Factor Analysis of the Causes of the Uneven Economic Impact of the COVID-19 Pandemic

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Abstract

This study analyzes the uneven economic impact of the COVID-19 pandemic in different countries and identifies the factors that influence the size of these losses. The study used econometric models to estimate economic losses in 2020 and cumulative losses for 2020–2021. The main groups of factors included macroeconomic indicators, macroeconomic policy measures, institutional indicators, and healthcare system indicators. Also, the estimates used the structure of the economy as a control variable. The results show that traditional monetary instruments did not have a significant impact in mitigating the economic effects of the crisis in 2020, while fiscal measures significantly contributed to the recovery of the economies in 2021. Institutional factors such as the efficiency of public administration and the level of corruption control also played an important role in reducing economic losses. Additionally, the impact of economic structure factors and health system capacity on the magnitude of economic losses due to the pandemic was analyzed. However, not all of the relationships between healthcare system efficiency factors and economic losses were as expected, and the analysis revealed that poor healthcare system efficiency can have significant negative economic consequences.

Introduction

The global economy experienced a significant impact due to the outbreak of COVID-19 which led to a dramatic economic downturn and unprecedented challenges for countries worldwide. The measures implemented to curtail the propagation of the virus, including quarantine and travel restrictions, resulted in diminished economic activity, elevated levels of unemployment, and reduced consumer spending. Concurrently, the economic repercussions of the pandemic exhibited disparities in their distribution, with certain nations experiencing greater impact than others. This necessitated a thorough examination of the factors contributing to these variations. For instance, developing countries such as India and Brazil experienced considerable economic hardship due to high levels of informal employment and inadequate social protection. At the same time, developed countries such as the US and Germany have suffered significant losses despite extensive fiscal and monetary support measures. It has been demonstrated by certain studies that institutional sophistication and macroeconomic stability are also of significance in terms of mitigating the economic impact of the pandemic [Ghecham 2022]. For instance, countries exhibiting elevated levels of macroeconomic stability and the implementation of effective government policies, such as South Korea and New Zealand, demonstrated a more expeditious recovery from the initial economic downturn [OECD 2021].

In our previous study, the economic impacts of the pandemic were analyzed, and the results published in the article entitled "Unevenness in the Economic Impact of the COVID-19 Pandemic: The Depth of the Economic Decline in Different Countries and the Factors that Caused It" [Petrosyan 2023]. Economic losses in 2020 and cumulative losses for 2020–2021 due to the pandemic were also calculated. Subsequently, an econometric

evaluation was conducted to ascertain the impact of various indicators on the value of economic losses in different countries worldwide. The study encompassed three distinct groups of factors. Firstly, indicators of macroeconomic sustainability were analyzed. Secondly, macroeconomic policy factors were examined. Thirdly, factors describing the degree of institutional development of countries were investigated.

The study's primary findings indicated that macroeconomic policy measures, including alterations in interest rates and the magnitude of monetary stimulus, exerted minimal influence in mitigating the economic consequences of the crisis experienced in 2020. This phenomenon can be attributed to the fact that, in the context of supply constraints triggered by the pandemic, traditional monetary instruments were found to be less effective. However, fiscal policy measures, including direct transfers, subsidies and tax incentives, significantly contributed to the recovery process of national economies in 2021 and reduced the magnitude of aggregate losses in 2020–2021. The efficiency of public administration, the level of corruption control and the quality of the regulatory framework were also found to be significant factors. It is evident that countries exhibiting elevated levels of institutional sophistication, such as New Zealand and Finland, demonstrated superior recovery rates. This observation serves to underscore the pivotal role that robust institutions play in crisis management, particularly in mitigating the detrimental consequences of economic downturns.

The results of the above study emphasized the importance of macroeconomic stability and developed institutions in mitigating the economic impact of the pandemic and accelerating economic recovery. However, the analysis also demonstrated that the impact of macroeconomic factors and government policies on economic losses in 2020 was mixed and required further in-depth assessment. This necessitates an expansion of the range of factors incorporated into the analysis, thereby facilitating a more comprehensive understanding of the underlying causes of variations in economic losses across different nations.

The present study, conducted for the period 2020–2021, proposes to supplement the list of factors included in the previous analysis with two new groups: factors of economic structure and healthcare system efficiency. The necessity to incorporate these factors is substantiated by the observation that an economy's structural economic framework and its capacity to function effectively within the healthcare system are pivotal in determining its sustainability to external shocks, such as a pandemic. The economic structure, characterized by the contribution of diverse sectors to Gross Domestic Product (GDP), the extent of diversification, and the reliance on foreign trade and tourism, serves as a crucial determinate in the degree to which individual sectors of the economy will be impacted by the imposition of restrictive measures. The capacity of healthcare systems is a critical factor in determining the effectiveness of healthcare interventions. This capacity encompasses various elements, including the number of hospital beds available, the number of medical personnel, and the level of financial support for healthcare. The capacity of the health system to manage the influx of patients exerts a direct influence on economic activity and public confidence. It has been demonstrated that countries with well-funded and well-equipped health systems, such as Germany and Japan, were able to control the spread of the virus more

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effectively and reduce mortality, which in turn helped to mitigate the economic impact of the pandemic [Ghecham 2022].

Consequently, broadening the analysis to encompass factors of economic structure and health system capacity will facilitate a more comprehensive evaluation of the underlying causes of variations in economic losses between nations during the course of the pandemic. The present study will contribute to a more profound comprehension of the consequences of the pandemic, whilst concomitantly offering a series of recommendations for enhancing the resilience of economic systems in the face of future crises.

1. Literature review

Numerous studies have demonstrated a positive correlation between population health and economic well-being, as well as growth [McKibbin, Fernando 2020]. The global pandemic evolved from healthcare and economic crisis into a systemic crisis with the potential to exert long-term consequences on the domestic development and international trade relations of nations [UNDP 2021].

The repercussions of the COVID-19 pandemic manifested in diverse patterns across national borders and industrial sectors. The tourism industry experienced the most significant damage due to border closures, while Internet commerce flourished as more people purchased goods online because retailers were compelled to close their stores during the pandemic [Dyvik 2024]. The repercussions of the coronavirus have been demonstrated to engender a decline in interest rates [Jawad, Naz 2023], increase in unemployment [Laikam, Bikbaeva, Pavlova 2021], and a contraction in international trade [Shuyskiy 2021]. However, a salient point emerges from this analysis: certain nations managed to avoid substantial losses, while others did not. A considerable body of research has been dedicated to the examination of the underlying causes of these disparities.

As documented in [Alon, Kim, Lagakos, Van Vuren 2022], the decrease in GDP per capita in 2020 compared to 2019 in developed countries was 2.4%, in developing countries was 6.7%, and in low-income countries was 3.6%. The researchers of the study sought to identify the factors that contribute to the significant variations observed among countries in the aforementioned indicators. Among the factors evaluated in the analysis, the most significant, in quantitative terms, are the volume of public transfer programs, age demographics, and the sectoral structure of employment. The majority of the observed losses in Gross Domestic Product (GDP) and elevated mortality rates in emerging market countries can be attributed to low levels of public financial assistance and a high share of jobs that require social interaction. Low-income countries experienced adverse effects due to inadequate public transfers; however, these negative effects were mitigated to a considerable extent by younger populations with greater disease resilience and a substantial agricultural sector, which offers a reliable source of income during periods of quarantine.

Policy can play a pivotal role in influencing the course of both individual and collective health, particularly in the context of global disasters such as the COVID-19 pandemic [Su 2021]. And "good" policies encompass not only governmental actions but also voluntary, self-protective changes in individual behavior, potentially precipitated

by government information campaigns [NBER 2020]. However, as [World Bank 2022] rightly points out, in contrast to other crises, the pandemic was met with extensive and decisive economic policy measures to minimize the human losses. Concurrently, these measures engendered new risks, including precipitously elevated levels of private and public debt within the global economy.

A number of studies have been conducted to ascertain the existence of a correlation between mortality and various economic indicators, including GDP and unemployment rates. The analysis revealed that the majority of countries, regions, and cities can be categorized into one of two groups: (1) those experiencing significant GDP loss and high mortality, exemplified by New York, Lombardy, and the UK, or (2) those demonstrating low GDP loss and low mortality, including Germany, Norway, and Kentucky. However, there were a few notable exceptions to this trend, including the state of California and Sweden. The authors also provide a rationale for these discrepancies, attributing them to government policy. Nations that effectively contained the virus from the outset were able to sustain economic activity and minimize mortality rates [NBER 2020]. At the same time, different countries had different financial capacities, and as a result, those countries with higher levels of financial capacity were able to overcome the crisis more effectively [Rodygina and Musikhin 2020].

An alternative perspective on the issue is presented in [Kizilov 2020]. This study posits that Germany's ability to navigate the recent economic downturn with minimal impact can be attributed to a conducive environment for entrepreneurship and a relatively low debt burden. In 2020, Germany exhibited the lowest level of gross public debt relative to GDP among the G7 countries, as well as the lowest growth rate of public debt. Consequently, the nation not only evaded a downturn in retail sales but also, as indicated by the study, exerted its influence on the dynamics of its neighboring countries, thereby ensuring analogous outcomes in those nations.

In particular, African countries that were dependent on foreign humanitarian aid experienced significantly greater hardship. An analysis of ten African countries demonstrated an increase in their debt-to-GDP ratios, with certain countries surpassing 100%. Furthermore, there has been a decline in FDI, particularly in oil-producing countries, and a reduction in various forms of humanitarian assistance. Accordingly, the economic and political uncertainty experienced by these countries has been noted as having increased [OECD 2021].

A similar trend was observed in all EAEU countries, with a decline being evident in the majority of industries. Concurrently, the impact on a specific nation and industry exhibited variability, contingent upon the initial indicators. For instance, Armenia witnessed a deterioration in its unemployment rate [UNECE 2021], which was already relatively high, while other EAEU countries did not experience a comparable increase in unemployment. In the context of Belarus, the prevailing uncertainty has led to a precipitous decline in investment in fixed capital, amounting to a 6.8 percentage point decrease. Meanwhile, in Russia and Kazakhstan, the consolidated budget deficit increased due to the decline in commodity prices within global markets. The recovery process may vary in speed depending on the economic structure of the country [Selishcheva 2021].

A comprehensive review of the extant literature on the subject was conducted in order to ascertain the factors that influenced the economic losses sustained by countries as a result of the COVID-19 pandemic.

2. Research methodology

The objective of this study is to evaluate the factors that contribute to economic losses resulting from the COVID-19 pandemic. The analysis will be expanded to incorporate new variables that describe the economic structure and capacity of the healthcare system.

A methodological approach was employed that entailed a comparison of real and predicted GDP values, the purpose of which was to estimate the economic losses caused by COVID-19 pandemic. The IMF's October 2019 forecasts for 2020 and 2021 were used to estimate anticipated economic growth. The selection of this period was predicated on the observation that the predominant economic consequences of the pandemic occurred in 2020, with 2021 signifying a period of economic recovery. Therefore, it is also possible to consider the potential lag effects of economic and social measures implemented in 2020. The data from 2019 were used solely for the calculation of the growth rate in 2020, and were excluded from the regression equations. The real GDP data for these years was also obtained from the IMF databases. The real GDP index was calculated by taking the value of real GDP in 2017 and setting it to 100. The projected real GDP index and the actual real GDP index for 2020 and 2021 were determined using projected and actual growth, respectively. The economic losses were calculated as the difference between the projected and actual values of real GDP. For instance, in the Republic of Armenia, the projected GDP growth for 2020 was 4.8%, and for 2021, it was 4.5%. However, the actual GDP growth in 2020 was -7.2%, and in 2021, it was -5.7%. The projected GDP index for 2020 and 2021 was 118.6 and 124.0, respectively, while the actual GDP index for the same years was 105.0 and 111.0. According to Petrosyan (2023), Armenia's economic losses in 2020 amounted to 13.6 and 13.0 of the GDP index in 2021, which, when combined, yielded 26.6 of the GDP index. This approach enables the consideration of the discrepancy between anticipated and actual economic growth, thereby facilitating a more precise estimation of the economic losses associated with a pandemic.

Following an estimation of the economic losses incurred, an analysis was conducted to determine which indicators had a significant impact on the magnitude of the economic losses. This analysis involved the examination of the effects of various factors. To this end, regression analysis was employed, utilizing data from 2020 and 2021. Given that the analysis was conducted over a two-year period (with a longer time period not being feasible due to the potential impact of factors other than the pandemic on the results), two models were developed for each year individually. The least squares method was employed to estimate these models. A comprehensive set of explanatory variables was considered, including macroeconomic factors (e.g., GDP per capita, inflation, public debt, current account balance, economic openness indicator, unemployment, investment, and savings), public policy factors (e.g., fiscal policy response, monetary policy response, anti-epidemic severity index, and economic support index), and institutional factors (e.g., the level of corruption

control, government effectiveness, political stability and absence of violence and terrorism, and legal support). In addition to these data, data on the structure of the economy as a control variable, as well as data on the effectiveness of the health system, among others, are used for the extended analysis:

- health care costs and health care resources;
- life expectancy and mortality rates;
- mortality from specific causes;
- mortality by age group and sex;
- sanitation and population.

Regression models are used for the purpose of conducting a comprehensive analysis, with the objective being the assessment of the impact that a multitude of factors exert on the economic losses experienced by various nations. The dependent variable will be the amount of economic losses expressed as a percentage of GDP. This will be estimated using the methodology previously presented and described in greater detail in the authors' prior article [Petrosyan 2023]. The independent variables, which are defined as the parameters describing the economic structure and capacity of the healthcare system, will be included in the study.

The econometric model constructed for the estimates is as follows:

$$Y_t = \beta_o + \beta_1 \times X_{1t} + \beta_2 \times X_{2t} + \varepsilon_t \,,$$

where:

Y_t is the dependent variable (economic losses as a percentage of GDP in 2020 or cumulative losses in 2020–2021),

X_{1t} and X_{2t} are independent variables (macroeconomic factors, fiscal and monetary policy, institutional performance, etc.),

β_o is a constant,

β_1 and β_2 are coefficients on the independent variables,

ε_t is the model error.

The regression analysis identified significant determinants of economic losses, such as fiscal policy measures and institutional effectiveness. All coefficients of the estimated regression models are included in the table in the appendix.

The analysis was conducted using multiple regression, which allowed us to determine the impact of each group of factors on the value of economic losses. The inclusion of new factors in the model is aimed at obtaining a more comprehensive and accurate analysis of the causes of differences in economic losses between countries.

1. **Multiple regression.** Inclusion of several independent variables in the model allowed us to assess their impact on the dependent variable and identify the most significant determinants of economic losses, taking into account the structure of the economy.
2. **Hypothesis testing.** Significance tests of regression coefficients were conducted to determine statically significant factors.
3. **Model diagnosis.** To ensure the reliability of the results, tests for multicollinearity, autocorrelation and heteroscedasticity were performed.

Different subsamples of data and alternative model specifications were used to test the robustness of the results. This made it possible to verify the robustness of the findings and their applicability to different countries and time periods.

3. Analysis and results

The COVID-19 pandemic had a significant impact on the global economy, causing unprecedented economic losses in various countries. A critical component of the analysis entails the examination of factors that may have mitigated or amplified these losses. One such factor is the structure of the economy, particularly the share of the services sector in the Gross Domestic Product (GDP). This study aims to identify the relationship between the share of services in GDP and the economic losses incurred by countries in 2020 due to the COVID-19 pandemic. As illustrated in Figure 1 (p. 29), countries with a higher share of services in GDP experienced greater economic losses. This finding underscores the heightened vulnerability of the services sector to pandemic shocks and highlights the necessity for economies to develop resilience in the face of such crises. The regression analysis between these variables also substantiates the relationship, thereby enabling its utilization as a control variable.

It is noteworthy that the proportion of the services sector in GDP exhibited a robust correlation with the magnitude of economic losses incurred during the year 2020. However, this correlation was not observed when considering the cumulative losses experienced from 2020 to 2021. This phenomenon can be attributed to the significant impact of the restrictions and social distancing measures implemented in 2020 on the services sector, particularly industries such as hospitality, tourism, and retail trade. Nevertheless, the speed of economic recovery in 2021 was contingent on a variety of factors, including fiscal policy and institutional sophistication. These factors will be discussed in greater detail in the following sections.

Figure 1.   Relationship between the share of services (% of GDP) and GDP losses
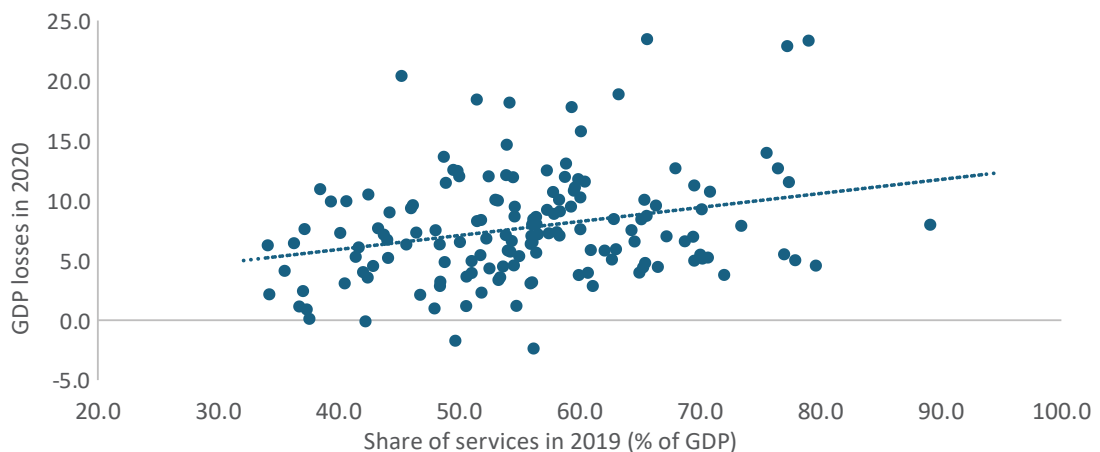
Source: authors' calculations.

The relationship between health performance indicators and economic losses due to the COVID-19 pandemic is not unambiguous. Life expectancy is frequently regarded as an indicator of population health and the quality of the health care system. As illustrated in Figure 2 (p. 30), a negative correlation is evident between life expectancy and total GDP losses incurred during the 2020–2021 period. Consequently, nations with higher life expectancies exhibited diminished economic losses. This outcome suggests that the presence of more advanced health care systems and the overall well-being of the population may have contributed to the reduction of the economic consequences of the pandemic. These findings underscore the importance of investing in health and social programs to increase economic resilience in global crises.

*Figure 2.*   Relationship between life expectancy and total GDP losses
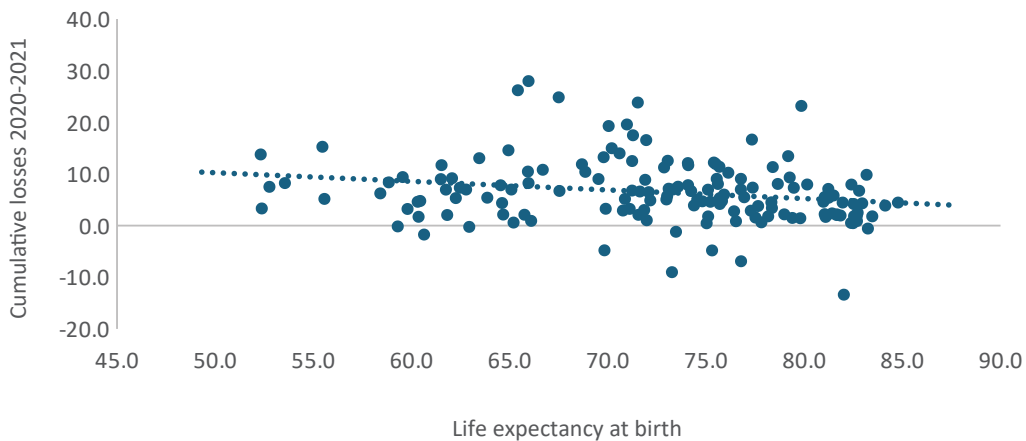
Source: authors' calculations.

Conversely, mortality rates and their components, including the lifetime risk of maternal mortality and mortality rates associated with household and outdoor air pollution, exhibit an inverse relationship. In general, nations with elevated mortality rates demonstrated reduced economic losses during the course of the pandemic. This outcome is noteworthy in light of the correlation between high mortality rates and the fragility of health systems. It can be posited that a shock of the magnitude of the ongoing pandemic should have led to an exacerbation of vulnerabilities, resulting in increased challenges for the labor force and greater economic losses. However, in practice, these countries experienced lower losses, as illustrated in Figure 3 on p. 31 (also confirmed by regression analysis, see Appendix, Table 3).

This phenomenon can be attributed to their diminished sensitivity to variations in the public health system and their propensity to operate in environments characterized by disease transmission. Consequently, the emergence of a new disease did not result in heightened security measures, leading to a reduction in restrictions on economic activity (see Figure 4 on p. 31).

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Conversely, countries with higher mortality rates demonstrated a more protracted recovery in 2021, resulting in increased cumulative economic losses. The findings indicate that the implementation of fewer quarantine restrictions in 2020 contributed to a reduction in economic losses during that period. However, subsequent analyses have revealed that these restrictions also exerted long-term effects, giving rise to increased cumulative losses in the 2020–2021 period.

Figure 3.   Relationship between mortality rates and GDP losses in 2020
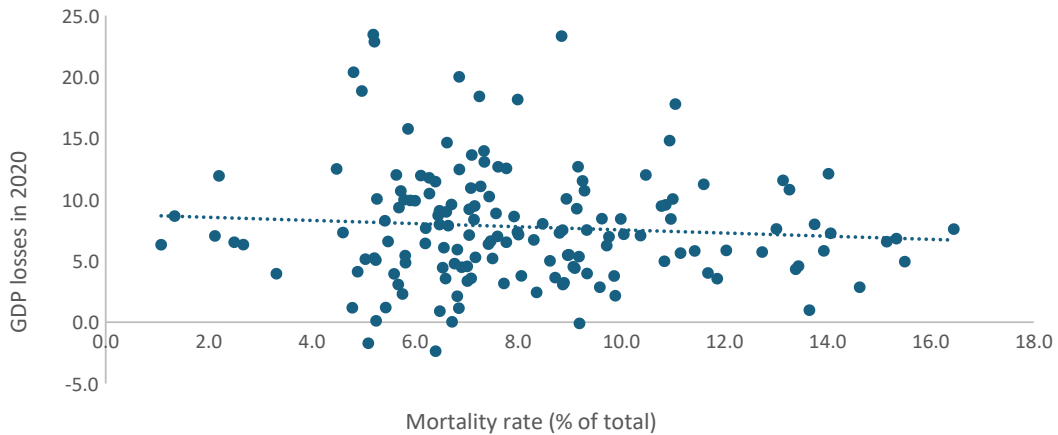
Source: authors' calculations.

Figure 4.   Relationship between mortality rate and state response index to pandemic shock
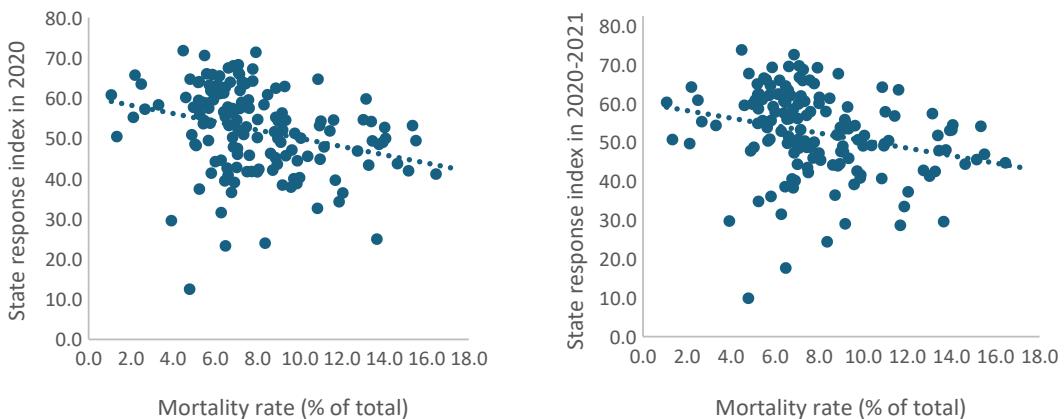
Source: authors' calculations.

The impact of macroeconomic, institutional, and fiscal factors was assessed using the share of the service sector in the economy as a control variable. The results of this model specification demonstrate that monetary policy measures are not associated with the

magnitude of economic losses incurred in 2020 and the cumulative losses experienced during the period from 2020 to 2021. The impact of fiscal policy was negligible in 2020; however, it played a pivotal role in mitigating accumulated losses during the 2020–2021 period. This is due to the time required for fiscal policy measures, such as stimulus packages and government spending, to be implemented and propagate throughout the economy. Despite the fact that the immediate effects were limited in 2020, sustained fiscal support helped stabilize the economies and mitigate accumulated losses over the two-year period.

The size of the public sector, as measured by the ratio of revenues to GDP and expenditures to GDP, did not play a significant role in economic efficiency in both 2020 and 2021. The aggregate size of the public sector does not necessarily reflect the efficiency or effectiveness of government interventions during the crisis. It is imperative to consider factors such as the swiftness and precision of fiscal measures, rather than merely the extent of government activity.

The expenditure patterns exhibited a substantial influence on the magnitude of losses, manifesting distinct effects in 2020 and 2021. For instance, the correlation between the share of investment as a percentage of GDP and economic losses in 2020 was found to be statistically significant, while this correlation was not significant in 2021. Conversely, the share of savings as a percentage of GDP was found to be important for economic performance in both 2020 and 2021. Investment spending likely provided immediate support to the economy, creating jobs and stimulating demand in 2020. However, as economies adapted in 2021, the role of savings, reflecting the financial strength and purchasing power of households and businesses, became more critical for sustaining economic efficiency.

A substantial correlation has been demonstrated between external stability, as measured by the current account balance, and economic losses. In the aftermath of the global economic downturn, countries with more positive (or less negative) current account balances demonstrated a reduced degree of economic loss during the 2020 and 2021 periods. A positive current account balance is indicative of a robust external demand for a nation's goods and services, thereby offering a cushion against domestic economic turbulence. Countries with healthier external balances were better prepared to withstand the economic shocks of the pandemic.

Institutional factors also exerted a positive influence on economic efficiency. In the context of the global economic landscape, nations that exhibit minimal corruption and optimal government efficiency have demonstrated a tendency to incur diminished economic losses in 2020 and to undergo a more expeditious recovery in 2021. The capacity of governments to implement effective policies and ensure efficient resource allocation is enhanced by strong institutions. Countries with superior governance and reduced corruption levels exhibited greater success in addressing the crisis and achieving economic recovery more expeditiously.

In the 2020–2021 period, health and mortality indicators exerted a substantial influence on the economic consequences, leading to notable GDP losses. Therefore, it can be concluded that the current health expenditures as a percentage of GDP, the number of hospital beds per 1,000 people, and the Human Capital Index (HCI) have had a significant

negative impact on GDP losses. This finding suggests that increasing investment in healthcare and enhancing the quality of healthcare infrastructure can contribute to the reduction of economic losses over time. The study also demonstrates that the number of hospital beds per 1,000 people has a significant impact.

The mortality rate (per 1,000 people), the number and rate of deaths from unintentional poisoning (per 100,000 population), and other indicators reflecting the percentage of deaths, as discussed earlier, have negative coefficients, indicating a significant decrease in economic losses with their increase. Specifically, the augmentation of hospital bed capacity, concomitant with a decline in fatalities resulting from unintentional poisoning, contributed to a reduction in GDP losses. In a similar vein, the human capital index (HCI) and life expectancy at birth exhibited negative coefficients; however, these coefficients were not statistically significant.

However, certain indicators, including mortality from air pollution rates and adult female and male mortality rates, have demonstrated a positive correlation with GDP losses, suggesting an increase in economic losses. This underscores the necessity for an integrated approach to enhance public health and regulate pollution. It is imperative to acknowledge that infant and newborn mortality also exerted a favorable influence on GDP losses, underscoring the necessity for additional measures to enhance obstetric and child health care conditions. The results of the study indicate that investing in health and environmental safety is a crucial strategy for mitigating the economic impact of pandemics and other crises.

Conclusion

The study found that the economic impact of the COVID-19 pandemic was uneven across countries due to multiple factors. A salient finding of the study is that macroeconomic policy measures, including alterations in interest rates and the magnitude of monetary stimulus, proved ineffective in significantly mitigating the economic consequences of the crisis experienced in 2020. This phenomenon can be attributed to the reduced efficacy of conventional monetary instruments in addressing supply constraints stemming from the pandemic. Concurrently, fiscal measures, encompassing direct transfers, subsidies, and tax reductions, contributed meaningfully to the economic recovery in 2021 and the mitigation of aggregate economic losses.

The effectiveness of public administration, the level of corruption control, and the quality of the regulatory framework are among the institutional factors that have played an important role. It has been demonstrated that countries with high levels of institutional sophistication, such as New Zealand and Finland, have exhibited faster recovery rates. This finding serves to corroborate the notion that robust institutions are of paramount importance during periods of crisis.

An analysis of economic structure factors revealed that countries with a high share of the services sector, particularly tourism and retail, experienced substantial economic losses in 2020. However, as economies adapted and opened up in 2021, the impact of this factor diminished. At the same time, economic diversification, as evidenced by South Korea, has been shown to contribute to greater resilience and adaptability.

The capacity of health systems, which is determined by the number of hospital beds, the number of medical personnel, and the level of healthcare funding, is also critical. Countries that have robust health systems, such as Germany and Japan, have demonstrated a more effective ability to control the spread of the virus and reduce mortality, thereby mitigating the economic impact of the pandemic.

Consequently, the analysis was expanded to encompass factors of economic structure and health system capacity, thereby facilitating a more comprehensive evaluation of the underlying causes of the observed variations in economic losses among countries during the period of the pandemic. This study not only deepened our understanding of the impact of the pandemic, but also provided recommendations for making economies more resilient to future crises. It is important to continue to explore and address the diversity of factors in order to develop more effective strategies to mitigate the impact of crises and accelerate economic recovery in the face of their global nature.

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Appendix

Table 1 presents the results of a regression analysis that estimates the impact of various macroeconomic indicators and fiscal measures on economic losses in 2020 caused by a COVID-19 pandemic. In particular, the table presents the coefficients of the regression models that demonstrate how changes in each of the factors such as inflation, GDP per capita, credit-to-GDP ratio, and other indicators affect the magnitude of economic losses. Substantial attention is paid to the role of fiscal policy, the effectiveness of which was measured by analyzing its various components. For the accuracy of the estimation, the coefficient of the service sector was included in the model to take into account the influence of the structure of the economy on the results of the analysis and to exclude it from the estimation of other factors.

Table 1. Impact of selected indicators on the size of real GDP losses in 2020 with value added of the services sector (% of GDP) as a control variable

Indicator	Service sector share ratio	Coefficient of the relevant indicator
Fiscal measures (above the line)	0.1509***	-0.1196
Fiscal measures (below the line)	0.0727*	-0.0048
Fiscal measures, total	0.1591***	-0.088
Monetary policy response in 2020	0.1131***	-0.1475
Cumulative MP response in 2020–2021	0.141***	-0.0437
Credit to GDP ratio 2020	0.1296*	-0.0205***
Credit to GDP ratio 2021	0.1357**	-0.0221***
Gross domestic product per capita in current prices, 2019	0.2359***	-0.0001***
Inflation, average consumer prices, 2019	0.1046***	-0.222*
Inflation, consumer prices at the end of the period, 2019	0.1042***	-0,206*
Total investment, 2019	0.1309***	-0.0874**
Total investment, 2020	0.1309***	-0.116***
Gross national savings, 2019	0.1403***	-0.1498***
Gross national savings, 2020	0.1337***	-0.1922***
Unemployment rate, 2019	0.1443***	-0.0338
Unemployment rate, 2020	0.1331***	0.0496
Public administration sector revenues, 2019	0.1524***	-0.0287
Public administration sector revenues, 2020	0.1568***	-0.0364
Total government expenditures, 2019	0.1414***	-0.0011
Total public expenditure, 2020	0.1242***	0.03
Gross debt of the public administration sector, 2019	0.1317***	0.0139
Gross debt of the public administration sector, 2020	0.1211***	0.0249**
Current account balance, 2019	0.1702***	-0.2577***
Current account balance, 2020	0.151***	-0.2374***
Controlling corruption: an assessment, 2019	0.2266***	-1.8298***
Government effectiveness: an assessment, 2019	0.2255***	-1.7668***
Controlling corruption: percentile rankings, 2019	0.1762***	-0.0257
Government effectiveness: percentile rankings, 2019	0.1679***	-0.0186
Political stability and absence of violence/terrorism: an assessment, 2019	0.1724***	-0.8985
Political stability and absence of violence/terrorism: percentile rankings, 2019	0.1498***	-0.0079
Normative quality: an assessment, 2019	0.2307***	-1.8437***
The rule of law: an assessment, 2019	0.238***	-2.0189***
Voice and accountability: an evaluation, 2019	0.1743***	-0.6632
Quarantine days	0,0448	-0.0075
COVID-19 cases, 2019	0.1391***	0.0000
COVID-19 cases, 2020	0.1388***	0.0000

Source: authors' estimates.

*** means that the p-value is less than 0.01, ** means that the p-value is less than 0.05, and * means that the p-value is less than 0.1. No * means that the coefficient is not statistically significant.

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Table 2 presents the results of the analysis of cumulative GDP losses for 2020–2021, with the value added of the services sector as the control variable. This analysis covers a longer time period and reflects the cumulative impact of the pandemic on economies. The table demonstrates that fiscal and monetary measures taken in response to the crisis had a significant impact in reducing cumulative economic losses. The coefficients of the regression models show how much the accumulated losses would change as a function of changes in each of the factors such as inflation, investment, unemployment rate and national savings. The table also emphasizes the long-run effects of fiscal measures, which are evident in 2021.

Table 2. Impact of selected indicators on the size of total GDP losses in 2020–2021 with service sector value added (% of GDP) as a control variable

Indicator	Service sector share ratio	Coefficient of the relevant indicator
Fiscal measures (above the line)	0.0047	-0.2119*
Fiscal measures (below the line)	-0.0998*	-0.0535
Fiscal measures, total	0.0141	-0.1433**
Fiscal measures/losses	-0.02	-0.6572**
Fiscal measures / cumulative losses	-0.0424	-0.1938**
Monetary policy response in 2020	-0.1122**	-0.1378
Monetary policy response in 2021	-0.113**	0.0919
Cumulative MP response in 2020-2021	-0.0438	-0.0769
Credit to GDP ratio 2020	0.0164	-0.0142
Credit to GDP ratio 2021	0.0123	-0.0139
Gross domestic product per capita in current prices, 2019	0.0765	-0.0001***
Gross domestic product per capita in current prices, 2020	0.0801	-0.0001***
Gross domestic product per capita in current prices, 2021	0.0881	-0.0001***
Inflation, average consumer prices, 2019	-0.0621	-0.1375
Inflation, average consumer prices, 2020	-0.0621	-0.0627
Inflation, average consumer prices, 2021	-0.0375	0.0823
Inflation, consumer prices at the end of the period, 2019	-0.0692	-0.2083
Inflation, consumer prices at the end of the period, 2020	-0.0482	0.0186
Inflation, consumer prices at the end of the period, 2021	-0.0428	0.0498
Total investment, 2019	-0.0495	-0.0567
Total investment, 2020	-0.049	-0.0746
Total investment, 2021	-0.0462	-0.0385
Gross national savings, 2019	-0.0387	-0.1344***
Gross national savings, 2020	-0.0445	-0.1831***
Gross national savings, 2021	-0.0447	-0.1328***
Unemployment rate, 2019	-0.022	-0.2107**
Unemployment rate, 2020	-0.0272	-0.1009
Unemployment rate, 2021	-0.0188	-0.181**

Indicator	Service sector share ratio	Coefficient of the relevant indicator
Public administration sector revenues, 2019	-0.0213	-0.055
Public administration sector revenues, 2020	-0.0236	-0.0447
Public administration sector revenues, 2021	-0.0221	-0.0481
Total government expenditures, 2019	-0.0336	-0.0265
Total public expenditure, 2020	-0.0486	0.007
Total expenditures of the public administration sector, 2021	-0.0631	0.0333
Gross debt of the public administration sector, 2019	-0.0457	0.0023
Gross debt of the public administration sector, 2020	-0.0546	0.0138
Gross debt of the public administration sector, 2021	-0.0599	0.0199
Current account balance, 2019	-0.002	-0.2834***
Current account balance, 2020	-0.0277	-0.2878***
Current account balance, 2021	-0.0355	-0.2618***
Controlling corruption: an assessment, 2019	0.0323	-1.5473**
Controlling corruption: an assessment, 2020	0.0303	-1.5199**
Controlling corruption: an assessment, 2021	0.0366	-1.6765**
Government effectiveness: an assessment, 2019	0.0478	-1.8333**
Government effectiveness: an assessment, 2020	0.0385	-1.7055**
Government effectiveness: an assessment, 2021	0.0364	-1.735**
Political stability and absence of violence/terrorism: an assessment, 2019	-0.0248	-0.5152
Political stability and absence of violence/terrorism: assessment, 2020	-0.0277	-0.4132
Political stability and absence of violence/terrorism: assessment, 2021	-0.0233	-0.5165
Normative quality: an assessment, 2019	0.0658	-2.1673***
Regulatory quality: assessment, 2020	0.0598	-2.0674***
Regulatory quality: an assessment, 2021	0.0633	-2.1482***
The rule of law: an assessment, 2019	0.0357	-1.5857**
The rule of law: an assessment, 2020	0.0415	-1.7577**
The rule of law: an assessment, 2021	0.0438	-1.8023**
Voice and accountability: an assessment, 2019	-0.0116	-0.6285
Voice and accountability: an assessment, 2020	-0.01	-0.6457
Voice and accountability: an assessment, 2021	0.0042	-0.9069
Foreign trade, 2019	-0.0776	-0.0016
Foreign trade, 2020	-0.0638	-0.0072
Foreign trade, 2021	-0.0638	-0.0072
Quarantine days	-0.0508	-0.0141
COVID-19 cases, 2020	-0.0452	0
COVID-19 cases, 2021	-0.0461	0
COVID-19 cases, total	-0.0458	0

Source: authors' estimates.

*** means that the p-value is less than 0.01, ** means that the p-value is less than 0.05, and * means that the p-value is less than 0.1. No * means that the coefficient is not statistically significant.

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Table 3 examines the impact of health system indicators on economic losses in 2020 and cumulative losses over 2020–2021. The table presents coefficients showing how indicators such as current health expenditure, number of hospital beds, life expectancy and mortality rates affect the magnitude of GDP losses. The results point to the important role of well-developed health systems in mitigating the negative economic impact of a pandemic. For example, increased health expenditure and improved health infrastructure contributed to the reduction of economic losses.

Table 3. Impact of health sector performance (2017–2019 average) on GDP losses in 2020 and cumulative losses in 2020–2021

	Coefficient	
Indicator	**GDP losses in 2020**	**GDP losses in 2020–2021**
Cause of death from non-communicable diseases (% of total)	0.0297	-0.0474*
Current expenditure on health care (% of GDP)	0.0943	-0.4505**
Mortality rate (per 1000 people)	-0.2481*	-0.2406
Hospital beds (per 1000 people)	-0.3317*	-0.5789**
Human Capital Index (HCI)	-2.348	-13.8496***
Life expectancy at birth, total (years)	0.0796	-0.1671***
Lifetime risk of maternal mortality (%)	-0.5955*	0.4531
Mortality rates associated with residential and ambient air pollution, age-standardized, female (per 100,000 male population)	-0.0143**	0.0204**
Age-standardized mortality rate from household and atmospheric air pollution, males (per 100,000 male population)	-0.0092*	0.0177***
Unintentional poisoning mortality rate (per 100,000 population)	-1.053***	-0.1105
Mortality rates associated with unsafe water, unsafe sanitation and lack of hygiene (per 100,000 population)	-0.0414**	0.0278
Adult mortality (per 1,000 adult women)	-0.0078	0.0117**
Infant mortality (per 1,000 live births)	-0.0436**	0.0498*
Newborn mortality (per 1,000 live births)	-0.0627	0.1098**
Mortality rate of children under 5 years of age (per 1,000 people)	-0.0312**	0.0286
Female mortality rate of children under 5 years of age (per 1,000 persons)	-0.0331**	0.0303
Mortality rate of children under 5 years of age, males (per 1,000 persons)	-0.0295**	0.0272*
Rural population (% of total population)	0.0021	0.0694***

Source: authors' estimates.

*** means that the p-value is less than 0.01, ** means that the p-value is less than 0.05, and * means that the p-value is less than 0.1. No * means that the coefficient is not statistically significant..