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Pandemics and Tax Innovations: What can we Learn from History?

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ABSTRACT
In this article, we shall see how pandemics of deadly diseases have changed tax systems over the past two millennia, each time leading to the emergence of new forms of taxation and tax administration. The purpose of the article is to prove that pandemics and the most notable innovations in tax policy are closely interrelated and that the consequences of the largest pandemics in the history of mankind are new approaches to the organization of national tax systems as well as the formation of interstate tax regulation. The lessons from history can be applied to the current corona crisis and may help us devise the appropriate anti-crisis tax policy. The study is based on the historical empirical-inductive method applied to reliable facts of the past related to pandemics and taxation. We trace the evolution of tax policy under the impact of the most significant pandemics and identify patterns of taxation and tax administration that are specific to their eras and are still relevant in the course of the pandemic COVID-19. Our analysis allows us to draw the following conclusions: (1) There is a historical link between pandemics and tax regulation. Many tax innovations originated in response to the consequences of large-scale epidemics of deadly diseases. (2) Many of the tax incentive tools used today in the fight against the corona crisis have already been used during previous pandemics so that we may learn from the experience of earlier times. (3) The COVID-19 pandemic can be expected to have several important consequences for taxation and public finance: innovations in tax administration with an emphasis on remote fiscal audits and digital control; innovations in the taxation of digital companies and their operations at the national and international level; possibly fundamental changes in the tax system of the European Union; and possibly a return of the inflation tax.

KEYWORDS
history of taxation, pandemics, tax administration, tax innovations, tax policy, tax system

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Пандемии и налоговые инновации: чему нас учит история?

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АННОТАЦИЯ
В предлагаемой статье мы выявим воздействие пандемий смертельных болезней на модификацию налоговых систем на протяжении двух последних тысячелетий, что приводило к появлению прогрессивных форм налогообложения и налогового администрирования. Цель статьи – доказать, что пандемии

и самые заметные инновации в налоговой политике тесно взаимосвязаны и что последствием самых масштабных пандемий в истории человечества стали новые подходы в организации национальных налоговых систем, а также становление межгосударственного налогового регулирования. Уроки истории могут оказаться полезными в условиях преодоления последствий коронакризиса начала 2020-х гг., помогая разрабатывать соответствующую антикризисную налоговую политику. Исследование основано на историческом эмпирически-индуктивном методе, примененном в отношении достоверных фактов прошлого, связанных с пандемиями и налогообложением. Сравнительный метод осмысления исторических событий позволил авторам сопоставить последствия эволюции налоговой политики под влиянием воздействия наиболее масштабных пандемий инфекционных заболеваний, а также выявить закономерности налогообложения и налогового администрирования, характерные для соответствующих исторических эпох и по-прежнему актуальные в ходе пандемии COVID-19. Проделанный авторами анализ позволяет сделать следующие выводы: (1) существует историческая связь между пандемиями и налоговым регулированием: многие налоговые инновации возникли в ответ на последствия масштабных эпидемий смертельно опасных заболеваний; (2) значительная часть инструментов налогового стимулирования экономики, применяемых в ходе антикризисного регулирования в период пандемии COVID-19, уже использовалась ранее, во время предыдущих пандемий, что позволяет учитывать соответствующие исторические уроки; (3) можно ожидать, что пандемия коронавируса SARS-CoV-2 будет иметь несколько важных последствий для налогообложения и государственных финансов: инновации в налоговом администрировании с акцентом на дистанционный финансовый аудит и цифровой контроль; инновации в налогообложении цифровых компаний и их операций на национальном и международном уровнях; вероятные фундаментальные изменения в налоговой системе Европейского союза; и, возможно, возврат в мировую практику инфляционного налога.

КЛЮЧЕВЫЕ СЛОВА
история налогообложения, пандемии, налоговое администрирование, налоговые инновации, налоговая политика, налоговая система

1. Introduction

In 2020, the global economy was hit by the pandemic caused by the virus SARS-CoV-2 and the severe infectious disease COVID-19 it causes. This kind of external shock has been almost forgotten during the past century but, in the previous history of mankind, often played a major role in social and economic development. Estimated consequences of the coronavirus pandemic paint a pessimistic picture for the world economy, predicting a long-term economic crisis caused by the disruption of global production, standstill in business activity, falling incomes and demand, and mass unemployment. In such circumstances, the first blow was taken by public finances: many national governments initiated large-scale monetary and fiscal stimulation programs for their economies. As of July 2020, these packages amounted to a total of $28 trillion (more than 30% of global GDP)[1]. Moreover, considerable changes are expected in taxation systems. It is necessary, firstly, to create fiscal incentives in order to stimulate economic activity and, secondly, to raise revenue in order to reduce the huge public deficits which have been and still will be incurred and the level of public debt, which is increasingly becoming unsustainable. Therefore, taxation will be an important tool of anti-crisis policy.

Pandemics should not be thought of only in the negative light. Despite and, often, because of their large-scale impact on human health, they led to major technological, social and economic changes that were conducive to progress and deve-

[1] Global Economic Effects of COVID-19. *Federation of American Scientists* (FAS). 2020. July 24. Available at: https://fas.org/sgp/crs/row/R46270.pdf

lopment, both socially and economically. Post-pandemic society very often went through transformations and institutional changes which proved to be beneficial in the long term. In particular, pandemics led to the emergence of new forms of taxation and improvement of tax administration, as a scientific approach towards taxation and tax systems was adopted.

In this article, we will analyze how pandemics have influenced tax policy for two millennia, each time leading to the emergence of new forms of taxation and new ways of tax administration. We will show that global pandemics and important innovations in tax policy are closely linked. We put forward the hypothesis that new approaches to taxation and tax administration were among the consequences of the most serious pandemics in human history. These historical lessons may be helpful for economic policy-makers during the current crisis and thus contribute to restoring economic and fiscal stability.

The structure and logic of the paper will correspond to the historical sequence of the known pandemics, which we will evaluate in terms of their consequences for taxation and tax systems. We will cover the time from antiquity, the Middle Ages and modern period right up to the present. Our focus in terms of geography will be on Europe. It should be noted that in what follows we will use the term "taxation" in a wide sense – comprising the imposition not only of taxes in the narrow sense of the word but of all compulsory levies, i.e. contributions and fees. Our analysis of published sources on the research topic shows that the hypothesis of the article is original and has not yet been sufficiently covered by the relevant publications.

2. Literature review

In our research we used both historical and modern sources that allow us to analyze the relationship between the evolution of taxation and the occurrence of the most serious pandemics. We will turn to publications about the corresponding epochs, in particular, the works of Bonvech [1], Grant [2], Kovalev [3], Selunskaya [4], Voigtländer and Voth [5]. Economic development and taxation in a historical context are discussed by Adams [6], Golubtsov [7], Kucherov [8], Lanin [9], Maddison [10], Mayburov and Leontieva [11], Pochinok [12], Schanz [13], Scheidel [14], Schmelzing [15], Tanzi [16], Vinnitsky [17] and Wagner [18]. Some interesting ideas for improving tax administration were proposed by Becher [19], Boisguilbert [20] and De Vauban [21].

The first scientific concept of taxation that was influenced by a pandemic was William Petty's "A Treatise of Taxes and Contributions" [22]. In his "Political arithmetic" [23], Petty also provided a methodological framework to evaluate tax collections in a post-pandemic economy. The theory behind inflation (or coin debasement) as a fiscal instrument was expounded first by Oresmius [24], then by Copernicus [25]. The role of the plague in the development of modern institutions is analyzed by Acemoglu and Robinson [26]. In addition, the demographic and economic consequences of the Black Death are discussed by Clark [27; 28]. An interesting publication about the role of pandemics in the process of economic modernization was presented by Scherbak [29], after the emergence of the COVID-19.

For medical characteristics of pandemics, we drew upon Byrne [30], Dunkan-Jones [31], Horrox [32], Littman [33], Mihel [34], Sokolova [35], Supotnitskii and Supotnitskaja [36]. The influence of religion on the reaction to epidemics and on taxation is discussed by Bulst [37], Lo-zinskij [38], Lvova and Pokrovskaya [39] and Vereshchagin [40]. Some of the consequences of the most famous pandemics, such as the Black Death, for national taxation are mentioned by Beresford [41], Falkovsky [42] and Goldberg [43]. The consequences of pandemics for the development of medical legislation were explained by Pechnikova [44], who focused on the case of Russia.

In addition, we use current publications from the World Bank, World Trade Organization (WTO), International Labor Organization (ILO), International Monetary Fund (IMF), Organization for Economic Cooperation and Development

(OECD), UNIDO (United Nations Industrial Development Organization), European Economic Advisory Group [45] as well as a number of other historical, legal and technical sources.

Putting aside the medical aspects of the pandemics as well as the social, political and technological processes of each historical epoch in question, we systematize the most valuable concepts for our study in Table 1. This table focuses on the historical and current tax research that confirm our hypothesis.

However, the available research literature does not explicitly discuss the relationship between pandemics and the evolution of taxation. In our paper we intend to fill this research gap, continuing the research done by one of the authors and presented in [46; 47]. As we will show, pandemics trigger significant changes in the sphere of public finance. Their connection to state revenues, in particular tax revenues, is obvious. Indeed, pandemics have contributed to significant innovations in taxation: this historical legacy of pandemics in public finance continues to this day. We can expect some innovative changes in taxation in the current context of the COVID-19 pandemic in 2020 as well as in the post-coronavirus world.

3. Methodology

Our analysis is based on the historical, empirical-inductive method. We consider the historical facts related to pandemics and taxation to find out whether there are any patterns in the impact that different pandemics had on taxation. This will enable us to clarify the relationship between pandemics and the development of taxation and thus to identify general tendencies in the evolution of taxation and tax administration.

Looking at how tax policies developed, we will be able to use reflexive approach for assessing modifications that current tax policies require. Critical thinking based on historical facts and the modern interpretation thereof will help us understand the innovations of today and tomorrow. Thus we will get answers to questions about possible law-like patterns in the development of tax systems under the influence of turbulent events triggered by pandemics, not only for the past but also, thanks to the reconstructive approach, for the present and future.

Table 1

Studies of the impact of pandemics on the evolution of taxation and tax administration

Author(s) and years	Summary
Nicolaus Oresmius (1373), Nicolaus Copernicus (1522), William Petty (1662)	"Inflation tax" and the law of coin spoilage in the post-pandemic period: justification, analysis, and criticism
William Petty (1662, 1690)	Theoretical principles of taxation and tax administration as a response to pandemic impact on the national economy
Adolf Wagner (1876), Vito Tanzi (2011)	Growth trend in the public sector of the economy due to increased public spending on social needs (including state health insurance for employees to cover pandemic risks)
Georg von Schanz (1892)	Basic principles of international taxation, whose development was influenced by pandemics
Charles Adams (1993), Alexander Pochinok (2015, mortem)	Historical approach to the development of tax systems: pandemics are discussed in the context of historical events that influenced the formation of taxation and tax administration
Angus Maddison (2007)	Historical approach to the development of macroeconomics: formation of tax theories in the context of historical events, including pandemics
Daron Acemoglu and James Robinson (2012)	Institutional approach to assessing economic development, including the role of tax institutions formed as a result of the impact of pandemics
Walter Scheidel (2017), Paul Schmelzing (2020)	Growth of the tax base in a post-pandemic period

Compiled by the authors.

We will analyze written and electronic sources of information, selected and systematized on the basis of their connection with tax theory and policy as well as the history of pandemics.

We are going to compare historical and recent events to reveal the consequences of the evolution of tax policy under the influence of various calamitous events, identifying patterns characteristic of the corresponding time periods. We are also going to use such general theoretical methods as analysis, synthesis, classification, generalization and analogy. This will help us find common patterns and draw conclusions about the transformation of tax regulation. We will focus on the specifics of the development of tax regulation not only at the national level, but also consider peculiarities of intergovernmental interactions in the tax field.

4. Pandemics and the evolution of taxation: chronology and main tax innovations

According to historical records, there have been several large-scale pandemics in the history of mankind (i.e. pandemics with more than one million casualties). Most of these pandemics, especially those of the antiquity, Middle Ages, and modern period (listed in Table 2 in chronological order), have left significant technological, political, economic, and social footprints. Pandemics, despite their deadly nature, often accelerated development by giving rise to new technologies, new institutions, and new forms of government. In addition, for effective governments' response to pandemics, innovative scientific approaches to public administration and public finance became more and more adopted from the beginning of modernity. Without exception, all major pandemics of the past have left their mark on taxation and tax administration, ushering in innovative tax policies and new tax systems in their respective historical eras.

Examples of the role of pandemics in the evolution of taxation are given in Table 3. It should be noted that, in recent times, only the coronavirus SARS-CoV-2 pandemic can be expected to noticeably influence taxation and tax administration. All the other recent pandemics were either too short-lived (e.g., Asian flu) or affected only a very small part of the population (e.g., AIDS), so that economies were not disrupted by them and changes in taxation were not necessary. It is different with the coronavirus pandemic, however. In this case, the serious and far-reaching economic and social effects of the pandemic are comparable to such terrible pandemics of the past as the plague or the Spanish flu. Therefore, the coronavirus pandemic will probably give rise to changes in taxation comparable to those of the major pandemics of earlier times.

Table 2

Major pandemics and their description

Historical period	Pandemics description
Antiquity	Antonine Plague (Plague of Galen): 2nd century (165–180)
Middle Ages	Plague of Justinian: 6th – 8th century (541–750) Medieval plague (Black Death): 14th century (1331–1353)
Modern period	Great Plague: 17th – early 18th century (1600–1714) Pandemics of the 19th and the first half of the 20th century: – first cholera pandemic (1817–1824); – second cholera pandemic (1826–1837); – third cholera pandemic (1852–1860); – third plague pandemic (1882–1927); – Russian flu pandemic (1889–1890); – Spanish flu (H1N1) pandemic (1918–1920)
Post-World-War-II period	– Asian flu (H2N2) pandemic: 1957–1958; – Hong Kong flu (H3N2) pandemic: 1968–1970; – swine flu (H1N1) pandemic: 2009–2010; – AIDS/HIV pandemic: since 1980; – coronavirus (SARS-CoV-2) pandemic: since the beginning of 2020

Compiled by the authors by using https://en.wikipedia.org/wiki/List_of_epidemics

Table 3

Pandemics and the evolution of taxation in human history

Pandemics, period	Death cases (estimates)	Technological, political and structural changes	Economic and social consequences of pandemics	Tax innovations related to pandemics
Antonine Plague (Plague of Galen), 165–180	7–10 million	Crisis of slave economy, expansion of foreign trade, development of crafts, formation of the territorial structure of the state, development of the law	Weakening of the Roman Empire: severe financial crisis, assimilation of barbarian tribes, spiritual decline, strengthening of monotheistic religions (in particular, Christianity)	Beginning of **fiscal centralization** (financial links between the center and territories through taxation system), **legal foundation of taxation** originated in the Roman law, **introduction of an "inflation tax"**
Plague of Justinian, 541–750	More than 150 million	Expansion of foreign trade, strengthening of state religion (Christianity)	Decline of the Byzantine economy (devastation of cities and the countryside), collapse of the Roman Empire, demographic crisis in the Mediterranean, birth of Islam	**Church taxes** imposed on a pro-rata income basis (forerunners of income taxation); Islamic model of taxation
Medieval plague (Black Death), 1331–1353	200 million	Shortage of labor, increase in the cost of labor, long wars (to finance wars, a high fiscal was imposed)	Shortage of labor resources, redistribution of land, increasing consumption of luxury goods and strong liquors, increasing influence of the Catholic Church	**Personalization of taxes** (poll tax, luxury tax), centralization of administration of Church tithes, tax incentives for foreign trade, excise taxes on strong liquors
Great Plague, 17th to the early 18th century	1,3 million	Self-government of cities, birth of demography and financial accounting as the scientific basis for assessing income	Growth of handicrafts and trade, acceleration of urbanization and monetary circulation, mass migrations	Development of tax theories (W. Petty), **centralization of tax collection systems on a scientific basis**, introduction of health care contributions, **analysis of the "inflation tax"**
Pandemics of 19th and the first part of 20th century (cholera, smallpox, plague, flu)	More than 60 million	Industrial revolution, abolition of slavery, multiple wars, conflicts, revolts and revolutions	Mass production, industrialization and construction of large-scale infrastructure, urbanization, creation of public health systems	**Contributions and quasi-taxes (because of the social responsibility of business) to finance medicine and health care**, including anti-epidemic measures
COVID-19 pandemic (started in 2020)	More than 1 million (as of beginning of October 2020)	New technological structure (digitalization, robotics and automation, artificial intelligence); aggravation of geopolitical contradictions and conflicts; trade, currency and technology wars; increase in income inequality	"Great Lockdown": decline of economic activity, disruption of global production systems and transport links, decline of trade and tourism, cancellation of cultural and sports events, social distancing, economic egoism, digital surveillance; crisis of public health care; rising public expenditures, declining tax revenues, high budget deficits and government debts	**Digitalization of taxes and tax control** (remote tax audits, introduction of tax ratings of citizens, changes in taxation of income of digital companies, digital service tax), growth of tax transparency of domestic and international operations, **growth of international tax cooperation**

Compiled by the authors.

In order to speculate about these changes, it is necessary to establish the mechanisms which link pandemics with taxation and tax systems. We will try to deduce these mechanisms by analyzing the consequences of earlier pandemics in the chronological order already used in Table 2.

It is important to note that pandemics have long-term consequences for taxation, regardless of the motivation and the intention behind the changes in tax policy at the time of their implementation. Unfortunately, for a long time the previous experience of relevant tax changes under the influence of pandemics was simply ignored. We believe that the time has come to make use of this experience, and a scientific basis we outlined will help to overcome the negative consequences of the current corona crisis.

5. The pandemic of antiquity: fiscal Centralization and the legal foundations of modern taxation

The first pandemic described in historical records was ***the Antonine Plague*** (165–180 AD), which happened during the reign of the last of the "five good Roman emperors" – the stoic philosopher Marcus Aurelius (reigned in 161–180). The second name of this pandemic is the Plague of Galen, after the Roman physician and philosopher Claudius Galen, who described its symptomatic manifestations. Perhaps, in reality, this pandemic was not really a plague but a pandemic caused by the smallpox or measles virus. In any case, it was the most serious outbreak of disease in Roman times, both in terms of the human lives lost and its socio-economic impact [33].

The Antonine Plague broke out at the beginning of the crisis of the slave economy which was gradually replaced by crafts and manufacturing. In addition, in that period, the Roman Empire was characterized by the expansion of foreign trade with surrounding territories, and its political organization can be called a "territorial state", a kind of conglomerate of various cities, regions and tribes, often at different levels of development, but governed from the center – Rome. The spread of the disease was facilitated by the war between the Romans and the Parthians over Armenia [3, p. 603].

The main consequence of the Antonine Plague was a significant decrease in the number of inhabitants of the Empire; modern historians estimate the population loss at seven to ten million people, about a third of the pre-pandemic population [31; 33]. A financial crisis followed this depopulation, because public revenue fell far behind public expenditure; more and more barbarians from the North of Europe settled in the Roman empire; religious doubts in the face of the catastrophic pandemic led to a decline of traditional religion and morals. All of these developments contributed to the weakening of the Roman Empire and were the first steps towards its final collapse a few centuries later.

Interestingly, Marcus Aurelius, in contrast to his predecessors, was very averse to raising taxes because he considered high tax burdens to be very harmful. Therefore, he tried to fight the fiscal crisis not by raising taxes, but by selling off a lot of his personal property to cover at least a part of the shortfall in revenue and by reducing government expenditure [6, pp. 107–109]. Perhaps this was the first attempt in history to overcome the crisis of public finances not by increasing tax revenues but by selling public (or semi-public) property in order to keep the tax burden at moderate levels and not to overtax the population that suffered great losses of income and property.

His son Commodus (reigned in 180–192), whom Marcus Aurelius named his successor, not only abandoned the moderation and thoughtfulness shown by his father but, more importantly, failed to reinvigorate social and economic life in Rome after the pandemic. This led not only to the secession of provinces from the Empire but also to riots and conspiracies due to the increase of the tax burden. As a result of one of those plots, Commodus was killed. Under Emperor Septimius Severus (reigned in 193–211), thanks to centralization and reorganization, Rome

began to recover from the consequences of the Antonine Plague [3, p. 608].

The period following Severus' rule was characterized by the decline of the Roman tax system and a significant depreciation of money (due to the decrease in the silver content of the denarius). This practice at first enabled the government to raise more revenues but, in the end, it failed when the denarius became almost worthless and taxes had to be collected not in money, but in kind, such as clothes or weapons [12, p. 23]. It was only during the reign of the Emperor Diocletian (284–305), a century after the end of the pandemic, that the disastrous effects of this "inflation tax" could be overcome; furthermore, the centralization of Rome's finances was then completed, including the reorganization of tax collection [6, pp. 113–118].

We can describe the influence of the Antonine Plague on taxation in the Roman Empire as follows. By the time the largest pandemic of ancient times began, the "Imperial system" of tax collection had already been established. This system turned out to be superior to the system of Republican times. The establishment of fixed contributions and customs duties meant that Imperial officials exerted less fiscal pressure on the provinces than the Republican magistrates of former times who had much more discretion and often used it to plunder the provinces [3, pp. 559–560]. The financial transformation under Diocletian after the end of the pandemic led to the unified collection of taxes in the provinces under the control and according to the interests of Rome. From the modern point of view, this system can be considered a prototype of fiscal centralization, i.e. the concentration of both the spending and the taxing authority in the center of power: Rome. The centralized system of direct collection of taxes from the provinces was controlled by Imperial procurators [3, p. 571]. In addition, since the time of Septimius Severus, a legal framework was established for taxation and tax administration in the form of well-developed Roman law, both conceptually and practically. In particular, important contributions were made by the outstanding lawyers Papinian (Aemilius Papinianus) and Ulpian (Gnaeus Domitius Annius Ulpianus), who systematized and built on executive and legal practices and principles formed in earlier times [2].

The Antonine Plague gave rise to several important tax innovations that have survived to the present era. Firstly, it was fiscal centralization in taxation, which became the basis for the architecture of most modern tax systems. Secondly, the codification of tax rules in the form of Roman law. The tax legislation in a significant number of countries, including Germany and Russia, was built upon this foundation. Thirdly, the concept of a comprehensive public finance reform, which aims not only at taxes but also at public expenditure and public property, was pioneered by the philosopher-emperor Marcus Aurelius. Last but not least, it was in the aftermath of the Antonine Plague that the most conspicuous case of coin debasement occurred, one of the earliest examples of the use of the "inflation tax". It should be noted that the adjustments to tax policy under the influence of the Antonine Plague were carried out more or less intuitively, without developing any systematic approach. Nonetheless, changes in public policy made by Marcus Aurelius and aimed at matching government spending to the ability to raise revenue in critical circumstances were repeatedly copied in the anti-crisis policies of later epochs.

6. Pandemics in the Middle Ages: church tithes, centralization of tax administration and personalization of taxes

The largest pandemics of the Middle Ages were the Plague of Justinian (541–750) and the Medieval plague or Black Death (1331–1353). Both of these pandemics, like the Antonine Plague that preceded them, had a noticeable impact on European development and on the development of tax institutions.

The Plague of Justinian, a period of devastation that spanned two centuries between the sixth and eighth centuries (the so-called "dark age" of the Middle

Ages), is named after the Byzantine Emperor Justinian I the Great (reigned from 527 to 565), who tried to restore the Roman Empire[2]. It is estimated that the number of victims of the pandemic in its first 50 years in Europe (the so-called "first coming") amounted to up to 100 million lives [36]; in total it is supposed to have killed more than 150 million people[3]. The pandemic began when what we would today call globalization was at its highest in the territories of the former Roman Empire: The Middle East, North Africa and Southern Europe were being integrated into the Byzantine Empire. It is believed that the main reason for the spread of the plague was foreign trade. The deadly disease was transmitted through rodents by way of grain shipments from Egypt to Europe and the Middle East[4]. The demographic catastrophe in the Mediterranean with its huge population losses and the devastation of cities and rural areas was a major cause of the decline of the Byzantine economy, which put an end to the prospects of revival of the Roman Empire.

The Plague of Justinian, which began at the time of the establishment of Christianity as the state religion in Byzantium[5], led to significant changes in social behavior. Due to Church teachings, the inhabitants of the Empire acquired a sense of common guilt and sin, characteristic of early Christianity. At the same time as Byzantium became Christian and as the Mediterranean region was devastated by the plague, a new religion began its triumphant ascent – Islam, which was established in the final period of the pandemic (7th and 8th century). Islam, and with it Arab influence, expanded in the Mediterranean (including North Africa and Spain), Central Asia, and the Middle East, and Arab-Muslim culture flourished after 750 AD.

The Plague of Justinian left its mark on the history of taxation in at least three ways. Firstly, the Emperor Justinian, continuing to wage war during the plague, increased the tax pressure on his citizens, forcing the living to pay not only their own taxes but also those of their dead neighbors. Excessive taxation is considered by some historians to be one of the most important reasons for the decline of the Byzantine Empire and for the appeal of Islam [6, pp. 131–132]: the Muslim conquerors were perceived by the enslaved inhabitants of the former Roman world as liberators, in particular from excessive taxation [6, pp. 133–136]. Not only was Islam more tolerant of other religious denominations than Christianity, it also pursued a tolerant and pragmatic approach towards taxation. In general, tax rates were moderate, the tax burden was distributed fairly, and tax collection was less corrupt [39, pp. 33–35]. The Roman poll taxes were imposed only on non-Muslims, which attracted many people into the fold of Islam [10, pp. 298–299].

Secondly, in some cases, Justinian applied a perfectly reasonable anti-crisis tax policy, trying to use tax incentives to solve the economic problems caused by the pandemic. Thus, Venice[6] in 551 received from Justinian its first "bulla" – a reduction in taxes on foreign trade operations (the Byzantine duties on trade amounted to 10–12.5%) [12, p. 59]. This played an im-

[2] In 330, the Roman Emperor Constantine I the Great officially moved the capital of the Roman Empire to the ancient Greek city of Byzantium, which became Constantinople.

[3] Schegolev I. A terrible epidemic, tamed by man. *Rossijskaya gazeta*. 2015. January 2. (In Russ.) Available at: https://rg.ru/2015/01/02/pandemia-site.html

[4] Smirnov S. Plague, inflation, and income growth: how epidemics changed the world economy. *The Bell*. 2020. February 5. (In Russ.) Available at: https://thebell.io/chuma-inflyatsiya-rost-dohodov-kak-epidemii-menyali-mirovuyu-ekonomiku

[5] During the reign of Justinian the Great, paganism was finally abolished in the Byzantine Empire: All pagans and their family members were forcibly baptized, and Christianity was codified by the introduction of appropriate titles (sections) in the Code of Justinian (see *Digests of Justinian*. Book 1. Titles I, VIII. (In Russ.) Available at: http://www.vostlit.info/Texts/Dokumenty/Byzanz/VI/520-540/Digestae_Just/).

[6] Venice, like many medieval European cities, suffered from the Plague of Justinian. It is in 543 that the dark history of the "Plague Island" of Poveglia begins. On this quarantined island in the Venetian lagoon, numerous victims of the plague found their last resting place.

portant role in the establishment and development of Venice as one of the centers of Mediterranean trade. In contrast, when, beginning in 1324, the citizens of Venice who engaged in trade and commerce were subjected to high taxes, the end of Venice as a prosperous state was approaching fast [26, pp. 152–156]. The stimulating role of reducing indirect taxes on foreign trade operations is a lesson of the Plague of Justinian worth remembering. In subsequent pandemics, this policy was repeated – however, without referring to historical precedent and analyzing the positive effects this policy had had in earlier times.

Thirdly, the pandemic made the Church pay more attention to its finances. In Byzantium there was a so-called "tithe" – a tax applied to certain types of income, including that from trade, and in proportion to the amount of the respective incomes. However, it was not regulated by Roman law in any way, despite the rather detailed Digests of Justinian[7] [9]. At the same time, the Church, whose influence was increasing, was interested in permanent sources of income that would be assigned to it by law. Since, on the one hand, the pandemic helped to strengthen faith in God and, on the other, it involved the Church in the care for the sick and in other kinds of charity[8], it was clearly the right time to expand and to stabilize the financial basis of the Church. The Synods of Tours (567) and Mâcon (585) commanded the faithful to pay Church tithes, first as an appropriate gesture of goodwill, and then as a Christian duty. Later, in 779, king Charlemagne of the Franks made Church tithes a mandatory tax[9]. From a modern point of view, Church tithes can be considered as a precursor to income taxation.

Therefore, they represent the really innovative element of the changes in taxation during the period of the Justinian plague. In addition, the Church tithe as such continues to be relevant even today; for example, in Germany, it is levied on Church members in the form of a surcharge on the income tax.

The Medieval plague or Black Death (epidemiologists call it the bubonic plague), which occurred at the beginning of the "little ice age" in the 14th century, was the most devastating pandemic in terms of the number of victims. Europe lost at least a third of its population only in the period from 1347 to 1352. According to various estimates, the region's losses ranged from 25 to almost 50 million people [30, p. 45]. The maximum number of fatalities from the Black Death in Eurasia over the entire period of its spread may have reached 200 million[10]; the mortality rate was 80–90% [32, p. 2]. There were two main reasons for the spread of the plague: the development of trade between Europe and Asia and military conflicts. The accepted theory is that the disease was brought to Europe by Genoese traders after the siege of the fortress of Kaffa (modern Feodosia in Crimea) by the Tatars under the leadership of Khan Janybek [36]. The pandemic developed against the background of famines which resulted both from crop failures due to the cooling during the "little ice age" and from the Hundred Years' War between England and France (1337–1453).

In contrast to previous pandemics, the Black Death caused an economic shock that in the end completely transformed European society and economy – and thus laid the foundation for the rise of Europe in the following centuries [5]. The immediate effect of the plague was the depopulation of vast parts of Europe. On the one hand, this led to a crisis in the feudal economy which was based on agricultural serfdom: land was redistributed among

[7] *Digests of Justinian*. (In Russ.) Available at: https://www.gumer.info/bibliotek_Buks/Pravo/digest/01.php

[8] In particular, in 651 (just at the time of the Plague of Justinian), the Hôtel-Dieu de Paris (Parisian Asylum of God) was founded under the patronage of the Catholic Church. It is the oldest hospital in the world still active and it is still located opposite Notre-Dame Cathedral. Once it had a special isolation ward for plague patients.

[9] Tithe. In: *The Encyclopaedic Dictionary of Brockhaus and Efron*. (In Russ.) Available at: https://rus-brokgauz-efron.slovaronline.com/43294-%D0%94%D0%B5%D1%81%D1%8F%D1%82%D0%B8%D0%BD%D0%B0

[10] Majzul's M. History of Plague. *Arzamas*. 2020. April 29. (In Russ.) Available at: https://arzamas.academy/mag/823-plague

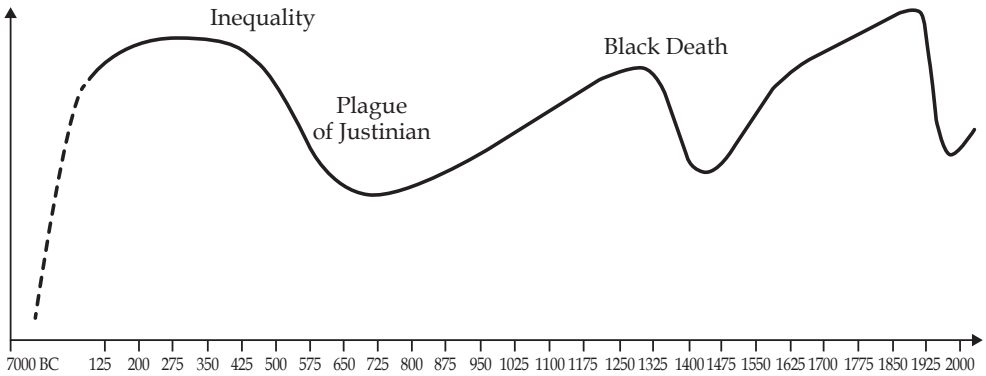

Figure 1. **Dynamics of inequality in Europe on a broad historical scale**

Source: [14, p. 32]

the survivors, and serfs became free agricultural workers, tenants or even land owners. On the other hand, there was a shortage of labor which gave rise to the improvement of the economic position of labor relative to the owners of capital and land [14, pp. 99–100]. Wages increased considerably, which at first caused the income disparity to narrow and then gave an impetus to the mechanization of agriculture and to technological progress in general[11]. Walter Scheidel's estimates of the development of income equalization during the Plague of Justinian and the Black Death are shown in Fig. 1 [14, p. 32].

Figure 2, which is based on studies of income diffusion by Paul Schmelzing [15] from the 14th century to the present day, shows that the leading European countries – Italy, England, Germany and France – in the post-pandemic period (late 14th – late 15th centuries) significantly increased their share in advanced economy real GDP, thanks to the new economic structure and development institutions adapted to the consequences of the Black Death. It is clear that the Black Death drastically expanded the tax base, contributing to income growth in the historical development period that followed the pandemic.

But there were also more indirect and longer lasting consequences: higher wages meant that income did not have to be spent only on food and other essential goods but that part of it could be used to buy "luxury goods". The crafts and the arts profited from this increase in demand and the towns and the cities grew where the craftsmen and the artisans were living and working. Higher incomes and urbanization had two important consequences for taxation: the tax base grew and tax administration became easier[12].

"After the plague, incomes per capita were higher; there was more surplus above subsistence that could be expropriated. As a result of the so-called 'commercial revolution' of the late Middle Ages, the economy had already become more urban, monetized and commercialized. Surpluses could be taxed more easily, providing the means for fighting more, and fighting longer" [5, pp. 781–782].

Thus, in fact, a self-propagating process was started: higher tax revenue could be used to wage more and longer wars which caused still more deaths (not only in battle but also because the plague was spread by wars) which, in turn, led to still higher wages, higher consumption and more urbanization.

[11] Smirnov S. Plague, inflation, and income growth: how epidemics changed the world economy. *The Bell*. 2020. February 5. (In Russ.) Available at: https://thebell.io/chuma-inflyatsiya-rost-dohodov-kak-epidemii-menyali-mirovuyu-ekonomiku

[12] Piper N. Die Ökonomie des Todes. *Süddeutsche Zeitung*. 2020. 10. April. Available at: https://www.sueddeutsche.de/wirtschaft/pest-coronavirus-wirtschaft-1.4873813

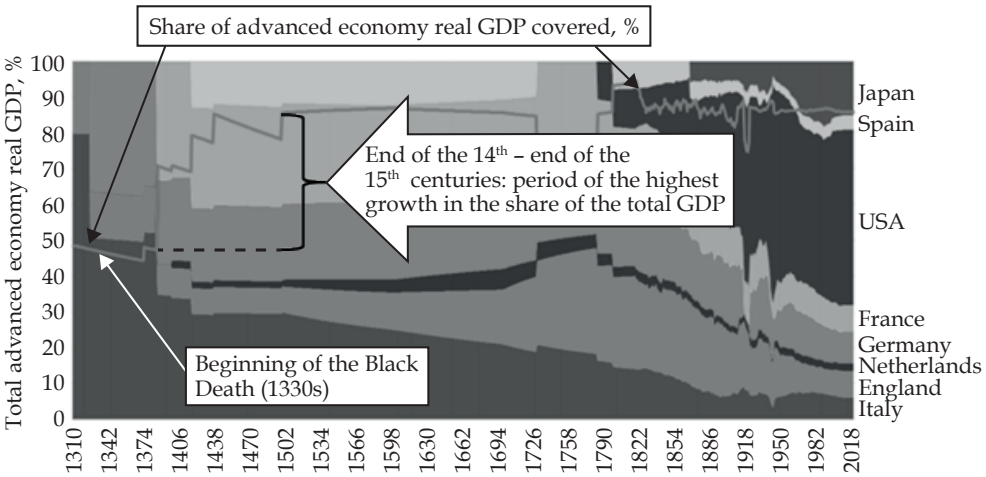

Figure 2. **GDP weights and the share of total advanced economy real GDP covered by the world's leading countries (estimated by the market value of national currency exchange rates): dynamics of the 14th – 21st centuries**

Source: [15, p. 4]

The economic consequences were accompanied by social ones. The attitude to consumption changed significantly. The awareness of the impermanence of existence led to a desire to maximize the enjoyment of life and even encouraged wasteful consumption [15, p. 71]. On the other hand, the influence of the Church on the faithful grew. Thus, in the most famous work of fiction about the plague – the "Decamerone" by Giovanni Boccaccio, which describes the sad events in Florence in 1348, one of the causes of the deadly disease is called the "righteous wrath of God". In fact, Pope Clement VI, in a message dated September 26, 1348, called the plague the judgment of God and a disease with which God struck the Christian people for their sins [37, p. 155]. The desire to atone for that sinfulness explains the emphasis on social justice and social responsibility: Charity and material sacrifices for the benefit of the sick and the poor, but also asceticism, were important phenomena in the late Middle Ages – in contrast and in opposition to hedonism and luxury [14, pp. 99–101]. In order to rein in the latter tendencies, sumptuary laws were passed on a large scale in Europe in the 14th and 15th century [15, p. 71].

In our opinion, there were several changes in taxation closely related to the Black Death and its aftermath:

1. In the affected regions, tax incentives for foreign trade were used on a large scale – both in the form of lower rates and in the form of tax harmonization. In 1356 in Lubeck the governing body of the Hanseatic League ("Hansetag", i.e. General Hanseatic Congress[13]) was formed[14]. The "Hanse" united the merchant guilds of 130 cities of the North Sea and the Baltic Sea region according to the principles of duty-free trade. In fact, the Hanse became the first private organisation in history which accorded its members most-favored-nation (or, rather, "-member") treatment in the form of tax exemptions in each of the member cities [1]. The growth of trade became one of the drivers of the economy in the late Middle Ages. The duty-free union of merchant cities of the Hanse can be seen, from a modern point

[13] The Hansetag met every two or three years and determined the general policy of the Hanseatic League. The decisions of the Hansetag were binding for all members of the Hanseatic League.

[14] Hansa, Hanseatic League. In: *Encyclopedia of World History*. (In Russ.) Available at: https://w.histrf.ru/articles/article/show/ganza_ganzieiskii_soiuz_niem_hanse

of view, as a kind of corporate code of honour in taxation. It also can be considered an early precursor of tax harmonization in Europe, which began only in the second half of the 20th century, when duties were unified.

2. Different types of luxury taxes were levied on a permanent basis in many regions. For example, in Italian cities after the Black Death pandemic both sumptuary laws and luxury tax laws were passed [4, p. 62]. Thus, wasteful and ostentatious consumption led to higher taxes on luxury goods.

3. In 1377 in England the poll tax was introduced, a precursor of personal taxes (such as the individual income tax) [41; 43]. It was intended to help to stabilize public finances during the Hundred Years' War with France. In order to exploit the growth of income of the population as simply as possible, the new tax base "heads of taxpayers" was used [12, p. 105]. However, the poll tax proved to be unsuccessful, causing numerous protests, including the large-scale peasant revolt of Wat Tyler (1381).

4. For the first time after the Roman Empire, tax administration was centralized in the part of Europe dominated by the Catholic Church. The core of its fiscal apparatus was the Apostolic Chamber. This institution managed the collection of Church taxes not only in the Papal State but also in all the administrative provinces of the Church and from the monastic orders [40]. The Apostolic Chamber was the largest and most advanced fiscal institution of the Middle Ages, its tasks and its powers were codified soon after the end of the plague pandemic – in the constitutions of Popes Urban V and Urban VI (in 1363 and 1379, respectively). However, in terms of revenue, the Apostolic Chamber did not work very successfully. After the death of Urban VI, the Papal Treasury was empty and it had to be replenished with bank loans, mortgages of jewelry (left from Urban VI himself), "jubilee fees", increased sales of benefices and the introduction of "annates" on a permanent basis ("annates" are the first year's profits of a benefice, to be paid to the Pope) [38]. For modern tax policy, interstate centralization of tax administration during the Black Death pandemic – notwithstanding its rather poor results – is important as the very first historical example of interstate tax coordination, which was tried again only in the 20th century.

5. Finally, another consequence of the Black Death was the imposition of taxes on alcoholic beverages. In the pandemic of the 14th century strong liquors became popular because people began to drink them heavily for "prevention" of infection and also to forget about the fatal disease [36]. Both the excessive consumption of alcohol (the so-called "feast during the plague") and the extravagance associated with luxurious consumption during the pandemic subsequently gave rise to the introduction of the respective excise taxes.

Innovations in taxation and tax administration that were closely related to the Black Death pandemic were the following: tax incentives for foreign trade; personal taxes in the form of the poll tax; taxes on alcohol and luxury goods (which can be interpreted as the first manifestation of the principles of social justice and social responsibility in taxation); and tax harmonization and interstate centralization of tax administration. These tax innovations remain relevant to this day.

7. Pandemics of the modern period: social policy, modern medicine and a scientific approach to taxation

Although there was a fairly large number of different pandemics in the modern period, it is the Great Plague of the 17th and early 18th century and the pandemics of the 19th and early 20th century (cholera, smallpox, plague and influenza) that are of interest in the context of taxation. In this historical era, both taxation and tax administration were based on scientific principles, and the church was replaced by modern medicine as the main institution for healing and caring for the sick. In contrast to the church, medical science went beyond the cure of diseases and worked hard on disease prevention, a task intimately related to epidemiology, which then came into being, too.

The Great Plague, which took place from the middle of the 17th to the beginning of the 18th century, was the deadliest in cities. In 1654, a major outbreak of plague happened in Moscow; in 1655, in Kazan; and in 1663 it hit Amsterdam and Rotterdam. In 1665 and 1666, London suffered from the plague (it was here that the epidemic received the name "Great Plague"), which claimed the lives of 70 to 100 thousand Londoners[15]. In 1678 and 1679, the Great Plague engulfed Vienna; 80 thousand inhabitants died of it; in memory of the struggle against the deadly disease, the famous Plague Column was erected in the city center in 1693. In 1681 the plague reached Prague; from 1708 to 1714, it spread across Northern Europe (in Danzig and the cities of East Prussia, such as Königsberg, it broke out in 1709 and 1710). Kiev was affected in 1710 and 1711, Marseille in 1720–1722.

Despite its awful name, the Great Plague did not take as many lives (less than 1.5 million) as the previous pandemics. However, its toll was great in cities which, having resurged after the Black Death, were overcrowded and where living conditions were insanitary. As the pandemics of times past, this one occurred against the background of long-distance trade, geopolitical conflicts and wars; but the Great Plague was also accompanied by urbanization and the development of urban self-government.

The population decline during the Great Plaque, as in times past, led to a shortage of labor, a decline in production and, thus, lower public revenues. As many European states waged wars of one kind or another (the Russian-Polish war, 1654–1667; the English civil war, 1640–1660; and the Great Northern war, 1700–1721), governments were preoccupied with raising money and improving their finances.

For the first time in world history, governments could enlist the help of science: New disciplines like economics (in the form of mercantilism), demography and "political arithmetic" (the precursor of econometrics) came into being. Thus, taxation no longer needed to be done (more or less) intuitively, but could rely on scientific expertise. It was during this period that tax science was born: William Petty (1623–1687), who was a physician in Cromwell's army and studied the effects of the plague in Ireland, published "A Treatise of Taxes and Contributions" [22]. This treatise had a significant long-term impact on the principles of taxation and tax policy in Great Britain and beyond [10, pp. 255–256]. Furthermore, his was also the first quantitative study of the economy [23], which showed how to get and how to use economic data for purposes of taxation. Consequently, tax censuses, trade statistics, systems of national accounts, and demographic statistics became the quantitative foundation of tax policy.

It is interesting to note the relations between different scientific approaches. Petty taught at Gresham College in London, founded in 1579 on a grant from the banker and Royal tax collector Thomas Gresham (1519–1579). To the latter the law is often ascribed, according to which "bad" money displaces "good" money from circulation. This pattern was first noticed by the scholastic Nicolaus Oresmius (1323–1382) [24]. "Bad" money results from the debasement of coins, i.e. the decrease of their silver (or gold) content. It occurred in Rome after the Antonine Plague (see sec. 4); it also was observed by the astronomer Nicolaus Copernicus (1473–1543) in the lands of the Teutonic Order after the plague of 1519 [25]. Debasement of coins represents a kind of indirect tax: it allows the government to mint more coins, which increases the money supply, which in turn leads to inflation. In effect, part of the purchasing power of the citizens is being transferred to the state. This kind of "inflation tax" was also discussed (and criticized) by Petty [22, pp. 65–71].

John Graunt (1620–1674), the first demographer and a close friend of Petty's, also made important contributions to developing "political arithmetic". He ana-

[15] Majzul's M. History of Plague. *Arzamas*. 2020. April 29. (In Russ.) Available at: https://arzamas.academy/mag/823-plague

lyzed the causes of death of Londoners during the Great Plague, estimated the probability of survival and life expectancy and, in turn, the number of taxpayers in the future [10, pp. 256–258]. In addition, Gregory King (1648–1712) and Charles Davenant (1656–1714) also did work in this field. Thanks to their development of methods for assessing income ("field tax audits") and forecasting tax revenues, England by the end of the 17th century had a quite sophisticated system of tax administration, based on scientific principles. Thus, in the modern period, tax theory and tax practice were adapted to the blows of the Great Plague which, once again, negatively affected the size of the population and the economy.

It should be noted that centralization of tax administration with the aim to improve the efficiency of tax collection also happened in France at the turn of the 17th to the 18th century. Here, authors like Pierre Le Pesan, sieur de Boisguilbert (1646–1714) and Sébastien Le Prestre de Vauban (1633–1707) tried to put taxation on a scientific footing [10, pp. 284–287]. Boisguilbert criticized the French tax system, which he regarded as highly inefficient and extremely inequitable [20]. The arguments of Boisguilbert inspired de Vauban, a famous military engineer, to write "The Royal Tithe" (*Le Dîme Royal*) [21], where he argued for a radical reform of the complicated system of taxation in France. The centerpiece of his proposal was a general income tax without exceptions. This proposal owed a lot to the success of his earlier proposal for a temporary wartime tax. This was a mixture between a poll tax and an income tax: all taxpayers were assigned to one of 22 social classes which served as proxies for income. All members of one class paid the same tax, but taxes were graduated between classes according to their members' typical level of income. Unfortunately, the new reform proposals were not accepted by the "sun king" Louis XIV, who, instead of a general income tax, introduced a poll tax – without, however, the key feature of graduation, characteristic of the earlier wartime tax.

The above-mentioned trends could also be observed in Russia. Here, between 1653 and 1667, customs duties were unified in the New Trade Charter [12, p. 155]. In 1654 the Accounting Affairs Chamber was created to analyze revenues and expenditures of the Muscovite state. Finally, in 1679, a city household tax (a tax on households of city residents) was introduced [7]; it had city residents' households as a tax base, which was simple to assess. Later, during the reign of Emperor Peter I in the mid-1720s, the poll tax was introduced in Russia, following the example of other countries, especially that of France [12, p. 233].

In Germany, Johann Joachim Becher (1635–1682) discussed, inter alia, the effect of taxes on the growth of population and on economic activity [19]. However, the potential for a tax reform aiming at rationalization and unification was extremely limited in Germany, because Germany was then not a nation state but a hodgepodge of many independent kingdoms, duchies, counties and cities.

Public revenue consists not only of taxes but also of contributions and fees. During the Great Plague several European cities levied special "anti-pandemic" contributions which they used to finance anti-epidemic measures, such as the installation of sewers and the improvement of cleanliness in general. This was seen as a social responsibility of citizens. For example, London parishes collected contributions from residents to pay for the inspectors who were to supervise anti-pandemic measures [35, p. 84]. This is probably the first attempt in the history of taxation to finance anti-epidemic measures with contributions. In other European cities, similar measures were carried out; often, they were covered from the revenue from contributions or fees imposed for this very purpose. For instance, in Moscow, in the 16th century, after the deadly pandemics, *Zemsky prikaz*[16] collected special bridge tolls for street improvement. After the

[16] This is the name of the central government institution responsible for the administration of Moscow and some other Russian cities from the 16th to the 18th century.

plague of 1654 and 1655, Russian authorities began paving city squares and streets to improve cleanliness [42].

Thus, the Great Plague was related to several important innovations in taxation. The tax system was rationalized and centralized according to the new theories of taxation, tax administration, statistics, accounting and demography, all of which had their origin in the late 17th and early 18th century. Moreover, the inflation tax, which already had been used in the context of previous pandemics, now was analyzed in greater detail. In addition, it should be noted that special contributions for anti-epidemic measures were introduced, which might be interpreted as the precursors of social security contributions.

The pandemics of the 19th and the early 20th century include several waves of various deadly diseases – cholera, smallpox, plague and flu. Some of them, like the outbreaks of cholera, were local and could be contained quickly, while others, like the infamous Spanish flu, claimed up to 100 million lives[17]. All these pandemics occurred in the context of rapid industrialization and economic expansion, of social and political revolutions, of large-scale wars and urbanization. Numerous military conflicts of this era and the growing concentration of the population in cities, together with insufficient sanitation and hygiene, contributed to the development of pandemics.

For the evolution of taxation and tax administration, the pandemics of the 19th and early 20th century were also quite important. They led to structural changes in tax systems, as opposed to the unsystematic imposition of special taxes or other levies to cover the cost of pandemics on a case-by-case basis. These structural changes include the introduction of contributions for health care, which were an equivalent of today's social security contributions. Furthermore, due to the growing awareness of their social obligations, the business and the political establishment in some countries took over (more or less voluntarily) the responsibility to establish hospitals and infirmaries.

In particular, Russia was at the forefront of promoting health insurance and charitable health care. Firstly, public hospitals were established under the patronage of members of high society and industrial tycoons. In 1805, with support from the Dowager Empress Maria Feodorovna, the Mariinsky hospital was opened in St.Petersburg, which ever since has played an important role in the fight against epidemics. Count Nicholas Sheremetiev, at his own expense, built the Hospice for Travellers (opened in 1810), one of the best private hospitals in Moscow. Now it is the Research Institute of Emergency Medicine named after N. Sklifosovsky. The Sheremetiev family spent 6 million rubles on the maintenance of the clinic during the first century of its existence. In the 19th century, the hospital provided medical care for 2 million patients free of charge[18]. From 1833 to 1835, the Peter and Paul Hospital (now a part of the First State Medical University named after Ivan Pavlov) was built in St. Petersburg from the donations of Emperor Nicholas I. The hospital has been involved in the treatment of all epidemics and pandemics from the 19th century until today. Nicholas I personally inspected the new buildings of the hospital where cholera patients were treated in the 1830s and 1840s. In 1900, Merchant of the 1st Guild Vikula Morozov initiated the construction of a new children's hospital for infectious diseases in Moscow. Now it is the Morozov City Children's Clinical Hospital of the Russian capital.

Secondly, at the expense of commercial and non-commercial public organizations, a mass program of vaccination against smallpox was carried out. This campaign was organized by specially cre-

[17] Schegolev I. A terrible epidemic, tamed by man. *Rossijskaya gazeta*. 2015. January 2. (In Russ.) Available at: https://rg.ru/2015/01/02/pandemia-site.html. It should be noted that even the losses from the First World War (approximately 18 million victims, including those who died of war-related famines and diseases) were smaller than those from the Spanish flu pandemic.

[18] *Research Institute of Emergency Medicine named after N. Sklifosovsky*. Available at: https://sklif.mos.ru/about/history.php

ated smallpox committees under the patronage of the Imperial Humane Society and with the participation of the Ministry of Internal Affairs and the Free Economic Society[19]. Moreover, anti-plague measures and vaccines were developed, and technologies for disinfecting drinking water were introduced. Especially noteworthy is the effectiveness of the Commission on Measures to Prevent and Combat Plague Infection (Komochum), established in 1897 under the chairmanship of Prince Alexander von Oldenburg, and the development of an anti-plague serum at the St. Petersburg Institute of Experimental Medicine [34, pp. 145–146].

Thirdly, to prevent the spread of cholera epidemics, the Regulations of the Cabinet of Ministers on the Organization of Hospital Treatment for Factory Workers (1866), required large manufacturers to maintain in their firms at least one hospital bed per one hundred employees. After 1867, seven major industrial centers of the Russian Empire (St. Petersburg, Moscow, Odessa, Ivanovo-Voznesensk, Lodz, Kharkiv and Warsaw) began to levy contributions to fund city hospitals[20].

Fourthly and finally, in 1912, the Third State Duma (Parliament) of the Russian Empire adopted the Law on Hospital Insurance Funds, which stipulated the establishment of insurance schemes for workers. Every firm had to set up a fund to cover the costs of medical treatment and sick pay; the funds came from the contributions from both workers and employers; smaller firms could co-operate and establish common funds[21]. Thus, after originating in specific cities in the 1860s, public health care was finally established nation-wide.

All of these measures were instrumental in reducing significantly the health risks of industrialization and urbanization, which included the danger of pandemics. The hospital infrastructure created in the Russian Empire during the fight against the cholera and plague in the 19th century was in high demand not only during the Spanish flu pandemic in the early 20th century, but is now still being used to treat patients suffering from COVID-19. Our review of medical regulations and tax support of medicine to prevent epidemics in the Russian Empire in the 19th – early 20th centuries is given in Table 4.

In our opinion, personal experience of the country's rulers was of great importance for the development of a national strategy to fight infectious diseases. In 1831, the participation of Tsar Nicholas I (reigned from 1825 to 1855) in the suppression of the cholera riot on Sennaya Square in St. Petersburg left an indelible impression on him. One year later, in 1832, new rules and statutes were written into the Code of Laws of the Russian Empire to provide for the funding of public health care. In 1836 the Statute on Quarantines was adopted and in 1842 the Statute on Sanitary Police was passed [44]. Detailed rules on quarantines and sanitary inspections, vaccinations against smallpox[22], construction of cholera hospitals, getting business to contribute to the financing of public health care – all of this would not have worked without the country's lea-ders' personal involvement and their understanding of the dangers of epidemics for socio-economic development.

The situation in Germany was similar to that of Russia in that it also suffered from numerous epidemics in the 19th century. These provided one of the

[19] *The Code of Laws of the Russian Empire, compiled by the order of the Emperor Nicholas I*. The edition of 1857. Vol. 13. Charters About the national foodstuffs, Public assistance and Medical. St. Petersburg; 1857. (In Russ.) Available at: https://runivers.ru/bookreader/book388226/#page/1/mode/1up

[20] Gorfin D. Factory medicine. In: *The big medical encyclopedia*. Moscow: Sovetskaya entsiklopediya; 1928. Vol. 10, pp. 645–648. (In Russ.)

[21] Tsvetkov A. How factory workers were treated in the Russian Empire. *Solidarnost*. 2012. Oktober 3. (In Russ.) Available at: https://www.solidarnost.org/thems/uroki-istorii/uroki-istorii_9263.html

[22] *The Code of Laws of the Russian Empire, compiled by the order of the Emperor Nicholas I*. The edition of 1857. Vol. 13. Charters About the national foodstuffs, Public assistance and Medical. St. Petersburg; 1857. (In Russ.) Available at: https://runivers.ru/bookreader/book388226/#page/1/mode/1up

Table 4

Medical regulations and tax support of medicine to prevent epidemics in the Russian Empire in the 19th – early 20th centuries

Years	Regulation and tax initiatives and their description
1832–1842	**Medical regulations of Nicholas I** (See: The Code of Laws of the Russian Empire, compiled by the order of the Emperor Nicholas I. The edition of 1857. Vol. 13. Charters About the national foodstuffs, Public assistance and Medical. St. Petersburg; 1857 (In Russ.)). Detailed characteristics of anti-epidemic and quarantine measures. Vaccination against smallpox at the state expense from the Ministry of Internal Affairs and the Free Economic Society. The fee for being in quarantine is charged if the observed have the appropriate funds, the poor are not charged. Payment for medical services is made by mutual agreement between the doctor (hospital) and the patient, the poor receive medical care in city hospitals or almshouses.
1864	**Alexander II's land reform (Zemstvo reform).** Local self-government bodies (zemstvos) were granted the right to organize medical and, consequently, medicinal assistance to the population of the territories under their jurisdiction with funds from local taxes and fees. Zemstvo medicine mainly served the Empire's rural population.
1866	**Establishing of the factory medicine by the order of the Committee of Ministers approved by Alexander II on August 28, 1866** (See: About the organization at factories and factories in the Moscow province of hospital rooms // Collection of laws and orders of the government, published under the Government Senate. 1887. SPb.: Publishing house of the government Senate, 1887. First six months. No. 12. Art. 126. P. 212 (In Russ.)). The document was adopted as a temporary measure in the face of the threat of a cholera epidemic. It did not become a permanent law and was not codified. This document obliged owners of industrial enterprises with at least 1,000 workers to open hospitals within a month at the rate of 1 bed per 100 people.
1870	**The urban reform: introduction of the system of state-funded (non-commercial) medicine. Public hospitals were built by using cities revenues.** Compared to zemstvos, city governments spent significantly less money on medical assistance to the population – on average, only about 5%, while zemstvos spent up to a third of their budgets. Only in Moscow, St. Petersburg, Riga, and Odessa, expenditures for medical and sanitary needs accounted for 15 to 20% of the city budget. In the 19-early 20th century in many cities of the Russian Empire, including Moscow and St. Petersburg, there was a so-called hospital fee for the maintenance of hospitals. In Moscow, this fee was collected from non-residents who came to work at the same time as obtaining a residence permit. Initially, the annual fee was 70 kopecks in silver per person, then the fee rose to one ruble, and since May 21, 1890 – one rouble and a quarter.
1912	**Laws "On the Establishment of Offices for Workers' Insurance", "On the Establishment of the Council for Workers' Insurance", "On the Provision of Workers in Case of Illness", " On Insurance of Workers from Accidents".** Hospital funds were established at all enterprises (small ones, up to 200 participants, were combined into general ones at several enterprises). All workers and employees with a period of employment of at least one week were required to join the hospital funds. Workers participating in the cash register were insured under the law not only against accidents, but also in case of illness. The owner of the enterprise was obliged to provide the first medical aid and outpatient treatment, as well as to provide or pay for hospital treatment and all medications (including women in labor) until recovery, but no more than 4 months. At the same time, patients were given a monetary allowance (from ½ to ⅔ earnings – having dependents, from ¼ to ½ earnings for the rest) from the fourth day of illness to recovery, but no longer than 26 weeks during one illness and no longer than 30 weeks during the year, and for temporary disability as a result of injury – from the moment of accident to recovery, but no longer than 13 weeks.

Compiled by the authors.

reasons for German Chancellor Otto von Bismarck (in office from 1871 to 1890) to introduce, in the 1880s, compulsory insurance for workers, organized and supervised by the state [16, pp. 114–116][23]. As the first element of this social security system, health insurance was established in 1883. Not coincidentally, the influential German economist Adolph Wagner (1835–1917), who was a strong supporter of Bismarck and his social security legislation, lived and worked for some years in Dorpat (then in Russia, now Tartu in Estonia), where he witnessed both the effects of the epidemics of the 1860s and the attempts of the Russians to improve public health and sanitation. In fact, he argued strongly in favor of the "welfare function" of the state in which he also included the prevention of infectious diseases and the care for sanitary living conditions [18, p. 257]. In order to finance these and other tasks, Wagner proposed a progressive income tax – one of the first economists to do so.

In this context, the development of the modern principles of taxation, in particular of income taxation, became important. The taxation of the income and of foreign citizens' property was especially controversial. Georg von Schanz (1853–1931) proposed the doctrine of "economic connectedness", according to which a state has the right to tax everybody who is in any way economically related to that state [13, p. 8]. Thus, it not only has the right to tax its own citizens but also the right to tax foreigners. Schanz came up with this idea just after the lethal Russian flu epidemic had spread in Germany (1889–1890). This might have inspired the following argument in favor of his doctrine: a foreign national can expect to receive medical care in the host country, including treatment for infectious diseases; therefore, the host country must have the right to tax income and property of foreigners who reside in this country. Subsequently, the two most important principles of international taxation – the source principle (withholding tax at the source of income generation) and the residence principle (taxing people in the country where they live) – were derived from the Schanz doctrine of "economic connectedness".

This period was also marked by the beginning of coordination of taxation at the interstate level due to the emerging problems of double taxation of income and property. Initially, this was due to the tax consequences of property transfers through inheritance [17, pp. 12–13], which occurred, in particular, after deaths from infectious diseases which were still widespread in the 19th and the early 20th century. After the end of the First World War, the first institution of international tax regulation emerged as a part of the League of Nations. Beginning in 1921, the Finance Committee of the League of Nations led the process of creating a system of legal regulation of international tax relations and developed measures aimed at eliminating double taxation of income and property [8, p. 13].

Thus, three major tax innovations can be interpreted as (at least, partly) the result of the pandemics of the 19th and the early 20th century: (1) private funding of medical research and health care through contributions of businesses that were voluntary only de jure and that therefore can be regarded as quasi-taxes; (2) the introduction of organized public health care, financed through compulsory social security contributions; (3) the development of international taxation principles and the creation of an institutional framework for the development of intergovernmental tax cooperation. Of course, the latter two innovations still retain their importance.

8. The COVID-19 pandemic of 2020: the digitalization of tax administration and the taxation of digital transactions

By the end of the 2010s, uncertainty and turbulence due to geopolitical conflicts and trade wars made themselves felt more and more. This could not but affect global development: by the end of 2019, production and trade slowed down

[23] There were also other reasons, of which the intention to make socialism less attractive for workers was the most important.

worldwide[24]. The beginning of the 2020s, however, turned out to be even worse than expected: the new type of coronavirus (SARS-CoV-2) that had appeared in China at the end of 2019 caused the global COVID-19 pandemic (the World Health Organization declared it as such on March 11, 2020), which triggered a major global economic crisis. The "Great Lockdown", as the IMF called it[25], brought the economies of many countries almost to a standstill and disrupted economic ties and glo-bal production systems; many jobs were lost; production, incomes and consumption went down; stock and commodity markets fell sharply; in a word, the world economy plunged into a catastrophe.

It is estimated that the fall in global GDP in 2020 will be close to 5%[26], the value of international trade will be reduced by almost a third[27], and up to 200 million jobs will be lost worldwide[28]. The strict quarantine measures introduced in March 2020 in Europe, North America and East Asia have interrupted not only global production systems, an important part of which is China, but also global tourism and transport[29]. According to IMF experts, the negative consequences of the Great Lockdown will significantly exceed the losses from the global financial crisis of 2008/2009[30]. It is obvious that the world economy needs massive support in order to get back on a growth trajectory.

As soon as the catastrophic consequences of the COVID-19 pandemic became obvious, proposals for changes in national tax systems were formulated at the level of international organizations. The OECD, the leading organization for international tax cooperation, has already recommended to reduce or eliminate taxes for the sectors of the economy most affected by the crisis[31].

Initially, the OECD planned for 2020 to be the key year for reforming income taxation of global high-tech companies that sell their services and digital products remotely[32]. According to the original plan, the countries affected were to submit, by the end of the year, proposals for the transition from taxation according to the principle of physical presence in the state ("nexus" rules) to taxation based on the sale of products in the country of consumption. Under current conditions, this

[24] *World Economic Outlook*. 2020. January. Tentative Stabilization, Sluggish Recovery? IMF. 2020. Available at: https://www.imf.org/en/Publications/WEO/Issues/2020/01/20/weo-update-january2020

[25] *World Economic Outlook*. The great lockdown. IMF. 2020. April. Available at: https://www.imf.org/en/Publications/WEO/Issues/2020/04/14/weo-april-2020

[26] *A Crisis Like No Other, An Uncertain Recovery*. IMF. 2020. June. Available at: https://www.imf.org/en/Publications/WEO/Issues/2020/06/24/WEOUpdateJune2020; Pandemic, Recession: The Global Economy in Crisis. *The World Bank*. 2020. June. Available at: https://openknowledge.worldbank.org/bitstream/handle/10986/33748/211553-Ch01.pdf

[27] Trade set to plunge as COVID-19 pandemic upends global economy. *WTO*. 2020. April 8. Available at: https://www.wto.org/english/news_e/pres20_e/pr855_e.htm

[28] *ILO Monitor: COVID-19 and the world of work*. 2nd ed. Updated estimates and analysis. 2020. 7 April. Available at: https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/documents/briefingnote/wcms_740877.pdf

[29] Seric A. et al. *Managing COVID-19: How the pandemic disrupts global value chains*. UNIDO's Department of Policy Research and Statistics. 2020. April. Available at: https://iap.unido.org/articles/managing-covid-19-how-pandemic-disrupts-global-value-chains

[30] Gopinath G. *The Great Lockdown: Worst Economic Downturn Since the Great Depression*. IMF Blog. 2020. April 14. Available at: https://blogs.imf.org/2020/04/14/ the-great-lockdown-worst-economic-downturn-since-the-great-depression/

[31] *Tax and Fiscal Policy in Response to the Coronavirus Crisis: Strengthening Confidence and Resilience*. OECD. 2020. May 19. Available at: https://read.oecd-ilibrary.org/view/?ref=128_128575-o6raktc0aa&title=Tax-and-Fiscal-Policy-in-Response-to-the-Coronavirus-Crisis

[32] *OECD leading multilateral efforts to address tax challenges from digitalisation of the economy*. OECD. 2019. October 9. Available at: https://www.oecd.org/tax/beps/oecd-leading-multilateral-efforts-to-address-tax-challenges-from-digitalisation-of-the-economy.htm; *Secretariat Proposal for a "Unified Approach" under Pillar One*. OECD. 9 October 2019 – 12 November 2019. Available at: https://www.oecd.org/tax/beps/public-consultation-document-secretariat-proposal-unified-approach-pillar-one.pdf

approach is becoming more important, as the business of leading cross-border online firms such as Netflix, Zoom or Amazon actually increased, while traditional suppliers of goods and services saw a sharp drop in income or even faced bankruptcy.

Most of the anti-crisis tax regulation measures proposed in the first half of 2020 are not new, they were already used during previous pandemics. The general characteristics of possible tax regulation measures applied both at the national and interstate levels in the context of the COVID-19 pandemic are presented in Table 5.

Currently, tax systems are expected to fulfill two obviously conflicting tasks: (1) stimulating production, investment and consumption to save and create jobs; and (2) raising revenue to cover the large budget deficits.

It is obvious that in the phase of economic downturn, tax incentives may help the economy recover. Nonetheless, the expenditure side of the public budget is more important. With jobs lost and production cut to the extent we observe today, the investment and consumption climate has suffered so badly that tax in-

Table 5

General characteristics of tax regulation measures applied in the context of the COVID-19 pandemic

Periods and their characteristics	Tax regulation measures: realized and desired
PRE-PANDEMIC SITUATION (until the beginning of 2020): slowing down the growth rate of the world economy and national economies as a result of geopolitical confrontations and trade wars	**Development of national and intergovernmental tax response measures to stimulate economic growth and increase tax transparency of operations:** ● modification of national tax systems (2017–2018 tax reform in the United States, sales tax reform in Japan in 2019, adjustment of VAT and excise tax rates in Russia in 2019); ● implementation of the BEPS Actions plan under the auspices of the G20 and the OECD (prevention of aggressive tax planning by multinational corporate structures); ● establishment of a framework for taxation of income from cross-border electronic transactions (OECD). **Using the previous experience of tax regulation in the context of crises and epidemics:** ● ***SARS epidemic of 2003:*** tax benefits for affected industries (passenger air transport, tourism sector in South-East Asia); ● ***The "Great Recession" of 2008–2009:*** tax incentives for development (reduction of income tax and VAT rates to support production and consumption growth) and increased tax collection to normalize the situation in public finances (increase of individual income tax rates for high incomes; increase of excise tax and VAT rates), fight against tax evasion and counteract tax optimization of companies and individuals both at the national and interstate level.
COVID-19 PANDEMIC (beginning – February–March 2020): sharp decline in economic activity in the global and national economies as a result of the «Great Lockdown»	**Stimulating tax support measures:** ● manufacturing activities; ● consumer demand (reduction in tax rates on consumption, including VAT, sales taxes and excise taxes); ● the most affected industries and sectors of the economy (transport and logistics; tourism and hospitality; retail; culture, sports and entertainment; public catering; education); ● small and medium-sized businesses; ● self-employed population. **Fiscal measures to increase tax revenues of the state budget:** ● increase of current tax rates and introduction of new taxes; ● waiving obligations under previously signed double tax agreements that included reduced tax rates for the repatriation of passive income (including dividends, interest, and royalties); ● increasing tax collection through stricter methods of controlling taxpayers' incomes, operations and properties (large-scale use of digital platforms for monitoring taxpayers' actions).

End of table 5

Periods and their characteristics	Tax regulation measures: realized and desired
POST-PANDEMIC RECOVERY: recovery growth of the world economy and national economies in the face of escalating budget deficits and public debt with the likelihood of continuing geopolitical conflicts and trade wars	**Creating tax incentives for recovery and investment activity in national economies:** ● reduction of income, property and consumption tax rates for the period when national economies enter the path of sustainable recovery growth; ● tax incentives (tax holidays) for startups, especially in small and medium-sized businesses; ● tax incentives for activities that create new jobs, especially for local residents in regions with mass unemployment; ● reduced taxation (or no taxation at all) for the self-employed population during the period of national economic recovery; ● tax incentives for foreign investors which create import-substituting industries or industries with local employment in depressed regions. **Introduction of tax incentives for the development of national health systems, including:** ● diagnostic, treatment, rehabilitation, research and educational medical organizations; ● manufacturers and suppliers of medical equipment and supplies used in healthcare; ● pharmaceutical companies in the supply of medicines and substances for their production under public procurement; ● construction of healthcare facilities and installation of medical equipment; ● medical personnel (increased tax deductions when buying or renting housing, compensation for the cost of using personal vehicles for official purposes, and so on); ● R&D in the field of medicine (accelerated depreciation of equipment, reduced taxation of grants for medical research). **Fiscal measures to increase tax revenues of the state budget:** ● increase in tax rates for the upper income ranges of financially secure individuals; ● continued digitalization of tax administration; ● continuing international tax cooperation to combat tax evasion and non-transparent tax optimization mechanisms. **Escalation of protective tax barriers as part of improving national economic security:** ● tax incentives for import-substituting industries (including a review of global production systems); ● no tax benefits for suppliers and investors from countries subject to restrictions

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centives alone will be of little help. Maybe they can slow the economic downturn but they will not be able to prevent it, let alone to reverse it. Firms need to be saved, the unemployed need to be helped, and health systems and medical research need to be supported – all of which is leading to an enormous increase in public expenses and, with tax revenue down at the same time, a virtual explosion of public debt. Table 6 shows the state of public finances in the leading countries of the world before the corona crisis and the preliminary forecasts for 2020 and 2021. As we can see, everywhere in the world public finances have suffered markedly. And these numbers do not even include the huge sums the EU has decided to spend on its corona recovery plan: € 750 billion will be raised on the capital market and allocated to the EU members according to how hard hit they were by the corona crisis – € 390 billion as grants, € 360 billion as loans[33]. For the first time in its history, the EU was empowered to take on debt for grants to member countries. Because all EU members will be liable for this debt according

[33] See, e.g.: https://www.consilium.europa.eu/en/policies/the-eu-budget/long-term-eu-budget-2021-2027/

to their shares in the EU budget, a big step has been made towards establishing a redistributive transfer system – something the richer EU members fought hard against hitherto.

As the world economy will, hopefully, recover and follow again a path of sustainable growth, it will become necessary, firstly, to deal with the negative consequences of the current crisis and, secondly, to prevent other pandemics from causing similar crises in the future. The second objective requires, on the one hand, public health systems to be overhauled radically and, on the other, the autonomy and resilience of national economies to be strengthened. In this context, both the stimulus and the fiscal role of taxes will be of great importance.

However, it is the fiscal function of taxes that will then be most important. When the economic situation will have normalized again, the ballooning budget deficits and public debts will have to be reined in again, because, after all, fiscal stability and budgetary prudence cannot be neglected for good. In order for the state to be able to fulfill its essential functions, a sound financial basis is necessary, which means adequate and stable tax revenues. Therefore, tax policy will have to find ways and means to improve the state of public finances again.

Even though the potential of taxation to overcome the crisis seems to be rather limited, there will be important consequences of the crisis for taxation.

1. *Changes in tax administration, with an emphasis on remote fiscal audits and digital control.* The coronavirus pandemic made it necessary to minimize social (or, rather, physical) contacts, a measure that had been used in one form or another during all previous pandemics. Reducing the number of tax audits and carrying them out remotely with the help of digital technology has already become common practice for many tax services. In addition, further progress is expected towards increasing transparency and control over tax compliance, which will make not only tax evasion significantly more difficult, but also tax avoidance (or tax optimization), which is in a kind of "grey zone".

Table 6

Indicators of economic growth and public finance state, 2018–2021 (IMF evaluation, June 2020)

	World Output, Year over Year (%)				Overall Fiscal Balance, % of GDP				Gross Debt, % of GDP			
			Projections				Projections				Projections	
	2018	2019	2020	2021	2018	2019	2020	2021	2018	2019	2020	2021
World	**3.6**	**2.9**	**–4.9**	**5.4**	**–3.1**	**–3.9**	**–13.9**	**–8.2**	**81.2**	**82.8**	**101.5**	**103.2**
Advanced Economies	**2.2**	**1.7**	**–8.0**	**4.8**	**–2.7**	**–3.3**	**–16.6**	**–8.3**	**104.0**	**105.2**	**131.2**	**132.3**
USA	2.9	2.3	–8.0	4.5	–5.8	–6.3	–23.8	–12.4	106.9	108.7	141.4	146.1
Euro Area	1.9	1.3	–10.2	6.0	–0.5	–0.6	–11.7	–5.3	85.8	84.1	105.1	103.0
Germany	1.5	0.6	–7.8	5.4	1.9	1,5	–10.7	–3.1	61.9	59.8	77.2	75.0
France	1.8	1.5	–12.5	7.3	–2.3	–3.0	–13.6	–7.1	98.1	98.1	125.7	123.8
Italy	0.8	0.3	–12.8	6.3	–2.2	–1.6	–12.7	–7.0	134.8	134.8	166.1	161.9
Spain	2.4	2.0	–12.8	6.3	–2.5	–2.8	–13.9	–8.3	97.6	95.5	123.8	124.1
Japan	0.3	0.7	–5.8	2.4	–2.5	–3.3	–14.7	–6.1	236.6	238.0	268.0	265.4
UK	1.3	1.4	–10.2	6.3	–2.2	–2.1	–12.7	–6.7	85.7	85.4	101.6	100.5
Emerging Market and Developing Economies	**4.5**	**3.7**	**–3.0**	**5.9**	**–3.8**	**–4.9**	**–10.6**	**–8.5**	**48.9**	**52.4**	**63.1**	**66.7**
China	6.7	6.1	1.0	8.2	–4.7	–6.3	–12.1	–10.7	47.0	52.0	64.1	70.7
India	6.1	4.2	–4.5	6.0	–6.3	–7.9	–12.1	–9.4	69.6	72.2	84.0	85.7
Russia	2.5	1.3	–6.6	4.1	2.9	1.9	–5.5	–3.9	13.5	13.9	18.5	18.8
Brazil	1.3	1.1	–9.1	3.6	–7.2	–6.0	–16.0	–5.9	87.1	89.5	102.3	100.6

Source: https://www.imf.org/~/media/Files/Publications/WEO/2020/Update/June/English/WEOENG202006.ashx?la=en

There is likelihood that things will even go further and the national tax services will learn from the experience of the People's Republic of China in creating special ratings of taxpayers as part of their Social Credit System [11]. Whether this would be acceptable or desirable from a political and legal point of view is a totally different question. Most countries of the world already have the appropriate technologies for digital tax administration and collection of data from citizens and companies; and digitalization, to which the COVID-19 pandemic gave an additional impetus, will increasingly influence the lives of taxpayers and tax authorities.

2. *Changes in taxation of digital companies and their operations at the national and international level.* At the end of the active phase of the COVID-19 pandemic, we can expect the implementation of the pre-crisis proposals of the OECD on the taxation of the digital presence of companies in the source country of their income. A number of countries around the world began to change their tax policies in this direction during the pandemic. In May 2020, the working group of the Federation Council of the Russian Federation on improving legislation in the context of the pandemic proposed to introduce a digital tax in Russia corresponding with the general guideline of the OECD[34]. The German government has not yet followed suit, but demands to that effect are being made by German politicians[35]. In addition, we can expect growing international cooperation on such matters as the exchange of information to prevent tax evasion, the development of tax coordination programs in economically integrated regions (especially in the European Union) as well as unification of taxation of income and sales from cross-border e-trade [46].

3. *New tax powers for the EU?* In the EU, consequences for taxation may go further still. The present system, in which the EU as such does not have any power to tax but relies on the contributions of its members, may seem inadequate: now that the EU has taken up so much debt, it may be thought necessary to provide it with the means to service that debt. To that end, new "European" taxes may be introduced, i.e. taxes that are levied by and whose revenue is due to the EU.

4. *A return of the inflation tax?* In addition, it seems possible that there may be another, deeply problematic, consequence of the corona crisis for taxation: as of today, nobody knows (or even cares) how to repay the enormous debts incurred by nations and supranational entities (such as the EU). If economic growth falls behind expectations or if a new crisis hits, politicians may be tempted to avoid high and unpopular taxes and to monetize the debts instead: they would have central banks take them over by expanding the money supply correspondingly. Inflation would result and the debts would thus be redeemed by an "inflation tax" [45, pp. 9–14]. Modern authorities would again use a kind of tax which was often used in history when regular tax sources had run dry or would have been too difficult to tap – in particular, after epidemics, as we have noted above.

9. Pandemics and taxation: Are there any regularities?

What insights have we gained from our journey through the history of pandemics and taxation? Are there any regularities? Of course, history does not repeat itself – at least, not exactly. Nonetheless, we can identify some common traits in the responses of tax authorities to pandemics.

1. Pandemics lead to improvements in tax administration: as a rule, we observe more centralization, more rationalization and more standardization. The reason is always a combination of dwindling revenues and increasing expenses which calls for a more effective exploitation of the tax sources.

[34] The Federation Council has sent the proposal to introduce the "digital tax». 2020. May 20. *TASS. Russian News Agency*. (In Russ.). Available at: https://tass.ru/ekonomika/8522947

[35] See, e.g.: Sahra Wagenknecht fordert Digitalsteuer: Besteuert Google und Co! *Frankfurter Rundschau*. 2020. 19. Juli. Available at: https://www.fr.de/wirtschaft/gastwirtschaft/sarah-wagenknecht-gastbeitrag-digitalsteuer-besteuert-google-und-co-13836280.html

Table 7

Pandemics as triggers of sufficient tax changes in human history

Historical period	Pandemic	Tax innovations
2nd century	Antonine Plague (Plague of Galen)	Fiscal centralization (analog of modern tax federalism), "inflation tax"
6th – 8th centuries	Plague of Justinian	Church taxes
14th century	Medieval Plague (Black Death)	Personalization of taxes (poll tax, luxury tax), tax incentives for foreign trade, excise taxes on strong liquors
17th – 18th centuries	Great Plague	Theoretical basis of taxation and tax administration
19th – 20th centuries	Cholera, smallpox, plague, flu	Contributions and quasi-taxes to finance national health protection systems,

Compiled by the authors.

2. In most pandemics, tax incentives of one form or another are used in order to re-energize the economy.

3. Debt plays an important role in raising the revenue needed to finance health care and anti-crisis measures.

3. In the aftermath of pandemics, the tax burden increases in order to service the debts incurred. To this end, "new" taxes are often introduced (formerly, the Church tithe, the poll tax, the income tax; today, possibly taxes on digital transactions).

4. Insofar as the necessary revenue cannot be raised through "regular" taxes, governments often resort to the "inflation tax". In former times, this meant the debasement of coins; in modern times it is levied by way of having the central banks print money.

To determine the most effective impact of pandemics on taxation and tax administration which remains relevant to this day let us refer to the data in Table 7. Of course, it is impossible to say that pandemics transformed the tax environment of the corresponding historical era in a given direction. At the same time, pandemics have undoubtedly triggered significant tax changes that resulted in significant tax innovations. It can be argued that tax changes related to pandemics are regular, since this is confirmed by the relevant historical facts for each of the most notable pandemics.

Based on previous historical experience, we can expect another tax innovation from the COVID-19 pandemic. Most obviously, such innovations will cover tax collection technologies, with an emphasis on digitalization of taxation and tax administration. Undoubtedly, this fits into the logic of the regularity of tax changes associated with pandemics.

10. Conclusion

Our research allows us to draw the following conclusions:

1. There are historical links between pandemics and taxation as many tax innovations resulted from the challenges that large-scale epidemics of deadly diseases posed for taxation and tax administration.

2. These links are not arbitrary, but there are certain regularities and patterns one can observe throughout the common history of pandemics and taxation. To give but one example, most of the tax tools used today in the fight against the corona crisis have already been used during previous pandemics.

3. Under the influence of the COVID-19 pandemic and the resulting economic crisis, tax administration will be strengthened through increased digitalization. Thus, transparency will increase, control of tax payers and tax returns will become easier, and tax evasion will become more difficult.

4. In the sphere of international tax relations, we can expect, as a consequence of the COVID-19 pandemic, a better coordination of the taxation of both the sales and the incomes of digital companies. The OECD and its plans for a large-scale transformation of the taxation system will be of great importance to the introduction and coordination of digital taxes.

5. Russia and Germany have historically been at the forefront of tax

innovations related to pandemics. As a result of the COVID-19 pandemic, both in the Russian Federation and in the Federal Republic of Germany, digital control of the incomes and the expenses of citizens will become more acceptable and changes in the taxation of income of digital companies will be realized according to proposals of the OECD.

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