects

A system of vertical effects, which can be induced by tax expenditure in a federal system is introduced in the following. If they are to be judged, then certain criteria are necessary⁴:

- assignment criterion – functions with their respective expenditure and revenue sources have been clearly assigned to the levels of government;

- purposiveness criterion – each expenditure item is described precisely by purpose and recipient;

- free decision criterion – each level is free to decide on the purpose and the recipients of its own expenditure, no one should interfere with this freedom of levels to use their resources;

- horizontal equity criterion – any transfer from a higher to a lower level should be distributed according to the specified rule (for example evenly across the level or unevenly according to a criterion such as taking fiscal need and fiscal capacity into account).

It seems that many of the problems caused in federal systems by tax expenditures arise from the fact that these criteria are applied to tax expenditure in a different way in comparison to how they are applied to direct expenditure.

For **direct expenditure**, certain rules can be assumed. Some of these may seem trivial, but are necessary to show the difference between direct expenditure and tax expenditure:

1. The level of the budget, which finances an expenditure item, is determined by the distribution of functions between the levels, as was previously explained.

2. The purpose and the final recipient are generally determined in an exhaustive manner in the relevant documents.

3. Usually a budget finances expenditure for its own functions. If the expenditure finances a function of a lower level, one speaks of a grant; if a higher level is financed, one speaks of a contribution. In both cases, only the financing level decides, but the receiving level obtains the benefit.

4. If a grant is distributed between different budgets of a level, it can either occur evenly or according to certain criteria.

With regard to **tax expenditure**, the situation is almost the opposite.

1. The assignment criterion is not met, because tax **expenditure** is characterized by the amount of **revenue** that has not been received at a particular budgetary level. Therefore, the level that finances the expenditure is in this case determined not by the distribution of **functions** between the levels, but by the distribution of **revenues**.

2. Neither the purpose nor the final recipient (beneficiary) of a tax expenditure is determined in an exhaustive manner; moreover, even if the purpose could somehow be assumed, the problem with the beneficiary still exists, because the tax

³ Mostly based on [1].

⁴ Some of the criteria are well known from constitutional documents (freedom), others from fiscal federalism literature [18–20] etc. They have been adjusted here to be helpful in the special discussion of tax expenditure in the intergovernmental relations.

can be shifted, as was shown in Part 1. Consequently, the purposiveness criterion is also often not met.

3. If tax expenditure constitutes an advantage for one level at the expense of another, one should additionally refer to the existence of a grant. To give an example, a federally granted VAT exemption for childcare reduces the need for the local support of kindergartens. However, in this case, nobody speaks of a grant to the local budgets, though it works like a grant to the local level. Moreover, such a grant might even be exercised by a decision of a third party so that the free decision criterion is not met. For example, in Russia a tax exemption from the **regional** transport tax exists for **local** passenger transport, which is granted by the **federal** level.

4. If a tax expenditure is interpreted as a grant, it should be noted that its horizontal distribution between different budgets of a level – and thus between regions – is not the same as the distribution of an equivalent grant. Here childcare can again be used as an example. Local government can subsidize it for poor parents by not asking a fee. For the same purpose, the central government could exempt childcare fees from VAT. The incidence is different, both in personal and regional terms. The VAT exemption cannot differentiate between rich and poor parents, whereas the local government can. This is the effect on personal distribution, but it also has implications for regional distribution. On average, rich parents live in rich regions, whereas in poor regions parents tend to be poor. Thus, the horizontal equity criterion is additionally not met.

To exemplify these statements, it might be useful to divide all tax expenditure into different types, based on three simple questions:

(1) *Which level decides to grant the tax expenditure?* This question is not new: There are many studies which distinguish between tax expenditures according to the level at which the decision to establish the tax exemption took place [5; 6 etc.]. However, as a rule, the studies are limited to the calculation of the tax

expenditure amount incurred by a decision of a particular level; consequently, they do not look into the problems of intergovernmental relations, which arise in connection with this. For the simplicity of the following analysis, it will be referred to as the **deciding level**. Nevertheless, we shall also specify here that if several levels are involved – for example first the federal government provides local authorities with the right to grant a tax benefit and then local authorities decide on the tax benefit itself – then the deciding level shall be defined as the level taking the **final** decision on the terms of how the tax benefit is applied in practice (which, in the given example, is the local level).

The remaining questions are more important in the context of intergovernmental relations.

(2) *Which level bears the lost tax money?*

Tax expenditures are still revenues, albeit not received. Therefore, it is always known which of the levels bears this fiscal burden. Moreover, if we consider this question in relation to the first one, we will obtain some very interesting combinations, where one level decides and the other one finances the consequences of this decision. Therefore, for the following analysis, it will be referred to as the **financing level**.

The third question adds one more dimension to this classification. In short it says: (3) *Which level is obliged to perform the financed function within the federation?* The main idea here is that tax expenditures as well as direct expenditures have to have a purpose, i.e. a function, and thus require to be assigned to one of the levels in accordance with the distribution of functions between the levels. It is at the advantage of this level that the tax expenditure occurs. Therefore, this level will be referred to as the **supported level**.

It can be seen that this third question adds one more dimension to the analysis. Taken together, these questions provide the possibility to classify tax expenditures depending on their effects in the system of intergovernmental relations, which will form the main topic in the discussion below.

3.1.2. Structuring the vertical effects of tax expenditure

This section of the paper deals with the various effects that a decision at one level in a federal system exerts on the other levels. To demonstrate the totality of these effects, a classification of tax expenditures is needed. For every tax exemption, the classification shows the three dimensions discussed above: the deciding level, the financing level and the supported level.

The whole classification may look like a cube having its sides defined by these three dimensions. In addition, the various levels of government have to be taken into account in each of the three dimensions. Each side is therefore built up by the levels of government, in this case federal, state and local (*F, S, L*).

The result is a cube which contains 27 blocks or cube cells. Within the cube, each cell is defined first of all by the three dimensions. In addition, within each dimension the cell is defined by one of the three levels of the federal system (Figure 2).

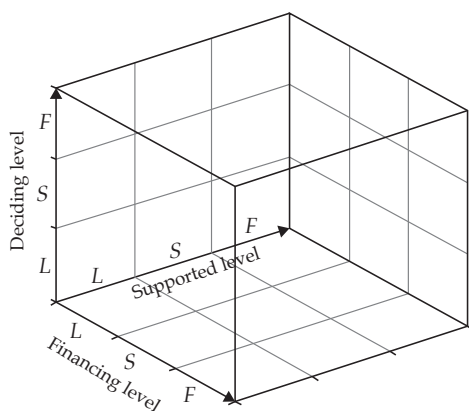


Figure 2. Three-dimensional classification of tax expenditures in intergovernmental relations

In order not to distract the reader by a great number of examples in a layer-by-layer analysis, a selection is made, based on important conclusions of the analysis.

For sake of simplicity, each combination is represented in a code where

- the first letter refers to the level that decides on the exemption;
- the second letter refers to the financing level – or, in other words, the level

bearing the fiscal burden of the tax expenditure;

- the third letter refers to the level is supported – or, in other words, taking responsibility for the financed function⁵.

Taken together, each code consists of three letters in a *DFS*-sequence (deciding-financing-supported). In this sequence, *F* stands for the Federal level, *S* for the State level and *L* for the Local level. As an example, the combination *FSS* means that the exemption is granted (1) by the decision of the federal level, (2) at the expense of the state budget and (3) in fulfilment of a state function. Similarly, *SSL* means that the state decided the exemption at the expense of the state budget to address local issues.

The analysis of the whole set of combinations permits to single out intergovernmentally-consistent and intergovernmentally-flawed tax expenditures. **Intergovernmentally-consistent** are those expenditures that are consistent with the criteria mentioned above. Actually, there are only two types of them:

1. Tax expenditures, which are almost equal to the usual direct expenditures, arising in the case where deciding, financing and supported levels coincide (*FFF, SSS, LLL* blocks).

The VAT zero tax rate for space-related activities in Russia is a perfect example for an *FFF* block. According to the constitution, all space-related activity is assigned to the central government, and the VAT goes entirely to the federal budget. Thus, no other level but the federal is involved. In this kind of situation, a tax expenditure can be considered as a direct expenditure without any intergovernmental effects.

⁵ For the sake of simplicity, we do not take into account here the situation where the assignment criterion is not met (fully or partially), as it is true for example for the so called “shared functions”, which are very important in Russia. If tax benefits are aimed at such a shared function, the issue is much more complicated and will be the subject of a separate later study. Likewise, the situation in which the purposiveness criterion is not met and a tax expenditure has no relation to the functions of any of the levels, is also not touched here and will be the subject of a future study.

A similar example can be given for the state level: in the territory of the Irkutsk region (Russia), disabled people are provided with tax exemption for the transport tax. According to Russian legislation, social support and social services for disabled people are assigned to the state (region). Therefore, taking into account the fact that the transport tax goes entirely to the state budget, such an exemption does not create negative effects in intergovernmental relations, because those who decide to issue the tax expenditure, who have to bear the burden and whose function is fulfilled, all coincide in one level.

2. Also consistent with the criteria are tax expenditures that are almost equal to a *contribution*, i.e. cases where deciding and financing levels coincide, while the supported level is higher (SSF, LLF, LLS blocks). Consequently, in Figure 3 all arrows are – in the end – pointing upwards.

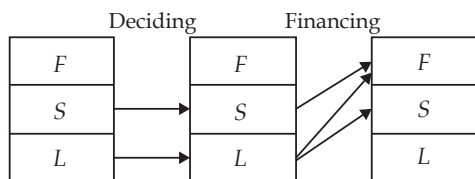


Figure 3. Tax expenditures equal to a contribution

In terms of an example for an SSF block, exemption from the corporate property tax (which is a state revenue) for airports of federal importance may be considered. In this case the state decides and pays, while the federation is supported. However, since the state has decided to grant this exemption independently, it follows all the criteria and there is no real need to address these kinds of situations.

Intergovernmentally-flawed tax expenditures, on the contrary, being inconsistent with criteria mentioned above, introduce flaws in intergovernmental relations. They include at least 4 types:

1. One type of tax expenditures is almost equal to a *matching grant*, arising in cases where deciding and financing levels coincide, while the supported level is lower than the financing level (FFS, FFL, SSL

blocks, Figure 4). Here all arrows – in the end – point downwards.

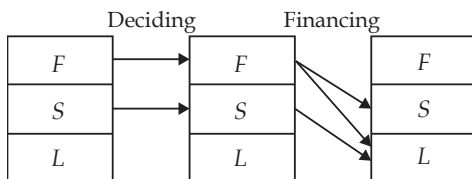


Figure 4. Tax expenditures equal to a matching grant

In these cases, functions of the state (FFS) or local authorities (FFL, SSL) are financed from the higher budget. For example, in Russia, charities are exempted from VAT, while support for socially-oriented non-profit organizations and charity are functions of the state. Likewise, childcare services are also exempted from VAT; these are the responsibility of local authorities. In such cases, one can speak of a financial support provided to the citizens of a local community. This is in effect the same as a matching grant. However, a grant is always distributed among the beneficiaries according to specific criteria derived from personal characteristics, while tax expenditures generated by VAT are given to all respective consumers without taking into account their need or any other criteria. In this case, then, the problem in intergovernmental relations induced by tax expenditures is quite obvious because the result of the distribution depends on the financing channel: tax expenditure versus direct expenditure. Consequently, tax expenditures lead to a violation of the horizontal equity criterion.

2. A second type of tax expenditure is almost equal to *general expenditure under the decision of the higher level*. These arise in cases where the deciding level is higher than the financing level, while financing and supported levels coincide (FSS, FLL, SLL blocks, Figure 5).

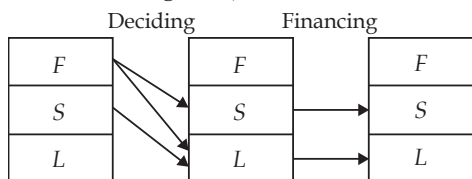


Figure 5. Tax expenditures, equal to general expenditure under the decision of the higher level

In *FSS*, the central government decides, but the financing is provided for a state function from the state budget. An example is the federal exemption for agricultural machinery within the transport tax. The support of agricultural producers in Russia is assigned to the states; if the state had a choice, it could decide either to give a direct expenditure to some farmers or to give a tax exemption. However, this decision was instead made by the federal government. Exactly the same situation arises when the federation grants a tax relief to support the local function at the expense of the local level (*FLL*). An example is the federal exemption from the payment of land tax for organizations of native arts and crafts, whose support is the task of the local authorities. One more block (*SLL*) can be illustrated by the tax exemption of childcare services from the Russian small enterprise tax ("patent tax"). The tax is a revenue of local budgets, but the exemption is made according to a decision of the state.

Potentially, this kind of situation may be observed with regard to direct expenditures as well; for example, when the federal government establishes some rules and standards that require a certain level of spending on some subnational function. Both, tax expenditures and standards reduce local expenditure possibilities and divert local expenditure from local preferences. Nevertheless, state authorities have a choice either to spend money or not, while in the case of tax expenditure they do not have such a choice. Consequently, the free decision criterion is not met here.

3. Tax expenditures that are almost equal to an *unfunded mandate* arise in cases where the deciding level is higher than the financing level, while the financing level is lower than the supported level (*FSF*, *FLF*, *FLS*, *SLF*, *SLS*, Figure 6).

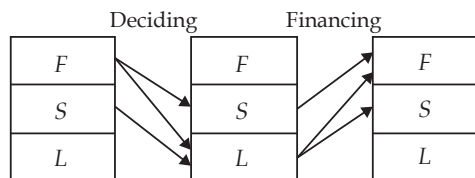


Figure 6. Tax expenditures equal to an unfunded mandate

This kind of problem can arise, for example, when the federation decides to issue a tax exemption in its own favor, but at the expense of the state (*FSF*). An example is the exemption for military transport from the transport tax in Russia, while defense is assigned to the federation and the transport tax is a revenue received at the level of states. A similar situation can be observed if the tax exemption is given in favor of the local budgets (*FSL*). It happens in Russia, for example, with the exemption from the transport tax of local passenger transport. In each case, the federal decision generates a so-called unfunded federal mandate – a lower budget obligation to spend money on the higher levels function which is not provided with financing. It is obvious that this constitutes a violation of the free decision criterion.

Other examples include land tax exemptions⁶ – for the organization of the penitentiary system (*FLF*), which is a federal function – as well as for the non-profit organizations of disabled people (*FLS*), which is a state responsibility.

An unfunded mandate is somewhat similar to a contribution: both require that the receiving level be higher than the financing. But in case of the contribution, the deciding level and financing level coincide, while in the situation of the unfunded mandate the deciding level is always higher than the financing level.

4. Tax exemptions which are almost equal to a *requested matching grant*⁷, arise in cases where the deciding level is lower than the financing level, while the financing level is higher than the supported one (*SFS*, *SFL*, *LFS*, *LFL*, *LSL*, Figure 7).

These situations are quite unusual, because they contain an obvious discrepancy. The decision in these cases is made by the lower level, while the financing is provided by the higher level. As a rule, this is possible only if the higher level has provided such an opportunity in the legislation. An example from the practice of Rus-

⁶ The land tax is in other countries a part of the property tax, together with the taxation of buildings.

⁷ Requested is a type of grant which is only given after a formal application has been filed.

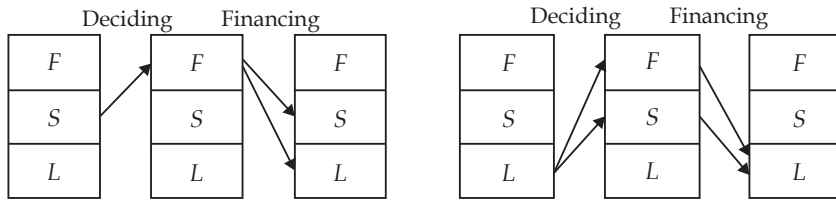


Figure 7. Tax expenditures, equal to a requested matching grant

sian fiscal federalism may be the situation where, according to a decision taken by a state, a special economic zone is created. The special tax regime for such zones presupposes a lot of tax exemptions, which also incur a burden from tax expenditures for the federal budget [21]. In other words, in this particular case it is a grant from the federal budget given at the request of the state. As such, it has the same flaws as a usual grant does — the incidence of such grants may be different from the incidence of direct expenditures for the same purpose. Consequently, the horizontal equity criterion is again not met.

There are some other examples; however, limitations as to the scope of this paper do not permit to them all be described. For the same reason, an empirical analysis of each of the described types of intergovernmentally-inconsistent tax expenditure will be the subject of a further study [1]. In this paper, the sole purpose was to study merely in principle the impact of such tax expenditures within the system of intergovernmental relations. This constitutes a very important means for identifying ways of solving the problems that arise in this context. The solution can either work through a change of the existing tax rules (to make tax expenditures compliant with criteria mentioned above) or through the use of the intergovernmental transfer system.

In particular, tax expenditures similar to unfunded mandates may be addressed by adjustments within the system of intergovernmental transfers because in this case adequate compensation is required from the other level. A separate question is which level of government should compensate: the one that decided to introduce a tax exemption or the one whose function was fulfilled this way. Likewise, tax

expenditures similar to matching grants (including requested ones) may also be addressed by adjustments within the intergovernmental transfer system if the distribution of such “subsidies” does not meet the horizontal equity criterion.

Now we turn to the case where a tax expenditure is equal to a general expenditure, but the decision to grant it is made by the higher level. The example was the federal exemption for agricultural machinery within the transport tax. These cases cannot be addressed by adjustments inside the intergovernmental transfer system but have to be carefully studied in order to identify the scale of the problem and find possible solutions by changing the existing tax rules.

At the end of this section discussing vertical effects, an additional issue is addressed. There is a term which is widely used for vertical situations in which fiscal decisions made by the government at one level affect not only its own budget, but also that of the government at another level. This term is *vertical fiscal externalities* [22; 23]. A typical case is an increase in the income tax of states and local governments in the USA, which make use of the common pool of the income tax base in the country. They thereby limit the possibility of the central government to do the same, because this would result in a too-heavy financial burden to the taxpayer, and the central government feels responsible for this. This effect is unintended by the sub-national action. The inter-level effects of various types of tax expenditures, which have been described above, can to some degree be called vertical externalities, but only insofar as those who decided on these tax expenditures probably did not intend these effects to occur. Usually, issuing a tax expenditure at the expense of an-

other level of government is a deliberate action. Therefore, these are rather genuine effects of tax expenditures, which arise in the presence of several levels of government, and should consequently be treated as effects, not as side-effects, as the term “externality” would indicate.

3.2. Horizontal externalities from tax expenditure

Horizontal fiscal externalities from both tax and expenditure occur when the independent policies of governments at a given level have effects on residents or governments of neighboring jurisdictions on the same level [19, p. 38]. As to the horizontal effects of taxes as such, these have been sufficiently studied in the literature [24; 25 etc.]; to some degree, tax expenditures have also been touched on there. For example, in relation to the tax externalities it has long been accepted that tax incentives provided by local authorities increase **tax competition** between territories and thus indirectly influence the tax revenues of neighboring territories. Another horizontal effect on the tax side is **tax exporting**: by providing a relatively favorable tax regime for activities with a mainly local area of consumption and, at the same time, imposing taxes mostly on activities consumed by residents of other regions (e.g. hotels, touristic activities, goods exported outside the region etc.), it is possible to shift the tax burden to the residents of neighboring jurisdictions.

Turning to the expenditure side and its externalities (Figure 8), the expenditure ex-

ternalities of what is called here “direct expenditures” have also been dealt with in the literature for a long time. But if it comes to the “expenditure externalities of tax expenditure” (see right side of Figure 8), they are still neglected. For instance, **expenditure spillovers** are usually considered as a benefit (or harm) generated by the expenditure policy of one jurisdiction to the residents of neighboring jurisdictions. So far, these spillovers have been researched in respect to direct expenditures only. However, expenditure spillovers could be observed in respect to tax expenditures as well: their existence in this case may be explained not only because locally provided goods can be used by residents of other regions, but also because almost anyone could become the beneficiary of that expenditure through tax shifting. In other words, due to the absence of an obvious recipient of the tax expenditures, the number of channels for spillovers multiplies.

To show these effects, we shall single out two types of tax expenditures (depending on the scale of the benefits and their beneficiaries [26]), namely:

- narrowly targeted and
- more universal tax expenditures.

Narrowly-targeted tax expenditures have a very specific beneficiary. This can be:

- the taxpayer himself (e.g. tax exemptions from direct taxes);
- the consumer, who buys the taxpayer’s goods (e.g. VAT exemptions with respect to goods with elastic demand);
- the person who supplies the taxpayer with resources (e.g. decreasing co-

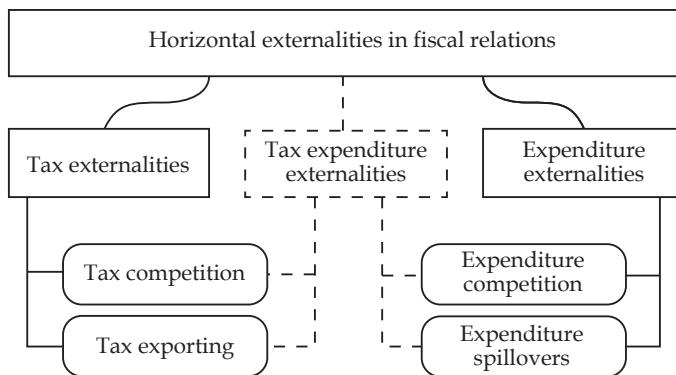


Figure 8. Horizontal externalities of tax expenditures

efficients to the tax rate, applied in case of employment of disabled people);

- in different proportions both the taxpayer and the consumer, as well as the person supplying the taxpayer with resources (e.g. VAT exemptions for goods with inelastic demand).

If the local authorities have definite knowledge as to the ultimate beneficiaries of their tax expenditures, it not only gives them the ability to make informed and efficient decisions in the field of local tax policy, but also helps them to identify cases and directions of tax expenditure spillovers.

For more *universal tax expenditures*, one cannot specify the beneficiary. If they were truly universal, society as a whole would benefit as a result of the positive externalities from such activity; however, this would seem to be an unlikely objective for a local tax expenditure. Consequently, the occurrence of spillovers is highly dependent on the nature of the activity to be funded. If, for example, an exemption from the land tax is granted for sports facilities or private schools, then the target area is coherent with the local consumption area and does not generate more risks of spillovers than similar direct expenditures would. Conversely, if the exemption provides benefits for an activity with a wider area of consumption and thus is more universal, for example an exemption from the land tax for land used for special environmental purposes, the exemption from the transport tax for electric cars, or the exemption from the property tax for solar-powered houses or research institutes, then they potentially lead to obvious expenditure spillovers, which might give reason to act somehow on the national or subnational level.

Expenditure competition as another expenditure externality is also quite possible to observe in the case of tax expenditures (Figure 8 above). For example, tax exemptions may be aimed at the intensive development of specific infrastructure (e.g. tax benefits for energy or development companies). These, in turn, can attract a tax base to the region (for example housing), thereby importing it from other regions.

Thus, both tax- and expenditure-related externalities are to be studied in

relation to tax expenditures in order to develop the principles that should be used for formulating tax exemptions for state revenue or local revenue taxes. This is of particular importance if we take into account as a possible outcome of this work new approaches to internalize these externalities by making a decision at the federal level, or to minimize their negative impact in other ways by some kind of collective local decisions on the subnational level.

Here, however, a note of caution is necessary, which applies to any externality. The mere existence of an externality is in itself not a reason to react to it. This was shown in the discussion of environmental externalities [27]. To look at externalities in terms of their effect and importance should therefore precede any political advice for action. One should always consider the option of not intervening. For that, it is helpful to thoroughly assess the consequences of just letting the externality happen and then confront the outcome with the cost of intervention.

3.3. Tax expenditure as equalization disturbing element

This final part of the paper does not relate to all tax expenditures, but rather to a certain type of them – those addressing distributional goals. The problem of tax expenditure in intergovernmental relations that can be observed here occurs as a result of the discrepancy between two equalization channels, which exist in any federation.

As to the first channel: since taxes are regarded as an important tool of redistribution in a society (beside social expenditure), quite a few tax exemptions in every federal state are targeted at supporting the poor. In this sense they aim at what is called here **vertical equalization**: reducing the nationwide gap between rich and poor, as expressed by the difference in their net income.

At the same time, there is a second channel of equalization, which is usually exercised in a federal state through the system of equalizing grants, here referred to as **horizontal equalization**. The ultimate objective of this system is dependent

on the methodology used for the grant distribution. Typically, it is “fiscal capacity equalization” (*FCE*) or “horizontal equity equalization” (*HEE*)⁸. What is important here is that the equalization exercised through the intergovernmental transfer system is aimed not only at interpersonal equalization, but also (and in the first place) at interregional equalization.

In general, both channels of equalization do not impede each other but rather work together to achieve the common objective in both dimensions – horizontal and vertical. This working together can be observed when the intergovernmental transfer system is based on the *FCE* methodology and in a situation, in which the rich and the poor are almost evenly distributed between regions so that all regions are quite close to each other in their level of average income (which is the case in Germany for instance). In this situation, both equalizing channels will reduce the gap in both dimensions, i.e. between regions and between people.

However, in a number of cases these channels of equalization can work in an uncoordinated manner or even in opposite direction – this will form a major topic in a later study.

Lack of coordination may be observed, for example, if two elements come together: (1) the intergovernmental transfer system is based on the *HEE* methodology; and (2) regions are internally more or less income-homogeneous but strikingly different across the country as a whole. In this situation, where truly rich and poor regions exist side by side, tax expenditures aimed at vertical equalization will be effectively working as transfers from the rich regions to the poor, while equalizing grants will be just redistributing the revenue between regions with the same fiscal capacity in accordance with their fiscal need. To put it differently, the equalization exercised through the tax expenditures will be aimed only at interpersonal equalization, not taking into account the difference in the fiscal need between the regions. At the same time, the intergovernmental transfer sys-

tem will be aimed only at the interregional equalization, leaving out the gap between rich and poor people in the federation.

This situation might look like a mere utopian ideal, almost impossible in practice (both because *HEE* methodology is almost not used in the world and because the difference between regions within any country is usually not that large [29]). However, it exemplifies very well the difference between the directions of equalization, exercised through different channels.

In practice and irrespective of whether *FCE* or *HEE* methodology is applied, situations are frequently observed where redistributive tax expenditures and equalizing grants work in the opposite direction, even though this may sound paradoxical. The general reason for this is the low degree of tax expenditure efficiency when it comes to distributive objectives. A more precise reason is the dependence of the amount of tax expenditure received in a region on the purchasing power of the population in the region. The most convincing example are VAT exemptions: previous studies in Russia [30] showed that VAT exemptions for education and healthcare, which in theory were designed to address equity⁹ issues [31, p. 47; 32, p. 21; 33, p. 14–15; 34, p. 36 etc.; 35, p. 35; 36, p. 13], have the opposite effect in practice. Tax expenditure per capita in a region caused by this kind of tax exemption has a strong positive correlation with the average income level in a region. In other words, instead of narrowing disparities, these tax expenditures mostly accrue in rich regions, making disparities wider.

The mechanism of this effect is quite obvious, as the following example shows. When the same reduced tax rate is applied for bread (for instance 7 % instead of 19 % in Germany), no matter whether it is cheap or expensive, then the advantages of tax expenditures received by the population in rich regions (where people buy expensive bread) will be considerable, whereas in poor regions (where people buy the cheap variant) they are smaller.

⁹ Under the concept of equity it would be helpful to help the poorest, because this would bring them close to the average poor. At the same time inequality in relation to the rich is reduced.

⁸ For an overview see [28].

At the same time, the regional distribution of equalizing grants will work the opposite way. Consequently, when tax expenditures with a strongly marked distributional objective are distributed across the regions without taking into account either fiscal need or fiscal capacity, as is typically the case, then disparities arise.

Therefore, some issues have to be addressed in respect to this kind of equalization-oriented tax expenditure. Should one target the tax expenditure distribution the same way as it is done with respect to the equalizing grants? If not, how exactly should they be distributed? If their distribution is far from ideal, should the government correct this effect within the intergovernmental transfer system?

In any case it should be noted here that as a result of the use of tax exemptions (like those which were given above for the VAT), the inter-territorial differences are obviously exacerbated. Huge sums of tax expenditure are changing the situation of people in different regions in favor of regions with high average income, thereby

undermining fiscal equity. These effects therefore require additional study, assessment and adjustment, either at the level of tax legislation or within the system of intergovernmental transfers.

4. Concluding remark

This paper contributes to the new field of tax expenditure as a problem in intergovernmental relations. The problem is huge due to the fact that tax expenditures account for large amounts in many countries. Moreover, the problem is caused by very particular effects caused by tax expenditure and experienced in the area of intergovernmental relations. For any empirical study in a country, an analytical framework is needed, which has so far been lacking. The framework developed here is intended to clarify which kinds of effects may occur. There are many of these: some are of a horizontal type, while others work vertically between the levels of government. Taken together, they should lead in any given country to specific measures to reduce the observed problems.

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Tax revenues, public investments and economic growth rates: evidence from Russia

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ABSTRACT

This article analyzes the economic effects of public investments in Russia. The correlation between gross regional product growth rates and public capital accumulation has been identified. It has been found that regional investments stimulate growth much better than federal ones. Therefore, the transfer of federal resources to regional levels, as well as a more precise tailoring of investment policies to the needs of individual territories, should contribute to a rise in productivity and an increase in regional growth rates. The findings show that investments from sub-national budget sources are closely correlated to regional tax revenues. Therefore, the fine-tuning of the revenue-sharing mechanism in the larger fiscal federalism framework, the expansion of the regional tax base, the improvement of tax collection and tax administration systems, and other related measures represent the main focus areas for expanding investment opportunities at the provincial level. In the long term, this way of regional development is expected to be more efficient and sustainable compared to the current emphasis on the implementation of large developmental projects at the expense of the federal budget. These aspects of Russia's experience seems to be valid for the entire Eurasian continent, as seen by the scale of infrastructure projects initiated there in recent years under the framework of "One belt-One Road" and other development initiatives

KEYWORDS

Economic growth, infrastructure development, public investment, regional economy, tax revenues

JEL R11, R53, H72

HIGHLIGHTS

1. Subnational investments from regional budgets positively influence the rate of regional development, whereas the role of federal investment, most often, is negative or statistically insignificant
2. The fine-tuning of the revenue-sharing mechanism, the expansion of the regional tax base, the improvement of tax collection and tax administration systems, and other related measures represent the main focus areas for expanding investment opportunities at the provincial level
3. Since federal investments are considered inferior to regional ones in terms of provincial growth stimulation, transferring most of the investment resources to the sub-national level could be beneficial for overall growth rates
4. Comprehensive use of local resources for federal construction projects allows to maximize the macroeconomic effects not only in Russia, but also in several Eurasian states, currently implementing large-scale infrastructure development initiatives

УДК: 330.322.14

Налоговые доходы, бюджетные инвестиции и темпы роста экономики: опыт российских регионов

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АННОТАЦИЯ

В данной статье на примере российских регионов исследуются экономические эффекты бюджетного инвестирования. Оценка корреляции темпов роста валового регионального продукта с накоплением общественного капитала показывает, что региональные инвестиции стимулируют рост намного лучше, чем федеральные. Следовательно, передача федеральных ресурсов на региональный уровень, а также более точная ориентация инвестиционной политики на особенности отдельных территорий должны способствовать ускорению национального экономического развития. Кроме того, инвестиции за счет субнациональных бюджетов тесно коррелируют с региональными налоговыми поступлениями. Следовательно, точная настройка механизма бюджетного федерализма в области доходов, увеличение налоговой базы субъектов Российской Федерации, улучшение собираемости налогов и другие аналогичные меры являются главным направлением расширения инвестирования на региональном уровне. В долгосрочном плане, этот путь территориального развития представляется более эффективным и устойчивым, чем реализация крупных проектов за счет федерального бюджета. Перечисленные аспекты российского опыта актуальны для всего евразийского континента, где в последние годы в рамках проекта «Один пояс-один путь» и других инициатив начато создание крупных инфраструктурных объектов за счет бюджетных источников

КЛЮЧЕВЫЕ СЛОВА

Экономический рост, развитие инфраструктуры, бюджетные инвестиции, региональная экономика, налоговые доходы

ОСНОВНЫЕ ПОЛОЖЕНИЯ

1. Капиталовложения из региональных бюджетов позитивно влияют на темпы территориального развития, однако роль федеральных инвестиций, чаще всего, отрицательна или статистически незначима
2. Увеличение налоговых доходов субъектов Федерации представляет собой главный и наиболее эффективный путь расширения региональных инвестиций
3. Поскольку федеральные инвестиции уступают региональным в плане территориального стимулирования роста, передача большинства инвестиционных ресурсов на субнациональный уровень может привести к повышению суммарных темпов экономического развития
4. Комплексное использование местных ресурсов в процессе строительства за счет федерального бюджета позволяет максимизировать получаемые макроэкономические эффекты не только в России, но и в ряде Евразийских государств, осуществляющих крупные проекты инфраструктурного развития

Introduction and the scope of this research

The Eurasian continent deservedly draws attention from all over the world as a unique research field for specialists in territorial development. Eurasia stands out for its experience with multilateral financial institutions, its operation of large

integration groupings, and its achievement of intensive economic interaction among key players. Important developments in recent years have included new large-scale development initiatives, the establishment of previously absent institutions, and the emergence of additional opportunities for infrastructure construction

within the frameworks of: the Eurasian Economic Union promoted by Russia, the One Belt-One Road initiative suggested by China, the Asian Development Bank lead by Japan, and many other important and actively working organizations.

In the vast Eurasian expanse, Russia possesses the largest territory and has accumulated the broadest experience in spatial development. As recent history shows, the “Turn East” policy initiated by Russia in the middle of the last decade gradually acquired the features of a comprehensive governmental program, one effectively oriented for sustainable regional growth. The implementation of large infrastructure projects, the shifting resources to the Asian part of the country and the establishment of regional development institutions have had a profound effect on the economic dynamics of the Russian provinces.

All these facts underline the importance of analyzing and disseminating best practices in the accumulation of public capital for regional development. The existing economic literature on this topic has taken one of two approaches. The first examines the role of the state in the formation of public capital and the related productivity issues [1; 2]. The second group of studies views the accumulation process as a precondition for the performance of public finance functions such as macroeconomic regulation, income redistribution and the provision of public goods [3].

Russia-based studies have been conducted in both directions but reached contradictory conclusions. Some papers argue in support of the positive role of investment (including public ones) in boosting economic growth [4], while others insist budgetary investments have no or an adverse impact on both growth rates and the reduction of regional disparities [5].

Even more important than these conflicting conclusions, however, is the fact that significant dimensions of Russia’s situation have not yet been properly analyzed in the economic literature. Among these issues are: the breakdown of public investment into federal and regional sources, the grouping of Russian provinces according to the dynamics of the

investment process, and the statistical relationship between public investment and regional growth rates. These omissions constitute the focus of this paper. After an empirical overview of budgetary investment understood as an increase of public capital, this paper looks at an econometric model assessing the interaction of investment and economic growth in Russia’s regions, before concluding with some policy implications. These topics provide important insight into the promotion of international projects currently being implemented on the Eurasian continent.

Theoretical issues and literature review

Existing approaches to the analysis of budget investments can be divided into two parts. The first group of works considers investment as a form of accumulation of social capital and deals with its productivity issues. In particular, a representative analysis of meta-data from 93 studies on this subject made it possible to conclude that in the post-war period in most countries the cumulative effect of public spending was rather positive, although not very significant [1]. A subsequent review of 76 sources led to a similar conclusion about the positive and statistically significant but relatively small contribution of social capital to the growth of gross output [6]. The positive contribution was limited to the educational and infrastructure components of investments in social capital. In the regional context, the latter’s positive influence was recorded for US states [7]. An analysis of the prefectures of Japan showed that the effect depended on the study period and the type of region. At the stage of rapid economic growth in the 1950–1970s, the role of social capital was unambiguously positive. However, in the 1980s and 1990s, negative contribution prevailed in less developed areas, indicating an excessive accumulation of public capital [8]. This was the result of significant changes in the Japanese regional policy after the first oil shock, when the center of gravity was switched from the stimulation of growth to a more even distribution of public goods throughout the country [9; 10].

For Russia, such studies have long been limited to the contribution of all accumulated capital to GDP growth or total factor productivity (a literature review is provided in [11]). In the first work, which divided the role of private and public funds, a positive and significant correlation of the output with public investment was established, but the accuracy of the constructed model raised serious doubts [12]. Later, a more accurate econometric analysis confirmed the conclusion about the positive and significant contribution of social capital to the economic dynamics [13].

The second group of works in the field of budgetary investments considers them as the process of formation and maintenance of fixed capital necessary for performing the basic functions of public finance, i.e. macroeconomic regulation, redistribution of resources and provision of public goods. Theoretically, budget investments should act as a tool to stimulate economic growth, equalize the levels of economic development and improve the social environment [3]. But according to the results of empirical studies, the elasticity of GDP on budgetary investments can have negative values [14], international and regional convergence is not always followed by investment [15], and simple expansion of budgetary investments does not necessarily lead to the desired social outcome [16].

Studies on the materials of Russia also lead to contradictory conclusions. Some papers cite arguments in support of the positive role of investment (including budgetary ones) in boosting the growth of the economy [4], while others mention the zero or even negative impact of budgetary investments on growth rates and regional differences [5]. However, the greatest difficulty is that some aspects of the Russian situation are not represented in the economic literature at all. This refers to the division of federal and regional investments, the analysis of different functions of public finance, the statistical correlation of budget investments and the quality of the social environment, etc.

Both mentioned approaches to budget investments (productivity of social capital

and functions of public finance) seem to be really important and promising. However, the research on productivity (the first approach) is nearly impossible, because of the absence of necessary data. That is why this paper is focused on the stimulation, redistribution and public goods provision functions of budget investment (the second approach). After this brief literature review, the paper describes the specifics of budget investments, followed by a statistical analysis of the correlation of investment with regional growth rates and the quality of the social environment, and concludes with policy implications and recommendations. Such research provides a new answer to the question of priorities and prospects for investment policy in modern Russia.

Public investments and tax revenues in Russia

The existing information on public investments in Russia is very limited. According to available data, one can assess only the broadest features of the investment process. The main indicators related to the investment process are shown in Table 1.

Table 1

The main indicators of the investment process in Russia, %

Indicator	1995	2000	2005	2010	2015	2016
Gross savings to GDP	27.5	33.6	30.6	25.1	27.2	27.3
Gross fixed capital formation to gross savings	76.4	54.5	58.1	83.7	76.3	77.0
Gross fixed capital formation to GDP	17.5	16.5	16.7	20.4	19.6	20.4

Source: [17].

Gross savings in Russia are only slightly lower than that of the middle-income countries, while gross fixed capital formation lags far behind. The gap between the rate of gross savings and capital formation reaches 5 % of GNI and is among the highest in the world (Table 2). This figure illustrates the well-known fact that Russian savings do not turn into investments because of a weak financial sys-

tem, a bad investment climate and conservative government policies.

In 1995–2016, the ratio of budgetary investments to Russian GDP fluctuated between 2.3 and 4.1 % (Table 3). This roughly matched the figures from the bottom quarter of OECD countries, the average of which was around 4 % [19].

As for the relative contribution from federal and subnational sources, during the 1990s we observed a reduction in the federal contribution (from 1.9 % to 0.9 %

of GDP), which reflects the general shift of expenditures to the subnational level (Figure).

However, since 2006, there has been an increase in the distribution of federal sources, which peaked in the crisis year of 2009 (1.9 %), and then started to fluctuate between 1.2–1.5 %. From 2010–2016, federal investments exceeded regional ones by 0.1 to 0.6 %. Apparently, this dynamic is a reflection of the evolving reality of Russian budgetary federalism.

Table 2

Gross fixed capital formation and gross savings, % of GNI

Country	Gross fixed capital formation		Gross savings	
	2005	2016	2005	2016
Brazil	17	15	17	14
China	41	44	48	46
India	39	30	38	30
Japan	25	23	28	27
Kazakhstan	31	27	29	21
Poland	20	20	17	19
Russian Federation	20	23	31	25
South Africa	18	19	15	16
Ukraine	23	22	26	17
United States	23	20	18	18
Uzbekistan	18	25
<i>World</i>	25	24	26	24
<i>Low income</i>	17	26	...	14
<i>Lower middle income</i>	28	27	29	28
<i>Upper middle income</i>	30	32	34	31
<i>High income</i>	23	21	23	22

Source: [18].

Table 3

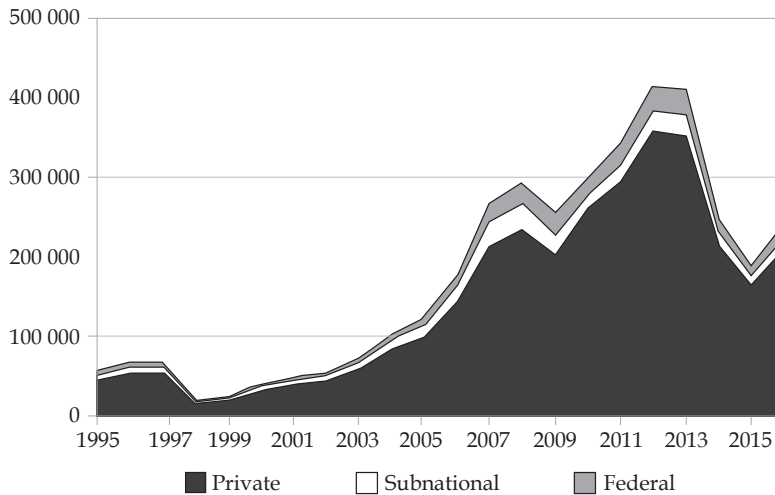
Investments in fixed assets in Russia

Indicator	1995	2000	2005	2010	2015	2016
<i>billion rubles (1995 – trillions of rubles)</i>						
GDP	1 429.0	7 306.0	21 610.0	46 309.0	83 232.6	86 043.6
Investments	267.0	1 165.2	3 611.1	9 152.0	13 897.2	14 639.8
Investments*, including:	267.0	1 053.7	2 983.2	6 625.0	10 496.3	11 266.9
federal budget	27.0	69.2	202.2	661.9	1 185.5	1047.9
subnational budgets**	27.5	151.2	365.1	542.8	736.0	907.2
<i>% of GDP</i>						
GDP	100.0	100.0	100.0	100.0	100.0	100.0
Investments	18.7	15.9	16.7	20.3	16.7	17.0
Investments*, including:	18.7	14.4	13.8	14.7	12.6	13.1
federal budget	1.9	0.9	0.9	1.5	1.4	1.2
subnational budgets**	1.9	2.1	1.7	1.2	0.9	1.1

* Since 2000: without small business entities and unobserved economic activity.

** Budgets of Russian provinces and municipalities.

Source: [20, pp. 579–581].



Investment in fixed assets in Russia, millions of USD at official rate

Third, the largest share of public investments (about 26 % of all federal investments in 2016) was directed to transport and communications, first and foremost to road construction. Nevertheless, as a percentage of GDP, road construction was only 0.3 % of GDP in 2016, compared to the 1 % recommended by the European Union to its members.

During the 2000s, there was considerable growth in the amount of investment carried out on the basis of the program budgeting method. In the federal budget, the share of programmed investments increased from 16.8 % in 2001 to 47.4 % in 2016. It should be noted that more than half (55.0 %) of all allocations went to the program "Development of the Transport System of Russia in 2010–2020".

Budgetary investments are very unevenly distributed across the country. During the same period of 2000–2015, the share of the 10 richest regions (leading in terms of per capita GRP) fell from 60 % to 38.2 %, while the share of the 10 poorest regions increased from 1 % to 6.8 %. Clearly, the spatial distribution of investments has become more egalitarian.

An interesting picture is drawn by the analysis of the spatial distribution of public investment stock. Since the deflators for budget investments are not available, we will calculate them in US dollars at the official exchange rate. For the period of

1995–2015, budgets of all levels invested in the Russian economy total 751.5 billion dollars (346.7 federal and 404.8 regional, see Table 4).

44.7 % of federal investment was channeled into the top ten regions. This composition illustrates the federal government's investment priorities, which include the two Russian capitals with their adjacent territories, a number of provinces with large national projects (the Sochi Olympics in 2014, the Summer Universiade in 2013, the APEC summit in 2012, etc.), and the North Caucasian republics that were severely damaged during a war against Islamic terror. Subnational investments are distributed even more unevenly. The top ten account for 63.8 % of public investment, 47.2 % for the first three provinces and 25.6 % for Moscow. The allocation of subnational investments depends, predominantly, on the financial capabilities of the provinces and reflects the uneven distribution of budgetary resources across the country.

Tax revenues are also very unevenly distributed throughout the country. This is a well-documented fact, thoroughly discussed in the relevant literature [21–23]. 52.5 % of tax revenues are collected in the 10 most economically developed provinces of Russia, with Moscow accounting for 22.3 % of the total amount. Preliminary estimates show that the tax revenues of regional budgets are closely related to bud-

Table 4

**Spatial distribution of public investment and tax revenues (stock, 1995–2015),
billion dollars**

Federal budget sources		Subnational budget sources		Tax revenues*				
1	Moscow	34.2	1	Moscow	103.6	1	Moscow	442.5
2	Krasnodarskii krai	24.5	2	Tumen oblast	65.4	2	Tumen oblast	169.9
3	Saint-Petersburg	19.2	3	Saint-Petersburg	22.1	3	Saint-Petersburg	114.3
4	Moscovskaya oblast	13.9	4	Tatarstan republic	13.4	4	Moscovskaya oblast	110.2
5	Primorskii krai	13.1	5	Bashkort. republic	10.7	5	Sverdlovskaya oblast	53.8
6	Dagestan republic	11.9	6	Krasnodarskii krai	9.3	6	Krasnoyarskii krai	50.7
7	Tatarstan republic	10.3	7	Moscovskaya oblast	9.2	7	Tatarstan republic	49.2
8	Voronezh oblast	9.3	8	Sverdlovskaya oblast	8.7	8	Krasnodarskii krai	48.7
9	Chechen republic	9.3	9	Dagestan republic	8.3	9	Bashkortostan republic	39.4
10	Rostov oblast	8.7	10	Nizhegorodskaya oblast	6.9	10	Samarskaya oblast	39.1
<i>Total for 10 provinces</i>		155.0	<i>Total for 10 provinces</i>		258.1	<i>Total for 10 provinces</i>		1 117.7
<i>Total Russia</i>		346.7	<i>Total Russia</i>		404.8	<i>Total Russia</i>		1 981.3

* For the years 2000–2015.

get investments, with the partial correlation coefficients being positive for regional (0.6, significant at 0.01) and negative (–0.28, significant at 0.01) for federal investments. Such a preliminary conclusion seems to be very important for this research and requires additional verification.

This brief overview shows that both public investments and tax revenues differ greatly in volume, dynamics and spatial allocation. We can reasonably suggest that they also have differing impacts on the economic dynamics of the tax collecting and investments receiving provinces. Let us try to test this assumption using the available data.

Correlation of public investment, tax revenues and economic growth

In this part we will try to establish a correlation between the indicators of public investments and the parameters of the regional economy, concentrating on the efficacy of public finances in stimulate economic growth. The estimation model is described by the formula:

$$Y = \mu + \beta_{inv} Inv + \sum_{i=1}^n \beta_i X_i + \sum_{i=1}^n \beta_i Z_i + \varepsilon,$$

where Y is the dependent variable, namely: GRP index; μ is a constant; Inv are shares of federal, subnational and other (private) investments in GRP; i – provinces of Russia; β_{inv} and β_i are the estimated partial

correlation coefficients; X is a vector of constantly present control variables; Z is a vector of additional control variables that reflect the characteristics of the regional economy; ε is the statistical error.

The observation period covers 13 years from 1997 to 2009. Data on autonomous okrugs are included for the larger provinces, and the Chechen Republic is excluded due to missing data, bringing the number of regions to 79. The vector of constantly present control variables X consists of the following indicators: 1) Labor (index of employment); 2) Tax-revenues (tax revenues of subnational budgets as % of GRP). The vector Z includes *Jan-temp* (the normalized average temperature of January with the value for Russia taken as 1). In addition, some dummy variables were introduced into the X vector, such as dummies for the crisis years of 1998 and 2009 (*cr98*, *cr09*) as well as for the Republics of Kalmykia, Mordovia and the Chukotka Autonomous Okrug, which have a number of outstanding features in regional development and investment process (*kalmyk*, *mordov*, *chukot*).

Statistical characteristics of the variables are provided in Table 5.

The estimation results are shown in the Table 6. Estimation 1 includes only control variables X , in Estimation 2 the *Jan-temp* variable is added, and Estimation 3 includes the entire set of control variables X and Z .

Table 5

Description of variables (1997-2009, for 79 regions)

Variable	Mean	Min	Max	SD	Description
1.Inv-priv	0.174	0.002	1.023	0.096	Private investment share in GRP (%)
2.Inv-reg	0.020	0.000	0.227	0.018	Subnational budgetary investments share in GRP (%)
3.Inv-fed	0.031	0.000	0.433	0.041	Federal budgetary investment share in GRP (%)
4.Labor	0.998	0.866	1.173	0.024	Employment index
5.Tax-revenues	0.144	0.012	1.148	0.056	Tax income of subnational budgets to GRP (%)
6.Jan-temp	0.984	0.076	3.100	0.660	The average temperature in January (normalized with Russia's average value = 1)

Source: Rosstat data.

Table 6

OLS estimation results (GRP index as a dependent variable)

Independent variables and estimation results	Estimation		
	1	2	3
Intercept	-0.159 (-1.802)	-0.142 (-1.599)	0.422 (5.085)
1.Inv-priv	0.200* (7.074)	0.199* (7.052)	0.217* (8.753)
2.Inv-reg	0.066** (2.018)	0.062*** (1.899)	0.088* (3.090)
3.Inv-fed	-0.06** (-1.997)	-0.07* (-2.264)	-0.030 (-1.259)
4.Labor	0.384* (13.542)	0.380* (13.413)	0.207* (7.721)
5.Tax-revenues	-0.16* (-5.181)	-0.152* (-4.885)	-0.244* (-8.019)
6.Jan-temp	-	-0.06* (-2.175)	-0.08* (-3.314)
7.Kalmyk	-	-	0.034 (1.331)
8.Mordov	-	-	0.035 (1.495)
9.Chukot	-	-	0.154* (5.651)
10.Crisys-98	-	-	-0.33* (-13.080)
11.Crisys-09	-	-	-0.37* (-14.912)
Number of observations	1 027	1 027	1 027
Multiplied R2	0.479	0.483	0.668
Adjusted R2	0.225	0.229	0.441
F-statistic	60.907	51.731	74.730
Standard Error	0.065	0.065	0.055

T-tStatistic in parenthesis; statistical significance: * = 0,01; ** = 0,05; *** = 0.10.

All estimation models indicate a difference in correlation between investments and GRP depending on the source of financing. Private investment (1.Inv-priv), as common sense would suggest, has a positive and statistically significant impact on the gross output. The same applies to regional budgetary investments (2.Inv-reg). Federal investment betas (3.Inv-fed), however, are conspicuously negative. This means either that federal investment slows economic development or that it is systematically allocated to lagging regions. In either case, the stimulus provided by federal investments to regional economies is not only low, but, quite probably, negative.

Panel data estimates return the same results (Table 7).

The panel data results confirm the earlier conclusion about the serious difference between the correlations of certain types of investments with the GRP index. Private and regional investments have a significantly positive impact on the growth of provincial economies, but the correlation with federal investments appears to be steadily negative.

The role of federal investment in stimulating the provincial economy

The significantly negative correlation between federal investments and the rate of provincial economic growth

Таблица 7

Panel data estimation results (GRP index as a dependent variable)

Independent variables and estimation results	BE (t)	FE (t)	GLS RE (z)
Intercept	0.130 (0.58)	0.440 (5.01)	-0.422 (5.08)
1.Inv-priv	0.107* (4.20)	0.204* (8.01)	0.168* (8.75)
2.Inv-reg	0.372* (2.58)	0.275** (1.69)	0.354* (3.09)
3.Inv-fed	-0.164** (-2.73)	-0.002 (0.03)	-0.06*** (-1.27)
4.Labor	0.944* (4.14)	0.621* (7.00)	0.654* (7.82)
5.Tax-revenues	-0.318* (-4.01)	-0.315* (-6.66)	-0.322* (-8.01)
6.Jan-temp	-0.09* (-3.93)	Dropped	-0.009* (-3.32)
7.Kalmyk	0.043* (2.52)	Dropped	0.022 (1.33)
8.Mordov	0.025*** (1.80)	Dropped	0.023 (1.49)
9.Chukot	0.109* (4.74)	Dropped	0.102* (5.65)
10.Crisys-98	Dropped	-0.091* (-12.74)	-0.092* (-13.09)
11.Crisys-09	Dropped	-0.105* (-14.85)	-0.102* (-14.91)
Number of obs. (groups)	1 027 (79)	1 027 (79)	1 027 (79)
R2 within	0.237	0.442	0.441
R2 between	0.588	0.198	0.549
R2 overall	0.255	0.419	0.447
Wald chi2	-	-	821.86
F-statistic	10.96	106.89	-

BE – between effects (*t*-statistic in parenthesis), FE – fixed effects (*t*-statistic in parenthesis), GLS RE – general least square model with random effects (*z*-statistic in parenthesis).

is one of the most important results of the performed statistical analysis. This is an unexpected phenomenon, especially when compared to the state development programs that have been implemented in recent years. Conversely, regional investments have had a clearly positive impact on growth rates. This situation has already been described in the economic literature and has been repeatedly noted, for example, in Japan from 1990–2008 [14]. In some sense, this outcome appears quite understandable, given the central government's focus on projects of national importance, projects which do not necessarily generate immediate economic returns, as opposed to the activities of regional authorities, which are less subject to the influence of politics or corruption, and which generally produce greater economic benefits.

One reason for the low stimulus provided by federal investments can be attributed to the inevitable drop in the marginal productivity of capital that coincides with its accumulation. The excessive capacity of social capital (unnecessary bridges, roads, dams, etc.) is indeed

a by-product of Japan's fiscal stimulus policy. However, in Russia's case, the poor state of the country's economic and social infrastructure means that this is not a likely explanation for the inefficiency, nor is excessive capacity likely to become a significant problem within the next few decades.

Fortunately, a much more likely explanation for the Russian economic situation exists. A massive influx of budgetary investments can lead to a suppression of private funding. Indeed, the economy of any region has an "absorption capacity" in the form of limited opportunities for roads, electricity, labor markets and other factors. If this capacity is exceeded, then public investment displaces private, initiating a so-called "crowding out effect". The clearest illustrations of the crowding out mechanism come from the Winter Olympics in Nagano (1998), the Olympic Games in London (2012) and the G-20 Summit in St. Petersburg (2013). These enormous public events led to a decrease of customers to peripheral private facilities, because tourists feared visiting potentially overcrowded cities.

The existence of a “crowding out effect” might be proved by a negative correlation of federal and private investments and, in fact, some calculations show that federal and private investments have just such a negative correlation [24]. This phenomenon, however, likely has several causes. First of all, the central government tends to invest in regions that are not attractive to private capital, in order to compensate for a lack of financial resources. However, we should not reject the earlier hypothesis that large federal projects in small regions could displace or “crowd out” private investments. Most likely, both processes proceed simultaneously and their relative importance could only be separated by conducting further research.

Conclusion and policy implications

Several important conclusions can be drawn from this statistical analysis. First, budget investment in Russia clearly falls into federal and subnational categories. These investments are concentrated in different regions, have differing structures, and vary in their ability to stimulate gross output. Investments from regional budgets, as a rule, positively influence the rates of regional development. The role of federal investment, most often, is negative or statistically insignificant. Consequently, the concentration of financial resources at the national level, which has increased in recent years, is an important trend within the Russian government, which orients itself around federal political priorities more than regional economic concerns.

Second, our findings show that investments from subnational budget sources are closely correlated to regional tax revenues. Therefore, the fine-tuning of the revenue-sharing mechanism in the larger fiscal federalism framework, the expansion of the regional tax base, the improvement of tax collection and tax administration systems, and other related measures represent the main focus areas for expanding investment opportunities at the provincial level. In the long term, this way of regional development is expected to be

more efficient and sustainable compared to the current emphasis on the implementation of large developmental projects at the expense of the federal budget.

Third, the search for a balance of political and economic factors should be based on regional inclusion and a thorough consideration of regional specifics. In most Russian provinces, federal investments are inferior to regional ones in terms of efficient growth stimulation. Apparently, this conclusion could serve as the basis for reviewing the existing models of intergovernmental fiscal relations and transferring most of the investment resources to the subnational level. As for the small and poorly-funded provinces of Russia, the most urgent task is to increase the scale of federal inflows. In regions suffering from an overall lack of capital, the optimal policy would be to expand the investment possibilities through all available sources. In resource-rich areas where budgetary investments are not effective enough, it makes sense to consider the substitution of public funds with private ones, but regardless of regional specifics, the investment allocation model should be based on the criteria of economic efficiency. If decisions are made based on political considerations, the consequences should be assessed by evaluating the gain or loss of efficiency. This would introduce a measurement of economic costs to each step taken and considerably raise the quality of political management.

Forth, as the development of the vast virgin territories accelerates on the Eurasian continent, huge transport and energy infrastructures will develop alongside new opportunities for international integration. The majority of plans carried out by the Eurasian Economic Union, the New Silk Road and the Asian Development Bank have important political dimensions. This fact once again underlines the need to consider both political and economic factors. The balance of political and economic priorities represents the most difficult part of development process, but theoretically it is achievable even when executing the largest projects. The example of Russia suggests that the inclusive development

and comprehensive utilization of local resources in the process of all-nation infrastructure construction allows for enhanced long-term political effectiveness alongside a short-term gain from the revival of provincial economic dynamics. These aspects

of Russia's experience seems to be valid for the entire Eurasian continent, as seen by the scale of infrastructure projects initiated there in recent years under the framework of "One belt-One Road" and other development initiatives.

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Road traffic taxation in Germany: the present system, its problems and a proposal for reform

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ABSTRACT

This article examines the taxation of road traffic in Germany and makes a proposal for its reform. The policy-oriented approach used here is inspired by the tradition of economists like Richard A. Musgrave in the United States or Günter Schmölders in Germany who always sought to integrate fiscal theory and fiscal practice. Thus, our considerations are guided by three basic principles of taxation which are well-founded theoretically and, at the same time, flexible enough to deal with issues of policy: fairness, efficiency and practicability. They are used, at first, to show what a systematic taxation of road traffic would look like. Then, actual road traffic taxation in Germany is described and measured against this standard. It turns out that none of the different road traffic taxes or fees in Germany conform to the principles of taxation. Therefore, finally, a proposal for reform is made which is discussed not only in terms of fairness and efficiency but also in terms of political acceptability and of compatibility with European law. It is found that the reform proposed complies with the principles of taxation and European law, but that, at present, it may be difficult to win public acceptance for one of its parts

KEYWORDS

Road traffic taxation, principles of taxation, user fees, tolls, steering taxes, emission taxes, CO₂ taxes

JEL H23, H54, Q52, Q53

HIGHLIGHTS

1. It is argued that road traffic taxation, like taxation in general, ought to follow certain basic principles, such as fairness, efficiency or practicability. According to these principles, taxes on road traffic can only be justified in the form of fees paid by road users and in the form of steering taxes in order to combat air pollution and congestion
2. Since road traffic taxation in Germany does not comply with the principles of taxation, a proposal for reform is put forward. As a first step, the motor vehicle tax is to be abolished and the energy tax is to be transformed into a tax on CO₂ emissions; as a second step, the truck toll and the infrastructure charge are to be merged into a comprehensive toll
3. A European approach to the reform of road traffic taxation is needed, because any unilateral reform may possibly cause competitive disadvantages for German transport companies and obstacles to the flow of traffic in Europe

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Налогообложение дорожного движения в Германии: современные проблемы и планы реформирования

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АННОТАЦИЯ

Статья посвящена изучению налогообложения дорожного движения в Германии и разработке предложений по его реформированию. В исследовании использован политико-ориентированный подход, соединяющий фискальную теорию и фискальную практику. Данный подход продолжает традиции таких исследователей как Ричард Масгрейв (США) и Гюнтер Шмольдер (Германия). Поставлен вопрос о соответствии налогообложения дорожного движения в Германии трем

основным принципам налогообложения: справедливости, эффективности и практичности. Первоначально рассматривается, каким образом может налогообложение дорожного движения воплощать данные принципы, а затем, анализируется соответствие этим принципам налогов и сборов, составляющих систему налогообложения дорожного движения в Германии. Рассматриваются два налога (энергетический налог и налог на автотранспорт) и два сбора (дорожный сбор для грузовых транспортных средств и плата за инфраструктуру). Сделан вывод, что ни один из представленных налогов и сборов не соответствует основным принципам налогообложения. На основе исследования предлагается реформирование налогов и сборов, связанных с дорожным движением в Германии. Анализируются перспективы предлагаемых изменений, их фискальные и экономические последствия. Предлагаемые изменения обсуждаются как с точки зрения их справедливости и эффективности, так и с точки зрения политической приемлемости и совместимости с европейским законодательством. Установлено, что предложенная реформа соответствует принципам налогообложения и европейского права, но трудно реализуема в настоящее время

КЛЮЧЕВЫЕ СЛОВА

Налогообложение дорожного движения, принципы налогообложения, сбор с пользователя; дорожные пошлины; регулирующие налоги; налоги на выбросы; налоги на CO₂

ОСНОВНЫЕ ПОЛОЖЕНИЯ

1. В соответствии с основными принципами налогообложения (справедливость, эффективность и практичность), участники дорожного движения должны уплачивать только регулирующие налоги и сборы для борьбы с загрязнением воздуха и дорожными пробками
2. Поскольку налогообложение дорожного движения в Германии не соответствует основным принципам налогообложения, предлагается, во-первых, отменить налог на автотранспорт и преобразовать энергетический налог в налог на выбросы CO₂; во-вторых, объединить дорожный сбор для грузовых транспортных средств и плату за инфраструктуру в единый сбор
3. Реформа налогообложения в области дорожного движения должна соответствовать общеевропейским подходам, поскольку любая односторонняя реформа может ухудшить конкурентные позиции немецких транспортных компаний и создать препятствия для дорожного движения в Европе

Introduction

In recent years, the internal combustion engine in general and the diesel engine in particular have more and more fallen into disrepute. The use of internal combustion engines in motor vehicles is being criticized for their release of the greenhouse gas CO₂ and, thus, their contribution to climate change. In addition, automakers have come under fire for the wide discrepancies between the "official" emission and fuel consumption figures determined on the dynamometer and the (much) higher figures under real driving conditions. The image of the diesel engine has suffered most – firstly, because of the diesel scandal due to the illegal use by the Volkswagen group of default devices with which emissions testing was manipulated and, secondly, because diesel cars and trucks are blamed for excessive concentra-

tions of nitrogen oxides in the air of city centers and threatened to be banned from major cities. These days, the diesel engine is no longer seen as a reliable, durable and economical engine but as a major source of pollution. This has already led to a decline in the sale of new diesel cars and to losses in the market value of used diesel cars. Furthermore, the different tax rates for diesel and gasoline under the Energy Tax Code (formerly: Petroleum Tax Code) have been criticized. For example, the head of the Umweltbundesamt (Federal Agency for the Environment), Maria Krautzberger, called the lower tax rate for diesel an unwarranted subsidy and demanded "the abolition of the diesel privilege granted by the Petroleum Tax Code" [1, my translation]. Similarly, Dudenhöffer suggests "to quickly adapt the taxation of diesel to the taxation of gasoline and, at the same time,

to harmonize motor vehicle taxes on diesel cars and gasoline cars" [2, my translation].

In view of the above-mentioned problems such proposals seem to be justified and plausible. However, simply equalizing the tax rates for diesel and gasoline by, for example, raising the former to the level of the latter, would be inadequate as will be shown below. For us, the discussion about the diesel engine and the taxation of fossil fuels will serve only as the starting point for the examination of road traffic taxation in general. In the present paper, a systemic view of tax reform shall be adopted – a view that is to be guided by certain basic principles of taxation. These principles shall be drawn upon, firstly, to criticize the present system of road traffic taxation in Germany and, secondly, to derive proposals for the reform of this system – the objective being a system of road traffic taxation which is both consistent and economically efficient.

But, first of all, we need to sketch the present system of road traffic taxation in Germany and point out its shortcomings.

The taxation of road traffic in Germany: The present situation

Presently, road traffic in Germany is subject to two particular taxes: the energy tax and the motor vehicle tax. Both are federal taxes, that is, their revenue is due to the federal government.

In 2006 the petroleum tax was merged into the new energy tax which applies not only to petroleum products like gasoline, diesel or fuel oil but also to coal, natural gas and biofuels. For road traffic, mainly the tax rates for gasoline and for diesel are relevant. Less important for road traffic are other fossil fuels like natural gas or liquified petroleum gas which shall be mentioned only in passing. The energy tax amounts to € 0.6545 per liter of gasoline (unleaded, low-sulfur) and € 0.4708 per liter of diesel (low-sulfur) (§ 2, par. 1, nos. 1, 4 Energy Tax Code). The higher tax rates for diesel and gasoline with a sulfur content of more than 10 mg/kg are all but irrelevant since the market share of these fuels is below 0.1 %. The higher tax rate for leaded gasoline can be neglected too, since it is almost ex-

clusively used as an aviation fuel – and not for road traffic anymore [3]. Insofar as fuel is purchased by households (and not by business firms) the effective tax burden is increased by the value-added tax (VAT) which is imposed on the total net price and which, therefore, is imposed also on the energy tax which is part of the net price of fuel. With the VAT rate currently standing at 19 %, this increase amounts to € 0.1244 or € 0.0894 per liter of gasoline or diesel, respectively. This assumes, as is usual, that the energy tax is completely shifted forward to the buyers of fossil fuels. (The energy tax on natural gas is € 13.90 per MWh of thermal value (§ 2, par. 2, no. 7a Energy Tax Code).) The thermal value of natural gas being 12.87 kW per kilogram, this is equivalent to an energy tax of € 0.1789 per kilogram of natural gas (natural gas is sold by mass, not by volume); the VAT applying to this tax amounts to € 0.0340 per kilogram.)

Whether the fact that diesel is taxed at a lower rate than gasoline is called a subsidy of diesel or the different taxation of different tax bases is only a matter of semantics which might be used as a political argument, but which is irrelevant for economic analysis.

Energy tax revenue in 2016 amounted to € 40.091 billion – of which the tax on unleaded, low-sulfur gasoline and on low-sulfur diesel contributed € 15.868 billion and € 20.849 billion, respectively. (In comparison, the taxation of natural gas used for motor vehicles yielded only € 0.004 billion [3].)

The motor vehicle tax, which is levied on an annual basis, uses different tax bases for the different kinds of motor vehicles. Here, we shall be concerned only with cars and heavy trucks (with a permissible total weight of more than 3,500 kg). For cars with gasoline engines, newly registered since January 1st, 2014, the tax rate is € 2.00 for every 100 cm³ of engine capacity plus € 2.00 for every gram of the CO₂ emission per kilometer in excess of 95 g/km. CO₂ emissions are determined by a dynamometer test which is standardized within the EU. (Cars which run on natural gas are taxed like those which run

on gasoline.) In the case of diesel cars the tax component based on engine capacity rises to € 9.50 for every 100 cm³, but the tax component based on CO₂ emissions stays the same (§ 9, par. 1, no. 2b Motor Vehicle Tax Code). Trucks are taxed in accordance with permissible total weight and the amount of emissions and noise they produce. For the computation of the tax the so-called “graduated tax-rate method” is used; in addition, there is an upper limit to the total tax due (§ 9, par. 1, no. 4 Motor Vehicle Tax Code). For example, the maximal tax for trucks belonging to emissions class S2 (S1) is € 556.00 (€ 914.00) – amounts which are of the same order of magnitude as those for cars with big diesel engines (for example, the motor vehicle tax for a Range Rover 4.4 SDV8 is € 666.00). Motor vehicle tax revenue in 2016 was € 8.952 billion; there is no current data on the respective shares of cars, trucks and other vehicle categories but, if data from the recent past is any indication, cars will have contributed more than 80% of total revenue [4; 5].

As can be seen from Table 1 [3; 4] there have been only insignificant changes in both energy tax and vehicle tax revenue during the last ten years; furthermore, the energy tax on unleaded, low-sulfur gasoline and low-sulfur diesel has always been the most important part of the energy tax (accounting for more than 80% of total energy tax revenue in each year).

Table 1
Energy Tax Revenue in Germany
2007–2016

Year	Energy Tax Revenue in billions of Euros		Vehicle Tax Revenue in billions of Euros
	total	unleaded, low- sulfur gasoline and low-sulfur diesel	
2016	40.091	36.717	8.952
2015	42.433	36.465	8.805
2014	41.893	30.095	8.501
2013	42.160	35.410	8.490
2012	42.115	35.457	8.443
2011	41.985	36.068	8.422
2010	43.025	35.719	8.488
2009	41.238	34.759	8.201
2008	41.418	35.137	8.842
2007	41.712	35.080	8.898

Comparing the total tax burden of cars, it is obvious that cars with gasoline engines are hit harder by the energy tax than cars with diesel engines, whereas the motor vehicle tax is lower for the former than for the latter. Since the motor vehicle tax is a fixed cost and the energy tax is a variable cost (with only the latter depending on mileage), the total tax burden per kilometer (or mile) for diesel and for gasoline cars compares as follows: For low mileages the total tax per kilometer is lower for gasoline than for diesel cars – and vice versa for high mileages. At what mileage exactly a car with a diesel engine becomes cheaper in terms of taxes than a car with a gasoline engine depends on the car model considered, of course. This difference in taxation is due to the policy of avoiding high tax burdens for vehicles used by businesses (such as taxi and transport companies) which almost exclusively are equipped with diesel engines and whose annual mileage is, in most cases, very high. This policy is aimed at long-haul transport companies, in particular, which are subject to international competition and which would suffer from competitive disadvantages, if the energy tax on diesel were higher (at present, it is at about the European average). It is for that reason also that the motor vehicle tax on trucks is very low in comparison to that on cars.

In addition to these two taxes, there are also two traffic-related user fees: the truck toll and the infrastructure charge. Heavy trucks (with a permissible total weight of at least 7,500 kg) are subject to a toll which is collected on highways and major federal roads. The toll rate depends on the number of axles of a truck and its trailer and on the emission class; at present, it varies between € 0.125 and € 0.214 per kilometer. The infrastructure charge applies only to cars. It is a lump-sum charge that depends on engine capacity and emission class but not on mileage. German car owners have to pay it annually while foreigners using German roads are charged pro rata temporis. The infrastructure charge has already been enacted but is not levied yet because several suits against it brought by other EU members

are still pending in the European Court of Law. The plaintiffs accuse Germany of discriminating against foreign drivers because German drivers will be compensated for the infrastructure charge by a rebate on the motor vehicle tax so that in effect only foreign drivers will be burdened [6].

The revenue of both the truck toll and the infrastructure charge is due to the federal government. The latter has not yet generated any revenue; the development of the revenue of the former is shown in table 2 [source of data: personal communication from the Federal Ministry of Transport and Digital Infrastructure].

Table 2
**Truck Toll Revenue in Germany
2007-2016**

Year	Truck Toll Revenue in billions of Euros
2016	4.634
2015	4.372
2014	4.457
2013	4.389
2012	4.364
2011	4.475
2010	4.511
2009	4.327
2008	3.490
2007	3.308

Henceforth, the term “tax” shall be interpreted broadly – so as to include not only taxes in the narrow sense but also fees and charges.

The principles of taxation

In order for a tax system to be truly systematic – and not just a haphazard collection of various, unrelated and uncoordinated, taxes – it has to be governed by certain basic principles. At least since the time of Adam Smith, economists and political philosophers have put forward catalogues of principles that “good” tax systems are required to follow. It is neither possible nor necessary to discuss these catalogues in any detail here. Instead, only those very basic principles which seem to enjoy (almost) unanimous approval shall be considered [for the principles of taxation see, e.g., 7, p. 408; 8, pp. 224–225; 9, pp. 197–206].

Firstly, the tax burden ought to be distributed equitably among taxpayers – or,

rather, since there is no objective standard of equity, the distribution of the tax burden ought to be perceived and accepted as equitable. Fairness can be realized by either the ability-to-pay or the benefit principle – with the former being today the predominant principle of taxation and the latter only playing a subsidiary role. Secondly, insofar as taxes are used to achieve objectives of economic policy, they ought to be compatible with these objectives, that is, they must be so designed as to realize the objectives effectively and efficiently. And, thirdly, administration and compliance costs ought to be as low as possible, to wit, as low as is compatible with other, higher-ranking objectives.

These three principles may also be characterized as follows: The first one is concerned with distribution or fairness; the second one with allocation or efficiency; and the third one with practicability.

Obviously, a policy-oriented approach is being followed here. Instead of aiming for the elusive objective of a social optimum, time-honored and commonsensical principles of taxation are appealed to. Thus, it will be possible to accommodate flexibly the different aspects of tax policy – from efficiency and distribution to feasibility and acceptability. In this way, possible conflicts, and the trade-offs that then are necessary, can be made explicit. This may not be the most rigorous approach but, then again, it is not the most inapplicable either. Let us now see what implications our principles have for the taxation of road traffic.

Fairne]ss:

ability-to-pay vs. benefit principle

Like all taxes, taxes on road traffic may have two purposes: to raise revenue or to influence the behavior of tax payers. Insofar as the former is the only (or main) purpose, fairness is the most important criterion to be fulfilled. Obviously, in the context of taxes on road traffic, the ability-to-pay principle is inapplicable. Income being the generally accepted measure of ability to pay at present, it is not compatible with the ability-to-pay principle to tax both income and consumption. To do so would result in double taxation, that is, the taxation of both the

potential satisfaction of wants (income) and the actual satisfaction of wants (consumption). Thus, taxes on consumption cannot be justified by invoking the ability-to-pay principle, if income is used as a measure of ability to pay. This also goes for taxes on road traffic which, by definition, are taxes on consumption in one way or another.

On the other hand, these taxes may be compatible with the benefit principle, insofar as they can be regarded as “prices” to be paid for public services – in this case, for the provision and maintenance of the road infrastructure, the main users of which are motor vehicles. The benefit principle, as applied to the costs of public services (and not to the utility derived from them) demands that the contributions paid be equivalent (or as nearly so as possible) to the costs of the public services enjoyed. However, earmarking certain revenues for certain expenditures is not required, although this would seem to be an implication of the benefit principle.

The quantity and quality of road infrastructure that is needed depends primarily on the total mileage of all motor vehicles – which in turn is the product of the number of motor vehicles and their average mileage. The wear and tear of roads and thus the expenditure necessary for their maintenance also depends on total mileage and, besides, on the weight of motor vehicles. The differences in weight between various motor vehicles only matter, though, if they are very large – such as those between cars and heavy trucks: With cars weighing mostly between 1,000 and 2,500 kg, there is hardly any difference in road wear, if a light and a heavy car are compared with each other; but road wear will be found to increase disproportionately, if one considers cars, on the one hand, and heavy trucks, on the other.

If road infrastructure were to be financed in strict accordance with the benefit principle, a toll which takes mileage and, in addition, vehicle weight into account would be the only possible alternative. Ideally, such a toll would be collected for the use of all kinds of roads – with the toll per kilometer depending on the weight (or, rather, the weight class) of the

respective vehicle. Due to recent technological advances (such as GPS navigation, electronic metering technology, mobile internet connections), such an ideal toll could be realized today without prohibitive costs: Tolls would be deducted electronically by way of in-vehicle transponders. The main obstacle seems to be a political one: How can the privacy of drivers be protected and how can undue surveillance by the state be prevented?

Efficiency: steering taxes

Road traffic taxation may not only (or not primarily) aim at raising revenue – instead, its main objective may be to influence the behavior of taxpayers in accordance with economic policy objectives.

As (motorized) road traffic is the source of many negative externalities, it stands to reason that traffic-related steering taxes ought to be geared towards the internalization or reduction of these negative external effects. According to our policy-oriented approach, we do not advocate for the complete internalization of external effects. Instead, they are to be reduced in accordance with politically determined objectives (which may, or may not, be “optimal” from a welfare-theoretic point of view). In other words, our traffic-related steering taxes are not supposed to be “optimal” Pigou taxes but, less ambitiously, merely cost-efficient taxes in the tradition of the “standards and price” approach as pioneered by Baumol and Oates [10].

There are two major classes of externalities due to road traffic: the effects of congestion (in particular, the time lost in traffic jams) and the effects of air pollution. Besides, other kinds of external effects may exist, but they are either of minor importance or do not seem to lend themselves to the use of taxes [for a discussion of the externalities related to road traffic see, e.g., 11 and 12].

Let us first turn to congestion. On heavily travelled or even congested roads drivers impose externalities on one another because every driver contributes to congestion by slowing down the speed of all others; thus he increases the travel time for all others. Efficiency requires that motorists

take these effects into account, which can be accomplished by levying a congestion charge. This charge ought to vary according to traffic intensity which itself depends on road location and travel time. For example, for rural roads there would be no congestion charge at all. On the other hand, in urban areas a congestion charge would be collected which would be highest during rush hour and lowest (possibly zero) in the middle of the night. Ideally, one might in addition differentiate the charge according to vehicle length (the longer a vehicle is, the more of the road it uses and the more it contributes to congestion), so that trucks would have to pay a higher charge than cars. Though such congestion charges have been introduced in some few cities – e.g., London and Stockholm –, a nationwide congestion charge does not yet exist anywhere. In practice, such a system might be combined with a general road toll (see above); the congestion charge might be added to the toll as a surcharge to be paid only on certain roads and at certain times. Such an extended road toll would then consist of two components: a fee-like component that is to finance road infrastructure (at least partly), and a tax-like component that is to discourage drivers from congesting roads. As mentioned above, such a scheme would be technically feasible nowadays, but privacy concerns would make its introduction politically difficult.

The second major class of traffic-related externalities is caused by air pollution. Motorized road traffic is one of the major sources of air pollution and thus responsible for many environmental problems and, in particular, serious risks for human health. Alternatively, one might consider another ecological objective – that of saving natural resources. But, at present, the main problem with the use of fossil fuels does not seem to be their exhaustibility but the environmental degradation resulting from the emission of pollutants. Road traffic is responsible for the emission of enormous quantities of air pollutants and thus for excess costs due to the negative external effects caused by these pollutants (in what follows we shall neglect the non-material emission of noise). To reduce these negative

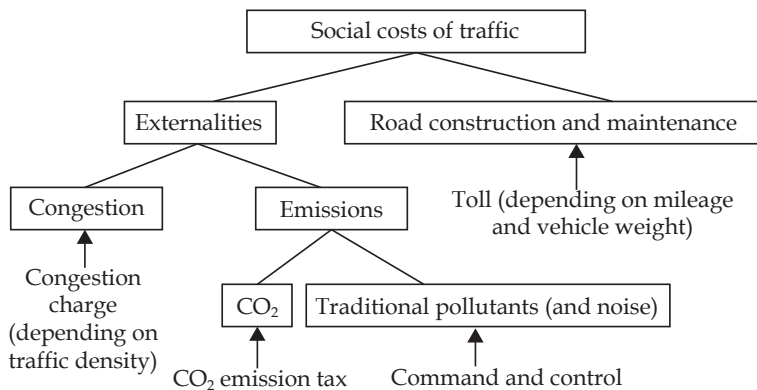
externalities to an acceptable level (which has to be determined politically), taxes or, to be more specific, emission taxes can be used. In fact, it is a well-established result of environmental economics that emission taxes have many advantages in comparison with the more traditional command and control approach. Both an ecologically effective and an economically efficient reduction of emissions can be achieved, if the quantities of pollutants released serve as tax bases so that the tax due results from the product of the tax rate (in monetary units per unit of emission) and the quantity of emissions. Conversely, if the emission of pollutants is to be reduced and if taxes are to be used for this purpose, they must be used in the form of (direct or indirect) emission taxes; taxes with bases other than the quantity of emission will hardly be able to be of much use [for emission taxes and the way they work, see, e.g., 10; 13, pp. 190–210; 14, ch. 6; 15, part III].

Whether emission taxes are to be used depends a lot on the emissions we have to deal with. Therefore, let us have a look at the emissions of motorized vehicles. Pollutants in the narrow sense (i.e. pollutants which are directly inimical to human health) make up about 0.2 % (diesel engines) or 1.1 % (gasoline engines) of the total emissions of internal combustion engines [16; 17]. These “traditional” pollutants are nitrogen oxides, carbon monoxide, hydrocarbons, particulate matter and sulfur oxides. Except for sulfur oxides, these pollutants can be treated with devices such as three-way catalytic converters, oxidation catalytic converters, particulate filters, nitrogen oxide storage converters and SCR catalytic converters. Sulfur oxides cannot be treated with end-of-pipe technologies; their emission can only be reduced by reducing the sulfur content of fossil fuels. Beside the traditional pollutants, internal combustion engines emit nitrogen, oxygen, water vapour and carbon dioxide. The latter is a colourless, odourless, non-toxic and chemically very stable gas – and thus no pollutant in the narrow sense. However, CO₂ is a greenhouse gas and – as such – a climate pollutant: It may, due to its effects on the climate, cause externalities indirect-

ly. In fact, the current level of CO₂ releases into the atmosphere from the burning of fossil fuels is clearly incompatible with the stability of the climate and with sustainability. Therefore, without discussing climate policy in any detail, we may state that the emissions of CO₂ need to be curtailed significantly, if potentially catastrophic developments are to be prevented. For our analysis, the following difference between traditional pollutants and the climate pollutant CO₂ is most important: There is no direct relation between the emission of traditional pollutants and fuel consumption. A powerful engine with a sophisticated exhaust gas treatment may consume much more fuel and, at the same time, emit much fewer pollutants than a low-powered engine without any exhaust treatment. On the other hand, there does exist such a direct relation in the case of CO₂: The combustion of a certain quantity of a fossil fuel always leads to the emission of a certain quantity of CO₂, which depends on the carbon content of the different fossil fuels; fuel consumption and CO₂ emission are, for every type of fossil fuel, directly proportional to each other. Admittedly, there are minute divergences: An engine with a catalytic converter emits, e.g., less carbon monoxide and fewer hydrocarbons than an engine without a catalytic converter; and since these pollutants are oxidized to CO₂ and H₂O in the catalytic converter, the CO₂ emission of the clean engine will be somewhat higher. But these divergences are so very small that they can safely be neglected for all practical purposes.

It is because of this proportionality that emissions can only in the case of CO₂ be taxed indirectly. This means that emissions need not to be taxed themselves but that instead fuel consumption can be taxed. All other pollutants would have to be taxed directly, which would require measuring the quantities of the various pollutants emitted by every single motor vehicle. (What is more, the tax rates for the different pollutants would also have to depend on where they are emitted, because car exhaust is less dangerous and causes less damage on some little travelled country road than on an urban thoroughfare. In the case of CO₂, on the other hand, the quantity of emissions is all that matters; the location of emissions is completely irrelevant.) Although technically feasible, this would be extremely costly. In addition, collecting these taxes would also be very expensive because measurement results would have to be transmitted regularly to tax authorities, which would then have to calculate tax bills and send them to the owners of motor vehicles. Therefore, considerations of cost and (im-) practicability require that traditional pollutants be dealt with by imposing regulations, that is, by using the command and control approach. (The same also goes for the emission of noise) On the other hand, the instrument of an emission tax can be applied to CO₂ emissions because, in the form of an indirect tax, it causes only negligible administrative and compliance costs.

Figure shows the results of the discussion in the previous two sections.



Social costs of traffic and how to deal with them

Steering taxes (or tax-like charges) have an important role to play when it comes to dealing with congestion and CO₂ emissions; they are less suited for reducing the emission of traditional pollutants (and noise). As regards fiscal taxes, the benefit principle may be invoked to justify the use of tolls for financing road infrastructure.

Road traffic taxation in Germany and the principles of taxation

As shown above, a system of taxes on road traffic can be derived from the principles of taxation. How do the actual taxes on road traffic in Germany compare to this system? It is obvious that it is quite different from our "ideal" system. How big the difference is and whether it complies at least in some degree with the principles of taxation shall be examined next.

The benefit principle

Since the ability-to-pay principle is inapplicable in the case of road taxation (see above), it is only the benefit principle that may be used to justify German road traffic taxes. Let us first have a look at the motor vehicle tax. It very quickly will become apparent that in this case the necessary equivalence between the cost of the public service and the amount to be contributed by its users does not even approximately exist: The amount of motor vehicle tax to be paid is completely independent of both mileage and weight in the case of cars. And, though taking weight into account, the motor vehicle tax on trucks disregards the much more important mileage: For example, even though a 10 ton truck with an annual mileage of 100,000 kilometers causes significantly more damage to roads than a 30 ton truck with an annual mileage of only 10,000 kilometers, the motor vehicle tax on the latter is higher than that on the former. Furthermore, the relation between the motor vehicle tax on cars and that on trucks is incompatible with the benefit principle: Since, because of their much higher weight and their much higher mileage, trucks wear out roads much more than cars, they ought to be taxed higher by orders of magnitude – which is certainly not the case at present.

The energy tax better complies with the benefit principle because a higher fuel consumption is, *ceteris paribus*, tantamount to a higher mileage and, thus, to more road wear. But even here, the relationship is rather weak. Driving style is a very important factor: An economical driver may, for example, be able to drive a distance of 1,500 kilometers with 100 liters of gas whereas a sports driver may only do 1,000 kilometers with the same car and the same quantity of fuel. The economical driver uses roads more than the sports driver but has to pay the same amount of energy tax (since, in our example, the fuel consumption is supposed to be the same). Even more important are differences between the various car models: A sport scar with a powerful engine that consumes 15 liters of gas per 100 kilometers does not cause three times as much road wear as a subcompact with a small engine that consumes only 5 liters of gas per 100 kilometers. The same arguments also apply to trucks – although in their case the differences with regard to engine power are less marked. Therefore, also the energy tax cannot be justified by invoking the benefit principle. This conclusion is, by the way, not affected by the earmarking of part of the energy tax revenue (formerly: petroleum tax revenue) for road construction – which, besides, has been attenuated and *de facto* abandoned since the 1970s [18].

As we have seen, a road toll is the fiscal instrument which complies best with the benefit principle. In Germany, there is a toll for heavy trucks and, for cars, there is to be the "infrastructure charge" (see above). Both can by no means meet the demands of the benefit principle. The former is collected not on all roads but only on highways and certain federal roads. Furthermore, vehicle weight is taken into account only indirectly (by the toll rate being dependent on the number of axles). In addition, the toll rate also depends on the emission class – which, however, does not affect road wear at all. The infrastructure charge fares even worse, as it is completely independent of mileage. However, it might serve as a first step towards a "real" toll [6].

Steering taxes and the allocative function of road traffic taxation

As the present taxes on road traffic in Germany cannot be justified by the benefit principle, we have to examine whether they perhaps serve as steering taxes so that they might find their justification in this way.

Let us first turn to the problem of air pollution. It is true that, for quite some time, environmental aspects have played an important role in road traffic taxation in Germany. Since the reform of the motor vehicle tax in 1985 the emission of pollutants has been one of the factors which determine the tax rate for cars: From 1985 to 2009 only traditional pollutants were taken into account; since then the focus has been on CO₂ emissions instead. As regards the motor vehicle tax on trucks, since 1994 the emission of traditional pollutants has been among the determinants of the tax rate. And since the ecological tax reform of 1999, at the latest, also the petroleum tax (now the energy tax) has explicitly been used to further the cause of the environment: Then, it was raised considerably in order to make the use of fossil fuels more expensive and thus to provide incentives for saving them. In addition, tax rates were differentiated according to the environmental impact of different fuels (leaded vs. unleaded gasoline; high-sulfur vs. low-sulfur).

But, notwithstanding all political intentions, are the energy tax and the motor vehicle tax actually able to function as ecological steering taxes? As we have seen, in the case of road traffic, the obvious ecological objective is the reduction of emissions. If taxes are to be used at all to such purpose, they need to be emission taxes. And emission taxes as applied to the emissions of motor vehicles only make sense in the form of indirect emission taxes. Finally, an indirect emission tax is possible only in the case of CO₂. It follows that the energy tax and the motor vehicle tax can be justified as ecological steering taxes only if they somehow function as CO₂ emission taxes, that is, if there is a direct and proportional relation between CO₂ emission and tax burden.

Obviously, this is – and cannot be – the case with a mileage-independent tax like the motor vehicle tax. It is true that, as regards cars, the tax base includes CO₂ emissions: explicitly in the form of the CO₂-based part of the tax and implicitly in the part of the tax which is based on engine capacity (since fuel consumption and thus CO₂ emissions tend to increase with engine capacity). However, it is not the relative CO₂ emission (i.e. the emission per kilometer) but the absolute CO₂ emission, which depends on mileage, that matters ecologically. The motor vehicle tax only takes the former into account – and even that in a very imprecise way because the “normal” CO₂ emissions per kilometer which are used for tax purposes may differ a lot from the real CO₂ emissions per kilometer on the road. In the case of trucks, CO₂ emissions do not play any role at all. It follows that the motor vehicle tax cannot be regarded as a tax on CO₂ emissions and is thus not an effective instrument to reduce these emissions. This conclusion will not be altered by the possible argument that, after all, the motor vehicle tax can be considered as an ecological steering tax because it discourages the acquisition of cars with large engine capacities and high CO₂ emissions, and of trucks with “dirty” engines. However, these objectives do not make sense on their own but only insofar as they further the underlying objective of reducing emissions. And to attain this objective, there are instruments much more effective and much more efficient than the motor vehicle tax.

At first sight, things look different with the energy tax. As it taxes the consumption of fossil fuels it is, in principle, able to function as an indirect CO₂ tax. However, for this to be the case, it would be necessary that the tax rates for the different fuels vary in proportion with their carbon content, that is, with the amount of CO₂ released by their combustion. This condition is, at present, not fulfilled. Burning one liter of gasoline (diesel) releases 2.33 kg (2.63 kg) of CO₂ [19; 20]. Therefore, the energy tax on gasoline of € 0.6545 per liter corresponds to a CO₂ tax of € 0.2809

per kilogram, whereas the energy tax on diesel of € 0.4704 per liter is equivalent to a CO₂ tax of € 0.1783 per kilogram. (The energy tax on natural gas of € 13.90 per MWh of thermal value is equivalent to a CO₂ tax of € 0.0706 per kilogram, because burning one MWh of natural gas releases 197 kg of CO₂.) Its tax rates being not proportional to carbon content, the energy tax cannot be regarded as an indirect tax on CO₂ emissions.

We have to conclude that neither the motor vehicle tax nor the energy tax can be justified as an ecological steering tax.

Besides air pollution, the other major cause of traffic-related externalities is congestion. Are the truck toll or the infrastructure charge in any way able alleviate this problem and thus to have some kind of allocative function? The answer clearly is no. From all that we have learned about the truck toll and the infrastructure charge, it should be obvious that neither can in any way function as a congestion charge.

To summarize, the German "system" of road traffic taxation does not in the least correspond to the principles of taxation and is therefore in dire need of reform.

A proposal for reform

What would a reform of German road traffic taxation look like? As shown above, road traffic ought best to be taxed as follows: There ought to be a CO₂ emission tax which is to function as a steering tax; and there ought to be a comprehensive toll which is both to raise revenue according to the benefit principle and to alleviate traffic congestion in its capacity as a steering tax. To get anywhere close to such a system, traffic taxation in Germany needs to be reformed considerably.

Part one of the reform: energy tax and motor vehicle tax

The first part of the reform would have to look as follows: On the one hand, the motor vehicle tax is to be abolished; under no circumstances can it be an instrument to reduce CO₂ emissions effectively and efficiently. On the other hand, the rates of the energy tax have to

be adapted to the specific CO₂ emissions of the different fossil fuels. If the ecological objective were not to be climate stabilization but resource conservation, the energy tax rates would have to reflect the energy content or the thermal value of the different fossil fuels (such a proposal is made by, e.g., [21]).

If one takes as given, e.g. the energy tax rate for gasoline of € 0.6545 per liter, which is equivalent to a CO₂ tax of € 0.2809 per kilogram, the energy tax on diesel would have to be raised to € 0.7388 per liter. It goes without saying that the tax rates for the other fossil fuels which are used for road traffic would also have to be adapted correspondingly (in the case of natural gas this would imply a tax raise to € 55.34 per MWh or € 0.7122 per kilogram). In this way, the energy tax would burden all road-traffic related CO₂ emissions uniformly and thus function as an efficient and, depending on the CO₂ tax rate, effective CO₂ tax. Finally, it would be justifiable as a steering tax, to wit, an ecological steering tax.

But what other consequences would our proposal have? From a fiscal point of view, the additional revenue due to the higher taxation of diesel would certainly be welcome (due to their very low market shares, possible tax hikes for other fossil fuels would only lead to insignificant additional revenue). Of course, the fiscal effect can be varied by adjusting the CO₂ tax rate. It is not the absolute rate as such that is crucial for the energy tax to function as a CO₂ tax but the fact that there is a uniform rate for all fossil fuels. Assuming, as is usual, that the energy tax is completely shifted forward, the price of diesel would rise by € 0.2684 per liter before VAT and by € 0.3194 per liter after VAT. On the basis of the 2016 sales figure (44.321 billion of liters) energy tax revenue would increase by € 11.896 billion (this amount and those following were calculated on the basis of [3] and [4]). If the business share (household share) of diesel consumption is taken to be 75% (25%), there would also be additional VAT revenue (the VAT applying to the increase of the net price of diesel times the household share in total diesel sales)

of € 0.565 billion. The percentages of 25 % and 75 % are derived as follows: Transport companies with their trucks account for about 50 % of total diesel consumption [22, p. 53] so that the other 50% are due to cars. Assuming that half of the latter 50% is used by businesses will result in the above-mentioned percentages. With total additional tax revenue of € 12.461 billion, the loss of the motor vehicle tax revenue, which in 2016 amounted to € 8.952 billion, would be more than compensated; all in all, there would be net additional revenue of € 3.509 billion.

However, it is to be expected that the considerable increase in the price of diesel, which would result from the suggested tax hike, would have consequences for the demand for diesel. In general, the price elasticity of demand for fuels in Germany is thought to be rather low – at least in the short run. For example, Boysen-Hogrefe [23] assumes values of -0.2 and -0.5 as the lower and the upper limit, respectively, to this price elasticity. If we choose the intermediate value of -0.35 for the demand for diesel, the fiscal effects of our proposal would change as follows: Because of the tax hike, the price of diesel, which stood, at the time of writing, at about € 1.26 per liter (VAT included), would rise by 25.3%, so that demand for diesel would decrease by 8.9 %, that is, from 44.321 billion liters to 40.377 billion liters (the relative price increase applies both to the price before and after VAT; therefore, the relative decrease in demand is assumed to be the same for business and household demand). This fall in demand by 3.944 billion liters would reduce the additional revenue of € 11.896 billion from the higher energy tax on diesel and of € 0.565 billion from the VAT to € 8.982 billion and € 0.427 billion, respectively, which would sum up to € 9.409 billion – still in excess of the revenue loss from the abolition of the motor vehicle tax by € 0.457 billion.

There would not be any distributional conflicts within the federal fiscal system of Germany: Both the energy tax and the motor vehicle tax are federal taxes so that neither states nor local governments would be affected – except through their

share in the additional VAT revenue. In our example, the federal government, whose share in VAT revenue is currently 53.3 %, would expect total additional revenue of € 0.231 billion (the difference between additional energy tax revenue and the loss of motor vehicle tax revenue: € 0.003 billion; plus the federal share in the additional VAT revenue: € 0.228 billion); state and local governments together would receive additional VAT revenue of € 0.199 billion.

In the longer run, the energy tax revenue can be expected to decline in as much as mileage would be reduced and fuel-saving vehicles or vehicles with alternative drives would be more and more in demand. But this effect would have been intended and would be evidence that the CO₂ tax functions as it is supposed to.

While the revenue increase would thus not be lasting, there would be another important effect which would be permanent: As the motor vehicle tax is, in contrast to the energy tax, levied directly from consumers, that is, the holders of motor vehicles, and as it thus is very costly to administer [24], its abolition would save a considerable amount of administration costs. On the other hand, the proposed change in the energy tax would hardly involve any costs at all.

Besides, the proposed reform would lead to considerable distributional effects among the group of vehicle owners. Owners of gasoline cars would profit from the abolition of the motor vehicle tax whereas owners of diesel cars and of trucks would have to pay the higher energy tax on diesel which, depending on mileage, could more than outweigh the savings related to the motor vehicle tax so that, for them, the reform could result in a net loss. As a rule, the mileage for such a net loss to occur would increase with the size and thus the fuel consumption of the vehicle. Let us compare, for example, two diesel cars: a subcompact (Mercedes A160d: 107 g CO₂/km; norm consumption 4.1 l/100 km; motor vehicle tax € 166.00) and a full-size sedan (Mercedes S400d: 139 g CO₂/km; norm consumption 5.4 l/100km; motor vehicle tax

€ 373.00). The owner of the former would suffer a net loss due to the proposed reform if his annual mileage were in excess of 12,700 kilometers, whereas the latter would find himself at a disadvantage only if he drove more than 21,600 km per year. In this example, it was assumed that the cars were owned by households and that the price of diesel would rise by € 0.3194 per liter (after VAT). As the realistic on-the-road consumption is virtually always higher than the norm consumption, the mileages calculated are upper limits; in effect, drivers of diesel cars would incur losses at lower mileages in most cases.

Business owners of diesel cars who typically have high to very high mileages would therefore almost always be among the losers of the tax reform. This is even more true for transport companies: The trucks that they operate have a much higher mileage and a much higher consumption than diesel cars, whereas the motor vehicle tax – and thus the amount saved due to its abolition – is not higher in the same proportion.

It is this consequence of the first part of our proposal that will be the main obstacle to its realization: German transport companies, especially long-haul transport companies, would become less competitive in comparison with foreign companies.

Part two of the reform: truck toll and infrastructure charge

According to our deliberations above, both the truck toll and the infrastructure charge ought to be merged into a new and comprehensive toll. There ought to be a base rate per kilometer which would depend on vehicle weight. As almost all damage to roads is attributable to (heavy) trucks, the rate for trucks would be higher than that for cars by orders of magnitude. For all practical purposes, four base rates (one for cars, one for light trucks, one for heavy trucks, and one for heavy trucks with trailers) would suffice. In addition to this user fee, there ought to be a surcharge for the use of heavily travelled roads in urban areas which would vary with the days

of the week and the hour of the day. Again, one would want to have only a couple of different rates so that the tariff does not become too complicated and thus the surcharge too unpredictable. This combined toll would be collected electronically by way of GPS-enabled transponders in all vehicles. Technically, this would be no problem at all; also, the cost would not be too high. However, there are considerable political obstacles. Privacy concerns, mistrust of “big government” and fear of data abuse would make the introduction of such a toll an uphill battle – which would be hard to win especially in Germany where data protection is considered very important.

Therefore, the chance for this part of our reform proposal to be realized soon are rather slim indeed. For political reasons it would seem appropriate that at first only part one of the reform proposal be realized. Until safeguards will have been devised which ensure privacy and the protection of drivers’ data, and until sufficient political support for the second part will have been built, the present truck toll and the soon-to-come infrastructure charge would be left in place. In that way, truck owners would continue to contribute to the cost of road infrastructure and in that way, also car owners would at least get used to the idea of paying some kind of toll or user fee. (Other authors propose second-best solutions in which the vehicle tax partly compensates for the inability to impose a toll depending on mileage; see, e.g., [25; 26].)

The European perspective

Nowadays, member countries of the European Union are no longer completely free to carry out political reforms. They have to make sure that these reforms are compatible with European law.

In the Energy Taxation Directive (Annex I) of the European Commission, minimum rates for motor fuels are established. There is, however, no further harmonization and member states are free to apply higher rates. In fact, rates differ considerably within the European Union [27]. German rates are above the EU av-

erage; its gasoline rate is the ninth highest and its diesel rate is the sixth highest. Therefore, as mentioned above, the unilateral introduction of a CO₂ tax – and the rise in the price of diesel consequent upon it – would cause problems for the German transport companies. If only for this reason, a European approach to the introduction of a CO₂ tax would clearly be desirable – although it would not be necessary according to the law of the European Union (there are also other reasons for a coordinated reform; see Conclusion).

Also a comprehensive toll system – if and when it is finally installed – will have to comply with European law. As of today, the existing European legislation on tolls only covers trucks (permissible total weight of more than 3,500 kg): the directive 1999/62/EC as modified by the directives 2006/38/EC and 2011/76/EU. As regards cars, there is only a “Communication from the Commission on the Application of National Road Infrastructure Charges Levied on Light Private Vehicles” (COM 2012/199 of May 14th, 2012) in which member states are enjoined to obey the principles of non-discrimination and proportionality, if and when they establish toll schemes for cars (it is the principle of non-discrimination that the German infrastructure charge is accused of violating). Furthermore, in the directive 2004/52/EC, the European Commission envisages a “European Electronic Toll System” which is to realize the principle of inter-operability. This means that a single on-board unit is to be used by drivers throughout the EU to pay any national tolls. Thus, not only is there nothing in EU law that would prohibit a comprehensive toll system for both trucks and cars, some such system and the technical means for its implementation are actually promoted by the European Commission. As, of course, also foreign road users would be supposed to pay this toll (just like drivers of foreign trucks have to pay the truck toll in Germany today), coordination between the EU member states would be highly desirable, although, again, it would not be required by law.

In any case, both parts of our reform proposal do not seem to conflict with European law. After all, this was to be expected because the transport policy of the European Union is guided by the “user pays” and the “polluter pays” principle [28] – principles that correspond with and can be derived from the first and the second of our principles of taxation, respectively.

Conclusion

It has been shown that the taxation of road traffic in Germany is not compatible with generally accepted principles of taxation and, therefore, ought to be reformed. Taxes on road traffic can be justified as fiscal taxes to raise revenue according to the benefit principle and as steering taxes to deal with environmental issues and congestion. Consequently, a reform has been proposed which would, on the one hand, replace the truck toll and the infrastructure charge with a comprehensive toll and, on the other, abolish the motor vehicle tax and transform the energy tax into a tax on CO₂ emissions. In order for German transport companies not to suffer competitive disadvantages from the unilateral introduction of a CO₂ tax and for traffic flow in Europe not to be impeded by uncoordinated national tolls, such a reform ought to be carried out on the European level.

In the context of such a European solution one also could – and ought to – abandon the regulation of CO₂ emissions of cars and light trucks (there are no CO₂ standards for heavy trucks) which not only would become superfluous if CO₂ emissions were taxed but which also would distort the economic incentives due to such a CO₂ tax. In particular, it is possible that CO₂ standards might actually increase total vehicle miles travelled [12, p. 388]. And of course one would wish to see a systematization of climate policy in general: Only when the burden on all CO₂ emissions, no matter their source, is – at least approximately – equal, can a cost-efficient climate policy be realized. Towards this goal, the proposed reform of the energy tax would but be a first, albeit an important, step.

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Tax reforms and elections in modern Russia

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ABSTRACT

The article is devoted to the study of the tax reforms in modern Russia. Tax reforms carried out since the beginning of the 1990s are analyzed in connection with the cyclical repetition of the stages of the electoral process, or the so-called electoral cycle. The research methodology includes the calculation of indicators characterizing the change in the tax system and the analysis of their dynamics at various stages of the electoral cycle. The main quantitative and qualitative indicators are: the tax burden on the economy as a whole (nominal and real); the tax burden on individual elements of GDP (on wages, on gross profit, on actual final consumption); the number of changes made to tax legislation; terms and procedure of tax amnesty. Three stages of tax reforms have been identified (1993–1996, 1997–2000, 2001–present) for research in modern history of Russia. The first two stages of tax reforms directly coincided with the electoral cycles. The third modern stage of tax reforms is implemented during several electoral cycles. The revealed influence of elections on the tax system of Russia results in a cyclical increase of the tax burden on the main elements of GDP in the first years of cycles and lowering of the tax burden in the final years of electoral cycles. In the elective period for elections to the State Duma, the nominal tax burden on the economy is always reduced. In the election year and next year of the electoral cycle, there is an increase in effective rates for profit, consumption and labor. In the final years of the electoral cycle, there is a decrease in effective rates for profit, consumption and labor. Thus, the results of the study confirmed the assumption on the existence of a relationship between tax reforms and elections in Russia and the possibility of increasing the tax burden in the short term

KEYWORDS

Tax reform, transformation of the tax system, tax burden, tax legislation, tax amnesty, electoral cycle, presidential elections, elections to the State Duma

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HIGHLIGHTS

1. The relationship between tax reforms and electoral cycles in Russia is unambiguously present. The intensity of the relationship is determined by the degree of competition in the elections
2. The electoral cycles for the elections to the State Duma of the Russian Federation have a stronger impact on tax reforms in Russia
3. Legislative activity on reforming the tax system of the Russian Federation is associated with the stages of the electoral cycle (declining in the election year in the State Duma and increasing in the pre-election period)
4. Tax amnesties are unambiguously connected with the electoral process and their conduct is confined to the elective period

УДК: 336.025;338.23;324

Налоговые реформы и выборы в современной России

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АННОТАЦИЯ

Статья посвящена исследованию налоговых реформ в современной России. Проведенные с начала 1990-х гг. налоговые преобразования анализируются во взаимосвязи с циклическим повторением этапов выборного процесса, или так называемым электоральным циклом. Методика исследования включает в себя расчет показателей, характеризующих изменение налоговой системы и анализ их динамики на разных этапах электорального цикла. В качестве основных количественных и качественных показателей выбраны: налоговое бремя на экономику в целом (номинальное и реальное); налоговое бремя на отдельные элементы ВВП (на оплату труда, на валовую прибыль, на фактическое конечное потребление); количество изменений, внесенных в налоговое законодательство; сроки и порядок проведения налоговых амнистий. Для исследования в современной истории России выделены три этапа налоговых реформ (1993–1996 гг.; 1997–2000 гг.; 2001 г. — настоящее время). Первые два этапа налоговых реформ прямо совпадали с электоральными циклами. Третий современный этап налоговых реформ реализуется в течение нескольких электоральных циклов. Выявленное влияние выборов на налоговую систему России заключается в циклическом повышении налоговой нагрузки на основные элементы ВВП в первые годы циклов и понижении налоговой нагрузки в завершающие годы электоральных циклов. В выборный период по выборам в ГД РФ всегда снижается номинальное налоговое бремя на экономику. В год выборов и следующий год электорального цикла наблюдается повышение эффективных ставок на прибыль, потребление и труд. В завершающие годы электорального цикла отмечается понижение эффективных ставок на прибыль, потребление и труд. Таким образом, результаты исследования подтвердили предположение о существовании взаимосвязи между налоговыми преобразованиями и выборами в России и возможность повышения налоговой нагрузки в ближайшей перспективе

КЛЮЧЕВЫЕ СЛОВА

Налоговая реформа, трансформация налоговой системы, налоговое бремя, налоговое законодательство, налоговая амнистия, электоральный цикл, выборы Президента, выборы в Государственную Думу

ОСНОВНЫЕ ПОЛОЖЕНИЯ

1. Взаимосвязь между налоговыми преобразованиями и электоральными циклами в России однозначно присутствует. Интенсивность взаимосвязи определяется степенью конкуренции на выборах
2. Более сильное влияние на налоговые реформы в России оказывают электоральные циклы по выборам в Государственную Думу РФ
3. Законодательная активность по реформированию налоговой системы РФ связана с этапами электорального цикла (снижается в год выборов в ГД и возрастает в предвыборном периоде)
4. Налоговые амнистии однозначно связаны с электоральным процессом и их проведение приурочено к выборному периоду

1. Introduction

President's elections have just finished in Russia as well as a regular electoral cycle has ended. Political scientists are now making forecasts on possible changes in the government and further steps of the President, but we are interested whether there will be any changes in the tax legislation after the election. The Ministry of Finance of the Russian Federation promises predictable fiscal conditions and no increase of the tax burden on bona fide taxpayers in the Main Directions of the budgetary, tax and customs tariff policy for 2018 and for the planning period 2019 and 2020¹.

It is well known that taxes might be a bright element of an election campaign. Remember the famous promises of the western leaders "Read my leaps – no new taxes". But in reality, the election promises, and factual actions do not always match, and the tax reforms are not an exclusion in this case.

Dictionaries provide two definitions of the word "reform". The first definition of "reform" is "to improve, to make close to perfection". Other definition is "to change, to transform". When politicians discuss the necessity of tax reforms they usually have in mind both meanings: the reform is the change in the tax system which leads to its improvement. Nevertheless, in most cases, changes can be considered an improvement only from the point of view of their initiators. History knows examples when the improvements of the tax system made by one government for tax reform were abolished by the next government also for tax reform purposes.

Is there a link between the tax reforms in the Russian Federation and the elections? We proceed from the hypothesis that the change of electoral cycles must be accompanied by appropriate changes in the tax sphere. And the tax reforms

themselves are derived from the political pre-election promises. In this regard, electoral cycles should lead to qualitative and quantitative changes in the country's tax system.

To prove the hypothesis, we analyze the main aspects of tax system transformation in modern Russia and refer the changes to the stages of electoral cycle.

In our research we are trying to answer several questions:

1. Which changes in the tax system of the RF were prevailing before and after the elections?

2. Which type of elections is connected with tax reforms more closely – parliament or president's elections?

3. Is it possible to claim that there is the relationship between tax reforms and electoral cycles in Russia?

For the purpose of tax reform study qualitative changes of tax burden as the integral indicator of taxation are analyzed including the changes in the effective tax burden for tax groups, as well as qualitative changes in taxation, tax administration and control.

The paper proceeds as follows. In the next two parts we consider theoretical substantiation of the relationship between tax reforms and elections and the research methodology. In the fourth part we describe general characteristics and trends of tax transformation in modern Russia. The analysis of the tax burden in the tax system of Russia in the period of 1993–2018 is made in the fifth part, and the relation of the said tax burden with the electoral cycle. In the sixth part we have analyzed the frequency of the tax legislation changes and certain aspects of tax administration linked to the timing of electoral cycle. Final part of the paper devoted to discussions on the result of analysis.

We analyzed the tax changes from 1993 to 2016. The choice of the time period is connected both with the availability of statistical data (statistics for calculating the tax burden for 2017 are not yet fully available) and with the periodization of the electoral cycle in Russia.

Several variants of electoral cycle periodization are suggested at present.

¹ Information of the official website of the Ministry of Finance of the Russian Federation. Available at: http://minfin.ru/document/?id_4=119695&area_id=4&page_id=2104&popup=Y#ixzz5D0hprOOJ.

First, the elections of 1989, when the elections to the Supreme Counsel of the USSR were held with some elements of the alternative. Second, some authors suggest considering the dates of the electoral processes since 1990 and even 1991, when the first elections of the President of the Russian Soviet Federative Socialist Republic took place. The majority of the researchers support the opinion that electoral development should be considered only since 1993, when the Constitution was adopted and the first elections to the State Duma of the Russian Federation took place [1]. In this case the first electoral cycle started in autumn 1993 with the dissolution of the Supreme Council of the RSFSR and the beginning of the electoral campaign for the State Duma of RF of the first convocation. In the period of time since adopting the Constitution of 1993 six cycles of the federal elections took place in Russia – the elections to the state Duma, and in 3–6 months – the elections of the President.

2. Literature Review

The classics of Marxism-Leninism drew attention to the interrelationship of politics and economics. They distinguished the following relations: the primacy of the economy in relation to politics, the active backward impact of politics on the economy, the primacy of politics over the economy.

They derived defining the nature of the economy impact on politics from the fundamental position of Marxism on the primacy of the economic basis and the secondary nature of the superstructure. The nature of the reverse effect was considered depending on the state of the latter, since “all governments, even the most absolutist, are ultimately only executors of economic necessity...” [2, p. 314]. The founders of Marxism-Leninism singled out three main directions of the impact of politics on the economy: politics can either accelerate economic development, acting in accordance with its laws, or slow it down by putting obstacles to the movement of the economy; or act simultaneously in the first two directions, then the

total influence will be either accelerating or retarding.

In Western political science electoral cycles are actively studied for various purposes and with various scientific approaches. Widely spread are the studies of changes in the electoral behavior of voters and authority agents during a certain cycle. A. Campbell argued that the presidential electoral cycles in the US differ in the degree of support for the presidential party during the elections and after the elections. From the degree of this support, which is cyclical, depends both on the overall course of the elections, and on their outcomes [3].

Early theories of fiscal choices (for instance, J. Buchanan and R. Wagner) based on political considerations highlight the manipulation of government expenditures by policymakers trying to get re-elected. The basic argument is that voters value public spending but consistently underestimate its costs in terms of the tax burden, especially if those costs are postponed. Thus, voters support policymakers who provide high levels of deficit-financed expenditures, and oust incumbents who are fiscally conservative [4].

Public choice theory explains and interprets politics as the interaction among constituents and agents seeking to advance or to express their own interests. J. M. Buchanan explains the tax changes as the political event and shows that it depends critically on the model of political choice [5]. Political reality of tax changes presumably embodies some mix of models of consensus, conflict, and agents’ discretion.

In particular, according to the theory of party preferences A. Gelman and G. King, voter preferences are formed during election campaigns, if the media provide voters with the necessary information on the basis of which voters determine their social position and evaluate party platforms [6]. Models of support for parties by voters throughout the entire electoral cycle may change. In the middle of the electoral cycle, the party that won the parliamentary elections loses its popularity. Before the next election, it restores voters’ confidence.

A. Drazin continued his research in this direction. He analyzed the explanatory possibilities of the first model of the monetary policy-business cycle and reviewed the theories that emerged over the next 25 years [7]. W. L. Miller and M. Mackie characterize electoral cycles through the dependence of political party popularity on economic conditions [8].

The neoinstitutional approach provides more opportunities to characterize political changes during certain electoral cycles. The influence of institutional design on elections and vice versa is studied by American political scientists M. Shugart and M. Soberg [9]. They believe that the parliamentary elections set the logic for the development of the entire electoral cycle. The low weight of the presidential party in parliament jeopardizes the formation of the government and makes its work ineffective. A fragmented government in the presidential system often leads to pathological situations. Thus, the institutional specifics of government formation sets the logic for the development of the election campaign and determines the content of the electoral cycle.

Substantially more productive, but at the same time less developed is the political-economic approach. From the standpoint of this approach, a number of interesting models of the electoral cycle have been developed. For the first time, a rational model of the electoral cycle was developed by W. Nordhaus [10]. The model is based on the fact that politicians manipulate economic policy before elections to increase the chances of re-election.

G. Brennan and J. M. Buchanan in 1980 offer an approach to the understanding and evaluation of the fiscal system, in which government is modelled as "revenue-maximizing Leviathan" [11]. The central question becomes: how much "power to tax" would the citizen voluntarily grant to government as a party to some initial social contract devising a fiscal constitution? Armed with such a model, politics in the office after elections assumed to exploit the power assigned to them to the maximum possible extent.

The model of the K. Rogoff budget cycle equilibrium is very interesting [12]. Under this model, the government signals its desire to be re-elected during the electoral cycle through the implementation of fiscal policy. As a rule, budgetary expenditures increase before the elections.

The most interesting for our study is the model developed by Per Pettersson-Lidbom. He revealed the dependence between the electoral success of the current government, the level of government spending and the collection of taxes. On the example of local executive elections in Sweden, he analyzes the explanatory possibilities of the theory of rational cycles. Pettersson-Leadbom made the following interesting conclusions: (1) the government increases expenditures and reduces taxes in the election year; (2) the government, which has a better chance of being reelected, implements large expenditures in the election year; (3) a year after the election, re-elected governments spend more than the governments just elected and, accordingly, reduce tax rates; (4) re-elected governments spend less after the elections than in the election year and taxes are collected more; (5) tax conditions and the level of government spending affect electoral success [13].

Some studies indicate the close connection between the elections and timing of tax reform.

For example, J. L. Mikesell shows that much of the pattern of state tax policy changes can be traced directly by elections [14]. They argue that state parties are concerned with gaining and retaining political power and that the severity of public reaction declines with the passage of time. The outcome is a distinct rate change cycle with the broad based taxes. Politically, state governments find it rational to increase statutory rates of major taxes at two points in the election cycle (three years and one year before the elections).

A. Alesina, D. Carloni and G. Lecce examined the conventional wisdom that fiscally "tight" governments lose popularity and elections and strong and popular government can implement fiscal adjustments and be reelected [15]. They found surpris-

singly little evidence supporting this conventional wisdom and no evidence that even large reductions of budget deficits are always associated (or most of the time) with electoral losses. The authors note that it is difficult to measure “strength” of a government, *ex ante*, and therefore their test should be taken cautiously.

H. Ehrhart analyses the impact of the electoral calendar on the composition of tax revenue (direct versus indirect taxes) [16]. It thus represents an extension of traditional political budget-cycle analyses assessing the impact of elections on overall revenue. Using the panel data from 56 developing countries over the 1980–2006 period authors find robust evidence of lower indirect taxes being applied by incumbent governments in the period just prior to an election. Indirect tax revenue in election years is estimated to be 0.3 *GDP* percentage points lower than in other years, corresponding to a fall of about 3.4 % of the average figure in the sample countries, while there is no such relationship with direct tax revenue.

M. Hallerberg and C. Scartascini finds support for the role of elections and banking crises in the timing of tax reforms and the allocation of the additional tax burden [17]. They argue that during electoral periods, increasing taxes becomes highly unlikely, even if the government is facing financing problems. Interestingly, politics seem to trump economics: banking crises do not affect the probability of having a reform during electoral times.

It is interesting that modern studies have confirmed the positions of the classics of Marxism-Leninism about the primacy of the economy in relation to politics for countries with a long history of democratic elections. Our study is designed to find out whether this provision is relevant for Russia.

3. Research Methodology

3.1. The tax burden indicators

To study the relationship between the electoral cycle and taxes, we are primarily going to analyze the change in the tax burden. Tax burden indicator characterizes

the proportion of mandatory payments paid to the country’s budget system in the corresponding resulting source of their payment (gross product, value added, income, etc.). The economic meaning of this indicator can be considered as a form of the monopoly price of aggregate public goods, in which the measure of the public services value is expressed. Payers of obligatory payments here act as forced “buyers” of public services, the cost of which is set by the state, in the form of the rates of these payments for the next year. While the seller (the state) is trying to inflate the price of its services, buyers (taxpayers) tend to lower it, hiding objects and income from taxation. There are, so-called “scissors” between nominal (assessed) and real (actual) indicators of the tax burden. The real tax burden is an indicator characterizing the ratio of the actually paid mandatory payments amount to the value of the corresponding activity result. The nominal tax burden is an indicator characterizing the ratio of the amount of assessed mandatory payments to the value of the corresponding result of activity. These “scissors” are always present and in all indicators of the burden. Their scale directly indicates the level of tax discipline, the effectiveness of the tax administration system, the state of the economy. But the main thing is that the scale of these “scissors” is an indicator of the acceptability or unacceptability of the existing level of the tax burden, and in fact, the price of aggregate public goods established by the state. The existing level of the tax burden shows the degree of centralization and socialization of *GDP* and its components, which, on the one hand, carries a stamp of subjective, monopoly actions by the government, and on the other hand reflects objective market and tax patterns, features of the tax policy model, economic model and the achieved level of socio-economic development of the country. The methodology for calculating the tax burden applied by the state statistics bodies determines the tax burden (TB_n) as the percentage of actual tax revenues in the budget system (TR) in *GDP* (GDP):

$$TB_n = \frac{TR}{GDP} \cdot 100\%.$$

The use of actual receipts as a numerator indicates the calculation of the real indicator. This indicator is suitable to make international comparative analysis of the tax burden. It does not show full and objective understanding of the burden's actual gravity. The numerator of the tax burden indicator should reflect the amount of accrued, not paid (actually received in the budget) payments, i.e. for domestic use, it is necessary to operate with nominal values.

The difference between nominal and real indicators is formed by so-called "tax scissors".

For analytical purposes and the development of tax policy measures, it is also possible to calculate the following tax burden indicators for individual elements of GDP in the System of National Accounts: on labor (taking into account insurance premiums), on gross profit in the economy, and on actual final consumption. At the same time, only those accrued taxes, fees and mandatory payments will be reflected in the numerator, the source of their payment is the corresponding basic indicator.

These indicators reflect the effective aggregate tax rate applied to a particular element of GDP. To calculate three price indicators (effective tax rates for labor, consumption and profit) we will use the following formulas.

The index of the nominal tax burden on labor (TB_{labour}):

$$TB_{labour} = \frac{PIT_{factual} + SP_{factual} + PIT_{debt} + SP_{debt}}{LP_{official}} \cdot 100\%$$

where $PIT_{factual}$ – Personal Income Tax factual, $SP_{factual}$ – actual receipts of the tax on incomes of individuals and set of social payments; PIT_{debt} – debts on these taxes (payments); $LP_{official}$ (Labor Payment official) – official remuneration of wage workers (without hidden wages).

Nominal burden on consumption ($TB_{consumption}$):

$$TB_{consumption} = \frac{EX_{factual} + VAT_{factual} + MET_{factual} + AR_{factual} + EX_{debt} + VAT_{debt} + MET_{debt} + AR_{debt}}{FHC_{house}} \cdot 100\%$$

where $EX_{factual}$ (excise tax), $VAT_{factual}$, $MET_{factual}$ (Mineral extraction tax), $AR_{factual}$ – actual receipts of excises, VAT , MET and other payments for natural resources sold on the territory of the country, import duties; EX_{debt} , VAT_{debt} , MET_{debt} – debts on these taxes and duties; FHC_{house} – actual final consumption of households.

The index of nominal burden on gross profit (TB_{profit}):

$$TB_{profit} = \frac{CIT_{factual} + ACIT_{factual} + CIT_{debt} + ACIT_{debt}}{GP} \cdot 100\%$$

where $CIT_{factual}$ (income tax), $ACIT_{factual}$ (aggregate income tax) – actual income tax on profits and taxes on total income; CIT_{debt} , $ACIT_{debt}$ – debts on these taxes; GP – gross profit of the economy and gross mixed incomes.

Official Rosstat data were used for the calculations. For the structuring of electoral cycles in Russia, a chronological principle was used. This principle allows better understanding of the interrelationship of political and socio-economic events in a certain period of time, and therefore, makes factorial assessment of political changes and tax reforms easier. Thus, the breakdown of the electoral process into cycles in our case may contribute to a better understanding of political development and tax reform periodization in Russia.

3.2. Electoral cycle in Russia

The concept of the electoral cycle is used to visualize and better understand the cyclical nature of the changes taking place in the electoral process. This tool was developed by the European Commission, the International Institute for Democracy and Electoral Assistance and the United Nations Development Program². The electoral cycle regards elections as an ongoing process, which is divided into three main periods: the pre-election period, the electoral period and the post-election period. It is noteworthy that the electoral cycle does not have fixed initial or end points,

² Available at: <http://aceproject.org/electoral-advice/electoral-assistance/electoral-cycle#ftn1>.

which is also true for all periods in the cycle. Theoretically, we can say that one cycle ends when another begins and the same applies to the periods in the cycle.

Six electoral companies for the election of the President and the State Duma were held during the analyzed period in the modern history of Russia (Table 1).

Table 1
Federal Elections in Russia 1993–2018

Period of election	Date	
	Elections to the State Duma	Elections of the President
1995–1996	December 17, 1995	June 16, 1996
		July 3, 1996
1999–2000	December 19, 1999	March 26, 2000
2003–2004	December 7, 2003	March 14, 2004
2007–2008	December 2, 2007	March 2, 2008
2011–2012	December 4, 2011	March 4, 2012
2016–2018	September 18, 2016	March 18, 2018

Taking into account the periodization of the stages of the electoral cycle, for the purposes of our research, we will allocate six election periods, taking as reference the elections to the State Duma (the first period – 1995, the second period – 1999, the third period – 2003, the fourth period – 2007, the fifth period – 2011, the sixth period – 2016).

The comparison of the electoral cycle and elections to the State Duma has historical roots and is connected with ensuring the legality of taxation. In the history of Western democracy formation, much of the political changes were based on resisting arbitrary taxation. Thus, the history of parliamentary power in the UK is closely linked to the struggle to restrict the king's right to raise taxes, and the American revolution began with protests against the use of the metropolitan tax without agreement with the colony.

Representing the interests of taxpayers in parliament is considered a democratic guarantee against arbitrary taxation on the part of the state. In the Russian Federation, tax authority for the establishment and imposition of taxes belongs to representative authorities. The only exception is the decrees of the President of the Russian Federation, which can make changes in the tax legislation, but should

not contradict it and the Constitution of the Russian Federation. Therefore, shall we consider first of all the relationship between tax transformations and parliamentary elections.

4. General Characteristics and Trends of Tax Transformation in Modern Russia

Like any socio-economic system, the tax system is constantly being transformed. According to the point of view ascending to A. Smith, the tax system should be characterized by stability and immutability for sufficiently long periods of time.

However, the twentieth century. made adjustments to the concepts of dynamism and stability. The rate of change in modern economic systems has increased significantly, so the change in tax systems should be adequate.

The formation and further reform of the tax system urgently adopted in Russia was implemented even more dynamically. Although this process should be characterized rather not as purposeful-dynamic, but as chaotic-dynamic, especially at first. This practice has developed due to a number of objective reasons for the 1990s:

- the rapidity of the transition from a planned to a market economy;
- lack of the required scientific and methodological elaboration of the reform, long-term program of its implementation and clear targets;
- large-scale borrowing of foreign tax structures and their subsequent adaptation to Russian conditions, using as the main trial and error method;
- excessive subordination to the changing political conjuncture.

4.1. The first stage of tax reforms: 1993–1996 (the first electoral cycle)

The essence of this stage was to run new models of taxes, to adapt them and to find ways to reform. By 1992, in the most urgent order, a tax system was created, where all possible list of taxes, fees and other obligatory payments was recorded at the same time.

The formed three-level system of a limited number of federal, but unlimited number of regional and local taxes and

fees (one listing of which does not fit on the whole page), could not initially be perfect. The lack of domestic experience and relevant scientific developments, low taxation culture and responsibility of payers, weakness of state power and local self-government predetermined low efficiency of the system functioning at the first stage. It did not implement fiscal, not to mention other functions of taxation in full. At the same time, one should note that although the scale of failures in the sphere of taxation in the first half of the 1990s was significant enough, but in general it should not be over-exaggerated. Tax failures are incommensurably fewer than the more serious failures of that time committed in the economy, public administration, finance, national relations and other spheres.

As I. V. Gorsky notes, at the beginning of the reform, the overall assessment of the formed tax system was quite satisfactory for the following reasons [18].

From a financial point of view, this system was quite diverse, covering all objects of taxation (income, property, consumption), and was able to meet budgetary needs under controlled inflation.

From the economic point of view, the planned tax burden should not, on the whole, discourage the development of production. However, the balance between the taxation of income and consumption was violated towards the latter. So, a number of taxes on incomes did not have high rates by international standards, in particular such taxes as on profit and income. Taxes on property were also insignificant. Fearing for decades of unsatisfied desire to consume, the reformers introduced two extraordinary elements in taxation to limit consumer appetites and inflationary consequences. First, VAT was introduced at an extremely high rate of 28 %, which has no analogues in world practice. Secondly, against the backdrop of fairly high social fund contributions (up to 39 %), for several years the level of remuneration of labor was regulated through profit taxation (a four-, six- and even eightfold excess of wages over the established minimum was included in the income tax base).

From a *social* point of view, the reform was the least developed. Pensions and social security systems were sorely lacking in funds. The high standards of social payments did not save, and under the conditions of hyperinflation instantly depreciated. Besides, the negative effect of high VAT limited the already low level of consumption of the least well-off strata contributed to the worsening of social stability in society, as well as the unknown previously differentiation in the distribution of incomes, which is impossible to take away by the progressive taxation of personal incomes in the absence of real control.

4.2. The second stage of tax reform: 1997–2000 (the second electoral cycle)

The essence of this stage was the transition to an active and purposeful reform of the tax system. This step was taken from the announcement of the President's Address to the Federal Assembly on March 6, 1997, which determined its main directions (see Figure 1) [19, pp. 360].

This message encouraged the process of choosing the direction of tax reforms. It was from this moment on that the reform of taxes acquired the features of purposeful and justified actions. In 1998, the Government of the Russian Federation finally settled on the project of the evolutionary improvement of the tax system proposed by the Ministry of Finance. It was the basis for the development of the Tax Code (TC), the first part of which was put into effect on January 1, 1999.

One of the main reform directions was a significant restriction of the previously granted and almost unlimited powers of regional and local government levels in the field of establishing new taxes and fees, and the distribution of tax revenues between budgets of various levels. The regional and local initiatives in this area by the mid-1990s essentially turned into tax arbitrariness, which caused the inequality of economic conditions in various regions and became a real threat to lose the unity of the country's economic space. Cardinal changes here were achieved with the adoption of part one of

the first TC, which determined the scope of their powers to establish, modify and abolish regional and local taxes. The most significant result of this direction was a closed (exhaustive) list of regional and local taxes, beyond which a tax initiative of the appropriate level could no longer go out. Thus, the subjects of the Russian Federation and local self-government bodies have lost the opportunity to introduce taxes or fees in excess of the list established by the TC.

Another no less important area of reform was the reduction in the total number of taxes and fees. Before 1996, the list of tax payments in Russia was at least 46 types, differing significantly in different regions of the country. With the adoption of the first part of the Tax Code, the amount of taxes and duties at all levels decreased by almost 20 %, amounting to 35 taxes and fees.

Another important area of reform was the reduction of tax rates for the main budget-forming taxes. Examples are sufficient. So, for VAT, the total rate changed from 28 % in 1992 up to 20 % in 1999. The corporate income tax rate decreased almost twofold: from 45 % in 1992 to 35 % in 1996 and further, from 1999 to 24 %.

The taxation of incomes of citizens was also significantly changed. Progres-

sive taxation of income tax, when the maximum rate of this tax was 40 % since 1992, and then 30 % since 1996, was replaced in 1999 by a “flat” personal income tax (personal income tax) scale with a basic rate of only 13 %.

It should be noted that the adoption of the Tax Code was intended to ensure the formation of an understandable and simple tax system. Against the background of positive effects, the reform was not without a number of less significant, but still observed shortcomings. The general provisions in many ways proved to be “dangling in the air” (left without any result) without solving the fundamental problems of construction and the application of specific taxes and fees.

In this connection, the work on the second part of the TC was speeded up, the adoption of the first four chapters of which marked the beginning of a new stage.

4.3. The third stage of tax reform: 2001 – present (the third, fourth, fifth and sixth ejector cycles)

The third stage of tax reforms was implemented during four electoral cycles. The essence of this stage is the codification of an exhaustive list of taxes and fees in modern Russia. The sequence of codification is presented in Table 2.

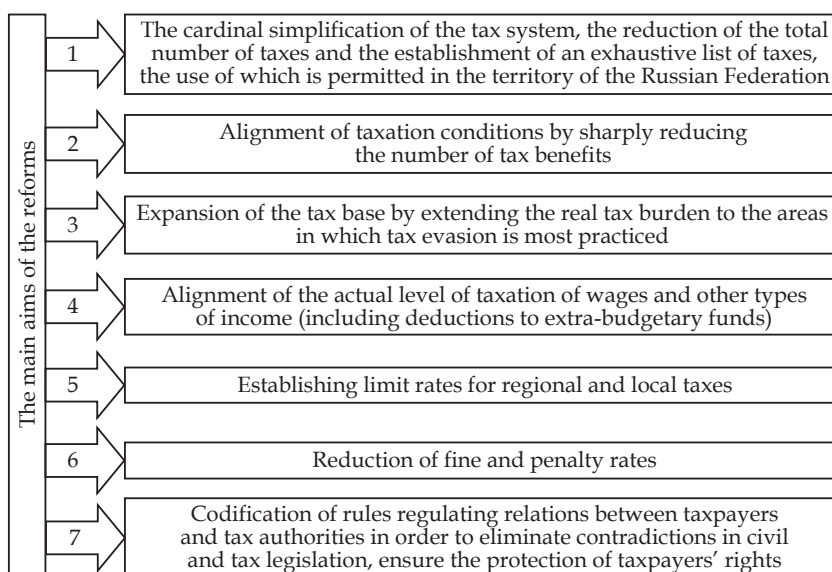


Figure 1. The Main directions of the second stage of the reform

Table 2

Sequence of the introduction of the Russian Federation Tax Code, Chapters of Part II

Implementation	Electoral cycle	The Tax Code Chapters
Since January 1, 2001	The third electoral cycle	Chapter 21. Value added tax Chapter 22. Excises Chapter 23. Personal Income Tax Chapter 24. Unified social tax (cancelled since January 1, 2010)
Since January 1, 2002		Chapter 25. Corporate income tax Chapter 26. Tax on mining operations Chapter 26.1. The system of taxation for agricultural producers (single agricultural tax) Chapter 27. Sales tax (canceled from 1 January 2004)
Since January 1, 2003.		Chapter 26.2. Simplified system of taxation Chapter 26.3. The system of taxation in the form of a single tax on imputed income for certain types of activities Chapter 28. Transport tax
Since January 1, 2004		Chapter 25.1. Charges for the use of objects of fauna and aquatic biological resources Chapter 26.4. The Taxation System in the Implementation of Production Sharing Agreements Chapter 29. Tax on gambling business Chapter 30. Corporate Property Tax
Since January 1, 2005	The fourth electoral cycle	Chapter 25.2. The water tax Chapter 25.3. The State Duty Chapter 31. Land tax
Since January 1, 2013	The sixth electoral cycle	Chapter 26.5. Patent system of taxation
Since January 1, 2015		Chapter 32. Personal Property Tax Chapter 33. Trading fee
Since January 1, 2017		Chapter 34. Insurance premiums

Thus, 17 taxes (fees) and 5 special tax regimes were codified in four electoral cycles. The greatest legislative activity falls on the third cycle, during which 11 taxes (fees) and 3 special tax regimes were codified. During the fifth cycle there was no legislative activity.

In general, the formation of the second part, despite the annual changes introduced, can be considered almost complete. The Tax Code became a single, systematic document regulating the whole set of tax relations in the Russian Federation.

It is extremely important that the codification of taxes was accompanied by their parallel revision. It was necessary to eliminate inefficient and overlapping taxes, as well as so-called negotiable, inherently “non-market” taxes, which was done at the beginning of the third stage. A significant success of such a revision can be considered the abolition of taxes on the maintenance of housing and social and cultural facilities. A striking example of a non-market tax was also the tax on road

users, levied on sales revenues. The tax amount paid was included in the price of the products at each stage of production according to the turnover tax principle. The amount of tax was accumulated with each new stage of the technological chain of production and the advantages were obtained by the manufacturer of technologically simple products, which did not contribute to the normal development of the economy. The total cancellation of this tax occurred in 2003, while the budget losses were compensated to a certain extent by an increase in excise taxes on fuels and lubricants and a change in the procedure for the application of excises in respect of petroleum products, as well as the introduction of a transport tax.

Examples of taxes with the same object of taxation and a similar tax base were deductions for the reproduction of mineral resources and payments for the use of subsoil. Since 2002, these two payments, as well as excises for oil and stable gas condensate, have been organically re-

placed by a mineral extraction tax that has comprehensively covered various taxable resource objects.

Until 2004, indirect taxes such as VAT and sales tax were similar on a tax base. Most countries have long abandoned their parallel application, the practice of their simultaneous existence persisted only in Russia and Canada, so the sales tax was abolished in 2004. In the past two years, the number of taxes and charges has stabilized, increasingly acquiring features of a certain logical completeness, despite the fact that some progress in reducing their composition is still continuing: from 2006, the tax on inheritance and donation has been abolished. Thus, the number of taxes and fees in the Russian Federation has steadily declined over the past 10 years, and since 2006 the tax system has included only 20 tax payments. This figure is by no means a reflection of the actual number of taxes paid by legal entities and individuals. Their number is significantly lower due to inclusion in this system of special tax regimes that replace the payment of some taxes, as well as certain taxes with taxable objects that are specific only for certain types of activities.

Compulsory social payments have undergone drastic reform. The aggregate of these payments paid by employers from the wage fund to different addresses was replaced by a regressive unified social tax, the rate of which decreased from 35.6 % in 1999 to 26 % in 2005. In addition to reducing the rate of a significant direct tax – UST, the rate has been reduced to 18 % since 2005 in the main indirect tax – VAT.

Another important area of improving the tax system, which directly affects not only the increase in tax revenues to the budget, but also the formation of a positive perception of this system by taxpayers, has been a steady decline in the total number of tax benefits. This reduction was carried out, firstly, by eliminating ineffective benefits, often not reaching those intended for them, and secondly, by eliminating the benefits that distort the economic content of taxation, which are peculiar “loopholes” for minimizing tax obligations.

Virtually all taxes and fees were inventoried to check the excessive number of benefits. For a number of taxes, such as for personal income tax and VAT, the number of indirect benefits was significantly reduced. On other, for example, the profit tax of organizations, all direct benefits were generally eliminated, including economically justified, and the most popular investment privilege. In addition, in the process of forming new chapters of the Tax Code, since 2002, lawmakers have already consciously sought to design taxes without the use of benefits. In some taxes, for example, in the tax on the extraction of minerals, they were able to fully implement it, in others, for example, in the state duty – no. Today, direct benefits as an element of taxation in the Tax Code have been left only in four taxes, but in camouflage form the benefits are still sufficiently present.

A significant success in improving the tax system was the implementation of a set of special tax regimes aimed at creating favorable tax conditions for certain categories of taxpayers. Favorable conditions here are determined by the possibility of reducing the tax burden, replacing of a number of taxes payment with a single tax payment, and, accordingly, a significant simplification of the tax administration procedure both at the level of the taxpayer and the tax authorities.

5. Tax burden and elections in Russian Federation

5.1. Tax burden and elections to the State Duma of the Russian Federation

In accordance with the proposed methodology for tax burden assessment, we should consider the relationship between its dynamics and elective periods (Figure 2).

The figure graphically shows the change in the tax burden in the election year. Each elective cycle is presented in the form of a line connecting points deviating from the basic indicator. The basic indicator is taken in the year preceding the election.

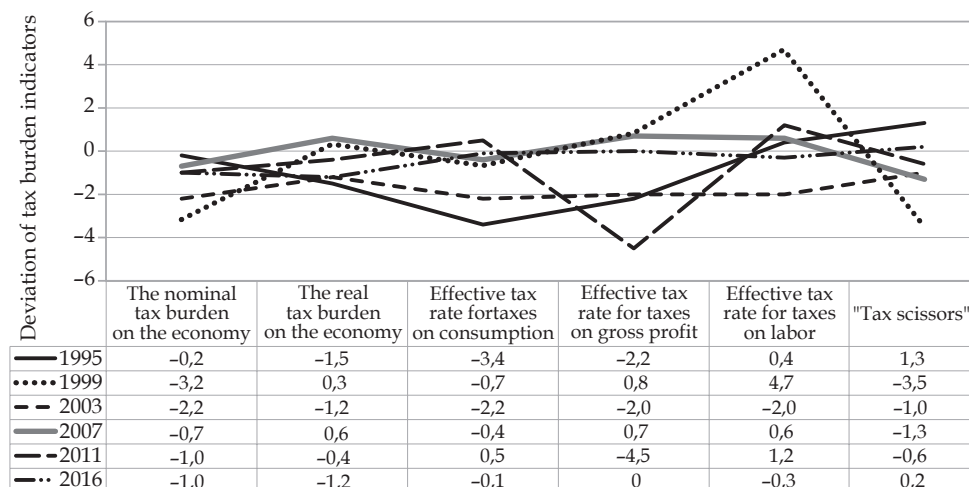


Figure 2. Deviation of the tax burden during the elections to the State Duma (the percentage point to the previous year)

For example, in the first election cycle (elections to the State Duma in 1996), the nominal tax burden on the economy decreased by 0.2 to the previous year, and the real tax burden on the economy decreased by 1.5. The effective consumption tax rate (-3.4) fell most of all, and the effective rate of taxes on labor, on the contrary, increased by 0.4.

Comparing the indicators of the tax burden with the stages of the electoral cycle, we can note the following:

- the nominal tax burden on the economy, which characterizes the ratio of the amount of assessed mandatory payments to the value of the corresponding result of activity, always decreases during the period of elections to the State Duma of the Russian Federation. This means that appropriate changes are made in the legislation, allowing to reduce the accrued taxes or, more simply, laws are adopted in favor of voters or their individual groups;

- the actual tax burden characterizing the ratio of the amount of actually paid mandatory payments to the value of the corresponding result of the activity changes not so uniquely and slightly increases during certain elective periods, which may indicate the activation of tax authority activities and the improvement of tax collection in the relevant period;

- the effective rate of consumption taxes depends to the greatest extent on the

electoral cycle. The effective rate of these taxes declined in five elective periods of six;

- with an increase in the tax burden, preference is given to taxes on labor, whose effective tax rate is more frequent than for other taxes growing in the election year;

- the most ambiguous manner is demonstrated by the most effective tax rate for the income tax, which fluctuations depend, inter alia, on the economic situation and do not lend themselves to instant regulation;

- "tax scissors" have a significant "opening angle" in earlier election periods. This indicates, first, the gradual improvement of tax discipline on account of increasing the effectiveness of tax administration, and secondly, that the tax burden becomes more acceptable to taxpayers.

- the first, second and fifth elective periods (1995, 1999 and 2011, respectively) are the most "unstable" periods from the point of view of chaotic changes in tax legislation. In these periods there is a variety of changes in the tax sphere: an increase in the effective rate of labor taxes is accompanied by a decrease in the effective tax rate for consumption or vice versa;

- the third, fourth and sixth elective periods (2003, 2007 and 2016, respectively) were the most stable periods in terms of the changes that were implemented characterized by a decrease or stabilization of all components of the tax burden.

5.2. The tax burden and the election of the President of the Russian Federation

As we said above, the transformation of the tax system belongs to the prerogative of legislative power. However, the role of the President of the country in the decision-making system in all spheres of country’s life is very high. The Institute of the President in modern Russia is one of the key institutes in the system of public authorities. In recent years, the positions of the presidency institute in the system of public authorities have acquired qualitatively new features. In fact, the relations developing in the system of political power in Russia testify, first of all, to the strengthening of the influence of the Russian Federation President on all branches of power. In addition, the institution of the presidency has become the main, integrating and consolidating factor in the country. Taking into account the role occupied by this institution in the life of the country, it can be argued that the fate of the entire Russian state depends on its development.

Taking into account the aforesaid, we shall consider interrelation of indicators of tax burden with an electoral cycle on elections of the President. Data characterizing tax changes in different elective periods are shown in Figure 3. We could not include in the analysis the election period of 2018 due to the lack of statisti-

cal data. Therefore, the analysis includes five elective periods: the first – 1996; the second – 2000; the third – 2004; the fourth – 2008; the fifth – 2012.

Comparing the indicators of the tax burden with the stages of the electoral cycle, we can note the following:

- the nominal tax burden on the economy, which characterizes the ratio of the amount of assessed mandatory payments to the value of the corresponding result of activity, significantly decreased only in the first election period (1996) generally characterized by contradictory changes in the taxation sphere.

- the real tax burden characterizing the ratio of the amount of actually paid mandatory payments to the value of the corresponding result of activity in all elective periods, except for the first one, tended to increase. Most likely, this is due to a certain increase in administrative pressure on big business in order to improve the collection of taxes to finance costs in the relevant period;

- most often, during the presidential elections, the effective rate of taxes on gross profit decreased;

- the effective tax rate for taxes on labor, most often, increased, the same as during the election periods for elections to the State Duma of the Russian Federation;

- the most “unstable” periods from the point of view of chaotic changes in tax

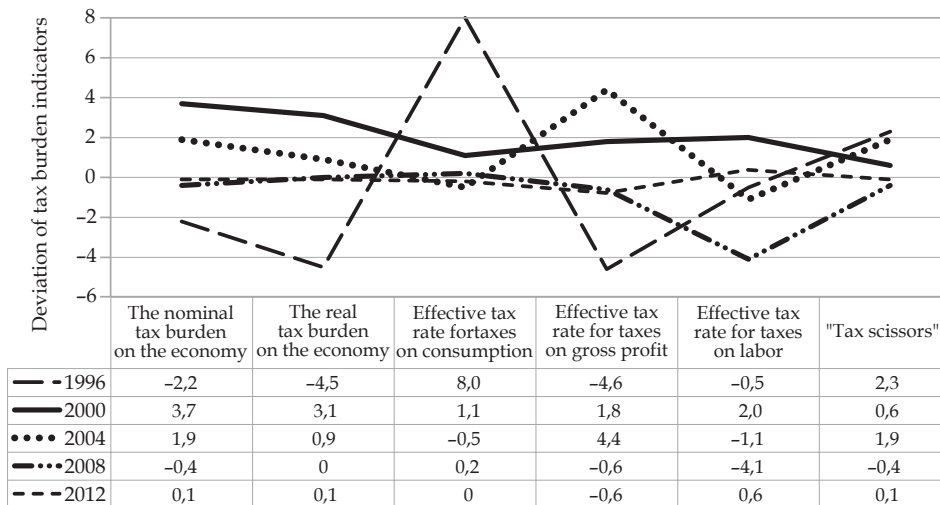


Figure 3. Deviation of tax burden indicators in the year of the Elections of the RF President (percentage point to the previous year)

legislation are the first and third elective periods (1996, 2004, respectively). In these periods there is a variety of changes in the tax sphere – an increase in the effective rate of taxes on labor or gross income is accompanied by a decrease in the effective tax rate for consumption or vice versa;

– the most stable periods in terms of the changes were the second and fifth elective periods (2000, 2012 respectively), the first of which was characterized by an increase in all components of the tax burden, and the second period was accompanied by virtually no changes in indicators.

5.3. Dynamics of tax burden and electoral cycle in Russia

Consider the effective rates for profit, labor and consumption in the dynamics (Figure 4).

The analysis of effective rates for labor, profit and consumption in the context of electoral cycles shows their multidirectional dynamics over the years of the cycle (Figure 4).

1. In the election year and next year of the electoral cycle, there is an increase in effective rates for profit, consumption and labor. This trend was especially noticeable in the first electoral cycles, when there was considerable competition in the presidential elections. So, consumption taxes increased at the beginning of the second and third electoral cycles. For taxes on labor, this trend is even more pronounced. Taxes on labor increased at the beginning of the first, second, third and even at the beginning of the sixth electoral cycle. On profit, the situation is somewhat different. There an upward trend is observed in the first, third and fourth electoral cycles.

2. In the final years of the electoral cycle, a decrease in effective rates for profit, consumption and labor is noted. Consumption taxes are reduced at the end of the first, second, third and fourth electoral cycles. For taxes on profit, the burden decreases at the end of the first, third and fifth electoral cycles. For taxes on labor, this decrease is noticeable only at the end of the third and fourth cycles.

Thus, the influence of electoral cycles on Russia's tax system is a cyclical in-

crease in the tax burden on the main elements of *GDP* in the first years of cycles and the lowering of the tax burden in the final years of electoral cycles. At the same time, it can be noted that the volatility of the tax burden indicators decreases in the last two electoral cycles, when the presidential elections in Russia no longer had a significant political intrigue. Accordingly, it may be reasonable to conclude that the volatility of the tax burden indicators for the main elements of *GDP* increases when the variability of electoral choice and the competitiveness of President's elections increase. However, the volatility of tax burden indicators on the main elements of *GDP* decreases when the variability of electoral choice and the competitiveness of the head of state elections are reduced.

We shall verify this conclusion by analyzing the tax burden indicators on the Russian economy as a whole (Figure 5).

In the first four electoral cycles, there is a clear trend of increasing the tax burden on the country's economy in the first years of cycles and reducing these indicators in the final years of the cycles. At the beginning of the fifth cycle, the decrease in the tax burden on the country's economy is due not to the influence of the electoral cycle, but to the impact of the global economic crisis and a marked decrease in the profitability of companies and, correspondingly, to a decrease in the deductions from profits in favor of the state.

Moreover, the real and nominal tax burden indicators change during the electoral cycle almost synchronously, repeating the trends of the initial increase and the final decrease during each cycle. In the fifth and sixth cycles, the upward trend in the indicators is not observed, but only the decreasing dynamics is noted. This reaction of the tax load on the economy during the first four cycles and the absence of such volatility in the last cycles confirms the earlier conclusion about the impact of competitive electoral cycles on the country's tax system. Moreover, the higher the variability of electoral choice and the competitiveness of the elections themselves, the more noticeable are the quantitative changes in taxation.

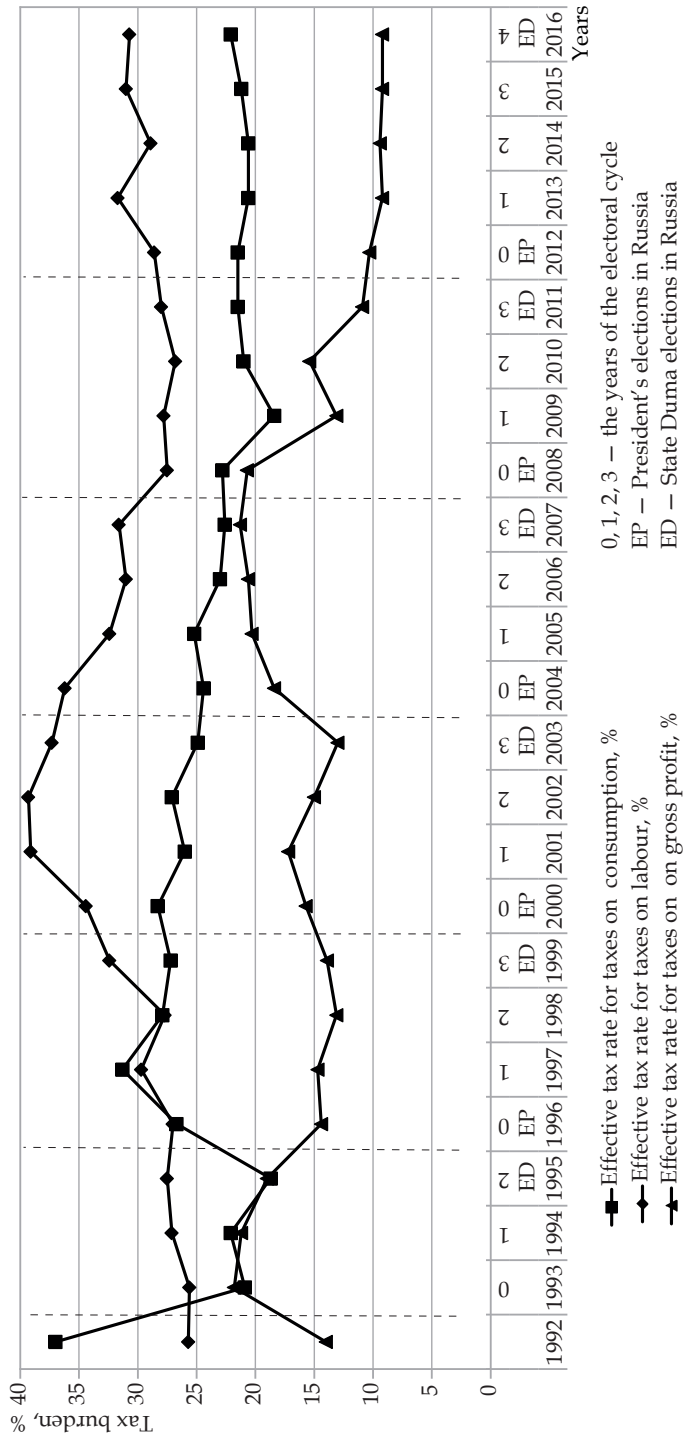


Figure 4. Dynamics of effective rates for labor, profit and consumption and the electoral cycles

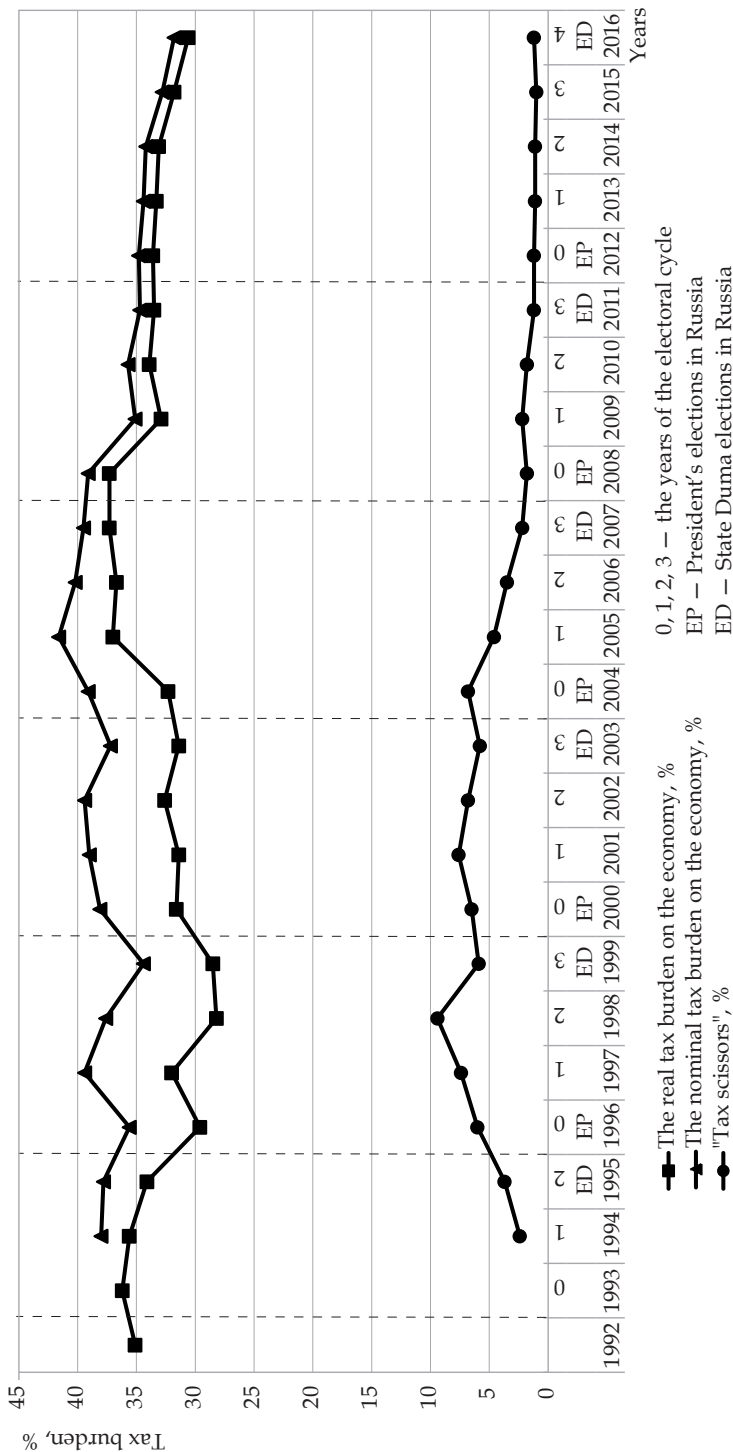


Figure 5. Dynamics the tax burden indicators on the Russian economy and the electoral cycles

As for qualitative changes in tax administration, we suggest using the indicator of “tax scissors” as the difference between the calculated and collected taxes (Figure 5) as an integral measure of such changes. It can be seen that the index of “tax scissors” reaches a maximum in the second and third electoral cycles, and since the fourth cycle has been steadily declining. This positive change indicates a steady increase in the collection of taxes. There is no stable connection with electoral cycles.

6. Tax legislation, amnesty and elections

6.1. The number of changes introduced into the tax legislation and elections

Let us also consider the question of whether there is a correlation between the stages of the electoral cycle and the number of changes introduced into the tax legislation. Under the tax legislation, as part of the study, we will understand the special tax legislation (tax and levy legislation) that is, laws that regulate only the sphere of tax relations. Of the four levels of the system of legislation on taxes and fees that regulate tax re-

lations³, we will only consider the Tax Code of the Russian Federation (RF Tax Code). The Tax Code fixes the most important provisions on tax relations and it is the main law in the tax law.

We can reliably determine the number of changes introduced into the tax legislation only after the introduction of the tax code of the Russian Federation. The first part of the code was introduced in 1999 and from that moment on it has been constantly amended. The number of changes was calculated using the Consultant Plus system. The number of changes in parts one and two of the Tax Code of the Russian Federation was counted under the text of each law introducing amendments and additions to the Tax Code, the number of changes was summarized by years. The results are imposed only on the electoral cycle for elections to the State Duma of the Russian Federation. The results are graphically shown in Figure 6.

³ Four levels of tax legislation are: The Tax Code of the Russian Federation (RF Tax Code) is a codified act of higher legal force; federal laws on taxes and fees, adopted in accordance with the Tax Code of the Russian Federation; laws and other normative acts of legislative (representative) bodies of the subjects of the Russian Federation; normative acts of representative bodies of local self-government.

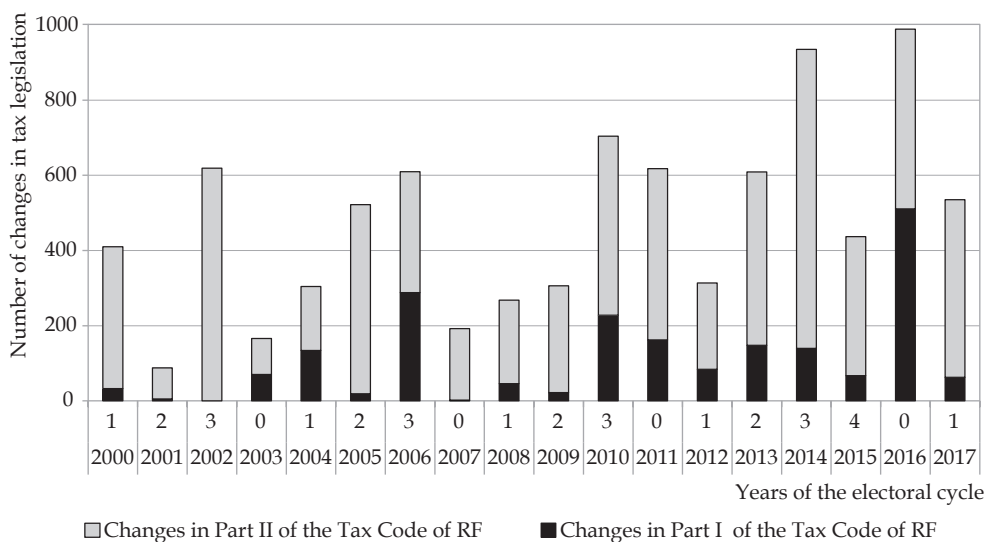


Figure 6. Dynamics of legislative changes in the tax system of the Russian Federation and elections to the State Duma

The figure clearly shows a decrease in legislative activity in relation to the number of changes in the electoral period. An analysis of these changes shows that in the first years of cycles the number of changes is less compared to the following years. The greatest number of changes is taken in the third year of the cycle. This dependence is manifested in the period of all analyzed cycles. Thus, the number of changes introduced was sharply reduced in 2003, 2007. A slight decrease can be noted in 2011. As for the last election period, the trend is not traced here. Supposing the elections did not move forward for a year and were held in 2015, then we would see a decrease in legislative activity again.

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6.2. Tax amnesty and elections

We are not going to consider the results and effectiveness of tax amnesties conducted. We proceed from the assumption that a tax amnesty may simply be a signal to the society or its individual groups and won't have a direct budgetary effect.

In the recent history of the Russian Federation, three announced tax amnesties have been carried out.

The first tax amnesty in 1993 was brought into compliance with the Presidential Decree No. 1773 "On the Tax Amnesty in 1993". According to the Decree, legal entities and individuals who declared before November 30, 1993 the amounts of previously unpaid taxes and transferred them to the budget, were

exempt from tax sanctions. In case of revealing companies' hidden income after this date, the bodies of the State Tax Service were obliged to collect fines from them in triplicate. During the period of the amnesty, about 2,000 individuals applied to the tax authorities.

The international experts B. Torgler and C. Schaltegger distinguish as a tax amnesty the exemption of certain organizations from tax debts [20]. From this point of view, the restructuring of arrears in taxes and fees, announced at the end of 1999 and conducted in 2000–2001 can also be attributed to a tax amnesty⁴. The amnesty was not of a total character. Decisions on the restructuring were made by the RF Ministry of Taxes and Tax Collection in the presence of an opinion on the solvency of economic entities of the Federal Service of Russia for financial recovery and bankruptcy, or by a territorial tax authority if the amount of the debt did not exceed 20 million rubles. The decision to restructure debts of organizations that are of strategic importance for the national security or of socio-economic importance was taken by the Government of the Russian Federation.

The next announced tax amnesty was held from March 1 to December 31, 2007⁵. In accordance with the law, individuals were asked to individually calculate the tax debt, based on the rate of 13 % of all income received before January 1, 2006. Curious can be called some results. The total income from payment of declarative payment amounted to 3, 6 billion rubles (considering the tax rate, the total amount of declared income was about 28 billion rubles). The income of declarative payment was formed mainly at the expense of two constituent entities of the Russian Federation: Moscow and the Chukotka Autonomous District, which provided 74 % of the total receipts of declarative

⁴ The procedure for restructuring the accounts payable of legal entities for taxes and dues, as well as arrears of accrued interest and penalties to the federal budget was approved by Resolution of the Government of the Russian Federation No. 1002 of September 3, 1999.

⁵ The federal law "On the simplified procedure for declaring income by individuals".

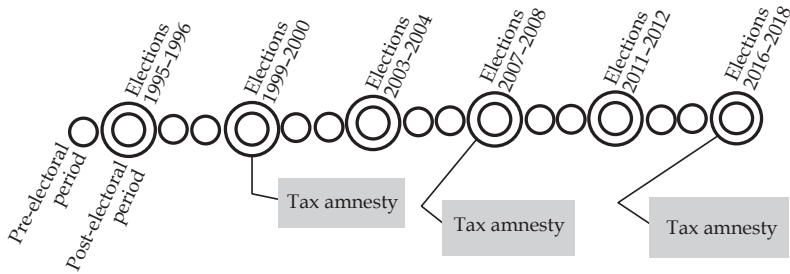


Figure 7. Tax amnesties and electoral cycles in Russia

payments (58 and 16 % respectively). It can be said that this amnesty also was not total and was used by certain individuals.

The third official tax amnesty was announced in 2017⁶. The amnesty should concern a large number of individuals for whom it is envisaged to write off tax debts formed on January 1, 2015 for property taxes (which include the transport tax, property tax of individuals and land tax). For individual entrepreneurs and individuals who were previously engaged in entrepreneurial activities, it is envisaged to write off tax debts and part of the arrears of insurance premiums.

So we can conclude that carrying out tax amnesties is unambiguously linked with the electoral process, and the moment of their implementation is confined to the elective period (see Figure 7).

7. Conclusions

As a result of the study of the relationship between tax reforms in Russia and electoral cycles, we consider the following points reasoned.

1. The relationship between tax reforms and electoral cycles in Russia is unambiguously present. The first two stages of tax reforms directly coincided with the electoral cycles. The third modern stage of tax reforms is implemented during several electoral cycles.

2. The intensity of the interrelationship between tax reforms and electoral cycles in

Russia depends on the nature of the election: interconnections are strengthened in the conduct of competitive elections and these relationships are weakened in the absence of significant competition in the elections. Accordingly, the higher the variability of electoral choice and the competitiveness of presidential elections, the more noticeable are quantitative changes in the sphere of taxation.

3. The electoral cycles for the elections to the State Duma of the Russian Federation have a stronger impact on tax reforms in Russia. The nominal tax burden on the economy is always reduced during the election period for elections to the State Duma of the Russian Federation. This means that the relevant changes in the legislation allow reducing the amount of taxes or, more simply, the State Duma passes laws in favor of taxpayers or their individual groups.

4. Electoral cycles for the election of the President of the Russian Federation have a less noticeable effect on tax reforms. During the presidential election, the effective rate of taxes on gross profit, as a rule, decreases. The effective tax rate for taxes on labor, most often, increased, as during the election periods for elections to the State Duma of the Russian Federation.

5. There is an increase in effective rates for profit, consumption and labor in the election year and next year of the electoral cycle. In the final years of the electoral cycle, there is a decrease in effective rates for profit, consumption and labor. Thus, the influence of electoral cycles on Russia's tax system is a cyclical increase in the tax burden on the main elements of GDP in the first years of cycles and the lowering

⁶ In accordance with the Order of the President of the Russian Federation, as well as Federal Law No. 436-FZ of December 28, 2017 "On Amending Part One and Two of the Tax Code of the Russian Federation and Certain Legislative Acts of the Russian Federation".

of the tax burden in the final years of electoral cycles.

6. The analysis of changes in tax legislation during the electoral cycles showed that legislative activity to reform the Russian tax system is not uniform throughout each cycle. In the first years of the cycle, the number of changes is less than in the subsequent years of this cycle. The greatest number of changes in the tax legislation is adopted in the third year of the cycle.

7. The analysis of the tax amnesties conducted in Russia has shown that amnesties are unambiguously linked to the electoral process and their conduct is confined to the elective period.

8. The analysis of the effective rates for labor, consumption and profit in the connection with electoral cycles allows to assume that after the presidential election in 2018 we should expect an increase in the tax burden on labor.

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3. В оригинальной научной статье необходимо упоминание не менее 25–40 источников, имеющих автора, в научном обзоре — 50–80, в том числе не менее 50 % источников на иностранном языке. Редакционная коллегия рекомендует цитировать статьи из журналов, которые индексируются в международных базах данных (Scopus, Web of Science).

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5. Самоцитирование автора допускается не более 20 % от количества источников в списке. Самоцитирование журнала (ссылки на статьи из данного журнала) не рекомендуется!!!

Пример оформления библиографических записей

1. Статьи в журналах:

Pimenov N. A. Fiscal risks in the system of tax security of businesses and State. *Nalogy = Taxes*, 2010, no. 4, pp. 10–13. (In Russ.).

Slemrod J. Lessons for Tax Policy in the Great Recession. *National Tax Journal*, 2009, vol. LXII, no. 3, pp. 387–397. Available at: http://webuser.bus.umich.edu/jslemrod/Great_Recession.pdf.

Jensen O. W. Transfer Pricing and output decisions: the dynamic interaction. *Decision Sciences*, 1986, vol. 17, pp. 428–436.

Börner K., Klavans R., Patek M., Zoss A. M., Biberstine J. R., Light R. P., Larivière V., Boyack K. W. Design and update of a classification system: The UCSD map of science. *PloS one*, 2012, vol. 7, no. 7, pp. 1–10. DOI: 10.1371/journal.pone.0039464.

2. Статьи из сборников научных трудов и материалов конференции:

Reingold I. I. The financial policy of NEP. In Sokolnikov G. Ya. (ed.) *Osnovy finansovoi sistemy SSSR* [Fundamentals of the financial system of the USSR]. Moscow, Gosfinizdat Publ., 1930, pp. 56–61. (In Russ.).

Atkinson A. B. Horizontal Equity and the Distribution of Tax Burden. In Aaron H., Boskin M. (eds.) *The Economics of Taxation*. Washington DC, Brookings Institution, 1980, pp. 3–18.

Börner K., Boyack K. W., Milojević S., Morris S. An introduction to modeling science: Basic model types, key definitions, and a general framework for the comparison of process models. In Scharnhorst A., Börner K., & van den Besselaar P. (eds.) *Models of Science Dynamics, Encounters Between Complexity Theory and Information Sciences*. Berlin, Springer, 2012, pp. 3–22.

Val'den P. I. The development of chemistry in Russia. *Dnevnik Vtorogo mende-leevskogo s'ezda po obshchei i prikladnoi khimii i fizike*. Saint

Petersburg, 21–28 dekabrya 1911 g. [The Diary of Second Mendeleev Congress on General and Applied Chemistry and Physics. Saint Petersburg, December 21–28, 1911]. Saint Petersburg, 2011, no. 1, pp. 124–141. (In Russ.).

3. *Монографии, учебники, учебные пособия:*

Kormishkina L. A., Koroleva L. P. *Finansovaya bezopasnost* [Financial security]. Saransk, The National research Mordovia State University Publ., 2016, 200 p.

James S., Sawyer A., Budak T. (eds). *The Complexity of Tax Simplification: Experiences From Around the World*. London, Palgrave Macmillan, 2016. 273 p.

Taleb Nassim Nicholas. *The Black Swan. The Impact of the Highly Improbable*. Random House, 2007. 400 p. (Russ. ed.: Taleb Nassim Nikolas. *Chernyi lebed'*. Pod znakom nepredskazuemosti. Moscow, KoLibri Publ., 2009. 528 p.).

4. *Диссертации, авторефераты диссертаций:*

Gombozhapova S. V. *Sovershenstvovanie nalogovogo kontrolya s uchetom istoricheskogo opyta*. Kand. Diss. [Improving tax control in context of historical experience. Cand. Diss.]. Irkutsk, 2012. 241 p.

Urban I. *Redistributive effects of direct taxes and social benefits in Croatia*. Doct. Diss. Slovenia, 2010. 199 p.

5. *Электронные ресурсы, в которых указан автор материала:*

Ivanov A. *Krepkii rubl' i deshevye kredity. Naskol'ko deistvenny predlozheniya Sergeya Glaz'eva* [Strong ruble and cheap loans. How effective are the proposals of Sergei Glazyev]. Available at: <http://svpressa.ru/economy/article/156619/>. (In Russ.).

Feldstein Martin. *The Case for Fiscal Stimulus*. Available at: <https://www.project-syndicate.org/print/the-case-for-fiscal-stimulus>.

Предоставление сведений об авторе (ах) статьи

1. В статье в информации об авторах на русском и английском языках указываются следующие данные:

- фамилию, имя, отчество (полностью);
- ученую степень, ученое звание (полностью);
- занимаемую должность;
- рабочее подразделение (кафедра, факультет, институт и др.);
- место работы в соответствии с официальным названием организации;
- почтовый индекс организации — места работы (с указанием почтового индекса);

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2. Дополнительно указывается информация, которая служит для связи с автором и в журнале не публикуется:

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3. Фамилия и имя на английском языке указываются автором в соответствии с их написанием в ORCID или ранее опубликованным в зарубежных изданиях, входящих в международные базы данных (Scopus, Web of Science), либо указанным в заграничном паспорте.

Publication requirements for articles submitted to Journal of Tax Reform

The requirements for the structure and content of the article

1. The article submitted for publication must contain novelty, must be an independent, complete and internally united research work on a current issue, related to tax reform at international and national levels.
2. The article should be structurally divided into sections with headings, reflecting:
 - relevance of the research;
 - background of a problem;
 - proposed research methods and their originality;
 - analysis of the study findings;
 - main conclusions, the results of the research and further discussion of them, or the problem solution.
3. The article should contain illustration material, showing the results of the research.

Format requirements

1. The manuscript files in Microsoft Word format should be converted to .docx. files
2. Technical format of the article has to comply with the following requirements:
 - the page size – A4;
 - font – Times New Roman; main text – 14-point, supplementary text (abstract, keywords, tables, figures, references) – 12-point;
 - line spacing – 1,0;
 - fit to the width;
 - indent – 1,25;
 - margins – 2.0 cm on all sides;
 - page numbers - at the bottom of the page;
3. Article should be 18–25 pages.
4. The article has to contain the following components drawn up in accordance with the journal's requirements (see the sample):
 - UDC code;
 - JEL classification;
 - title of the article in Russian and English;
 - information about the author given both in Russian and English;
 - abstract in Russian and English;
 - 5–10 key words in Russian and English;
 - the highlights of the article reflecting the key results of the study, theses of the article's main content, in the form of 3–5 items of the bulleted list;
 - the list of references;
 - the article should have reference notes given in square brackets provided according to the references.
5. All the elements listed in Sec. 4, indicated first in original language of the article, then in the subsidiary language (articles in Russian - first in Russian and then in English, and in articles in the English- first in English, and then in Russian).

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An Abstract is a source of information on your paper's content and findings.

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 - provides information on your paper and makes it unnecessary to read its full text version if it is of secondary interest to a reader;
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 - concise (**between 200 and 250 words**).
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 - research methods/methodology;
 - results observed;
 - the sphere of results application;
 - conclusions drawn from your study.
 - the object, topic and purpose of the research (if they are not clear from the title of the paper);
 - the research methods/methodology if they are original or of interest for this particular research. For papers concerned with experimental work describe your data sources and data process technique;
 - the results of research should be described as precisely and informatively as possible. Include your key theoretical and experimental results, factual information, revealed interconnections and patterns. Give special priority to new results and long-term impact data, important discoveries and verified findings that contradict previous theories as well as data that you think have practical value.
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 - conclusions could be associated with recommendations, estimations, suggestions, hypotheses described in the paper.
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1. Keywords encapsulate the principal topics of the paper. These keywords will be used for indexing purposes as a guide to search the articles in electronic databases, therefore, they should reflect area of science in which the article was written, the subject, the purpose and object of research
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 - avoid general and plural terms and multiple concepts (avoid, for example, "and", "of").
 - be sparing with abbreviations: only abbreviations firmly established in the field may be eligible. These keywords will be used for indexing purposes.
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2. To associate the list of references with the text of the article, you should include a reference as a number (running number of the source from the list) and also the page number in square brackets: [5, c. 115].

3. In the original scientific paper must be not less than 25–40 references, in the scientific review – 50–80 references. The Editorial Board recommends to cite papers indexing in international databases (Scopus, Web of Science).

4. The electronic sources without an author, statistic and regulation materials should not be included in the list of reference, but preferably set as a footnotes at the end of the page.

5. Author's self-citations should not exceed 20 % of the number of sources in the list of references.

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1. The information about the authors in Russian and English indicates the following data:

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- organization address (including postcode);
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