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A Bibliometric Review of The Early Econometric Studies on Covid-19: A Hybrid Analysis

Covid-19 Üzerine Erken Dönem Ekonometrik Çalışmaların Bibliyometrik Bir İncelemesi: Hibrit Bir Analiz

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ÖZ

Bu çalışma, Covid-19 pandemisine ilişkin erken dönem araştırma eğilimlerini, özellikle ekonometrik çalışmalara odaklanarak incelemektedir. Pandemiyle birlikte bilimsel literatürdeki hızlı artış, erken dönem temaların ve iş birliklerinin daha iyi anlaşılmasını gerekli kılmaktadır. Çalışmada, bibliyometrik analiz yöntemiyle yayın desenleri, atıf ağları ve temel araştırma yönelimleri analiz edilmiştir. R (bibliometrix) ve Vosviewer araçları kullanılarak bibliyometrik analiz, kapsamlı bir literatür incelemesi ile birleştirilmiştir. Bulgular, öne çıkan yayınlar, yazarlar, ülkeler ve iş birlikleri hakkında kapsamlı bilgiler sunmaktadır. Bunun yanı sıra, çalışmada ekonometrik yöntemleri kullanan çalışmalar detaylı bir şekilde incelenmiş; veri setleri, örneklemler, metodolojiler ve bulgular analiz edilmiştir. Beş ana araştırma konusu öne çıkmıştır: finansal piyasalar, halk sağlığı, işgücü piyasaları, refah ve makroekonomik etkiler. Çalışma, erken dönem literatüründe finansal sonuçlara büyük bir ağırlık verildiğini; ancak enflasyon ve büyüme gibi makroekonomik etkilerin yeterince ele alınmadığını tespit etmektedir. Bu bağlamda, makroekonomik etkilerin daha kapsamlı bir şekilde araştırılması gerektiğini vurgulamakta ve gelecekteki çalışmalara yönelik öneriler sunmaktadır.

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ABSTRACT

This study investigates early research patterns on the Covid-19 pandemic, focusing on econometric studies. The surge in scientific literature due to the pandemic underscores the need to understand the early themes and collaborations. By employing bibliometric analysis, it explores publication patterns, citation networks, and primary research directions. Using R (bibliometrix) and Vosviewer, a combined approach of bibliometric analysis and comprehensive literature review was employed. Findings offer insights into relevant publications, authors, countries, and collaborations. Additionally, the study delves into econometric studies, analyzing datasets, samples, methodologies, and findings. Five key research topics emerge: financial markets, public health, labor markets, well-being, and macroeconomic impacts. It notes a concentration on financial consequences, with macroeconomic aspects like inflation and growth being understudied. This research underscores the need for broader exploration of macroeconomic effects and suggests future research directions.

1. Introduction

This paper conducts a bibliometric analysis alongside a comprehensive literature review on the economic research related to the COVID-19 pandemic. Over the past several years, COVID-19 has become one of the most popular research topics across various academic disciplines. Naturally, the economic implications of the COVID-19 pandemic constitute an essential and indispensable part of this body of research. Given the significant progress made in this area, it is important to assess where early studies stand within the broader landscape of economic research on COVID-19.

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The aim of this paper is to uncover the patterns in early economic research on COVID-19 in terms of concepts, perspectives, and key highlights, while also mapping the current state of the literature. This is achieved through a hybrid analysis combining bibliometric techniques and a comprehensive literature review.

Bibliometric analysis is a research method that employs quantitative techniques to examine patterns, relationships, and trends in scientific literature. While bibliometric analysis is widely used in scientific research (Dos Santos Teixeira and De Souza Ribeiro, 2014; França et al., 2016), its application in the fields of economics and business has gained significant popularity only recently (Donthu et al., 2020b, 2021). Bibliometrics encompasses both numerical interpretation and content analysis of data, enabling the examination of a large volume of documents from multiple perspectives. These include the number of citations, publications, keyword occurrences, topics, influential authors, sources, institutions, researcher collaborations, countries, and emerging trends in the research field. Although COVID-19 is a relatively new research topic, the number of publications generated is enormous. Therefore, bibliometric analysis is particularly well-suited for investigating the economic research on COVID-19.

Our paper consists of two main parts. Regarding the bibliometric analysis, we construct two samples: a full sample and a sub-sample. The full sample includes all the articles in our dataset, while the sub-sample consists only the articles that have econometric analysis. In the first part, we conduct a bibliometric analysis to identify the key features of existing research, such as prominent authors, journals, keywords, and concepts, for both the full sample and the sub-sample. In the second part, we perform an in-depth literature review of the sub-sample to examine the existing literature more closely. By combining these two steps, we aim to provide a comprehensive overview of early economic research on COVID-19.

For the second step, we selected 100 papers as sub-sample that include econometric analysis according to the highest citations. COVID-19 is a relatively new phenomenon, and measuring its impact on the economic environment presents significant challenges, particularly due to severe data limitations. By filtering articles that employ econometric analysis, we aim to uncover detailed insights about the data, data sources, data frequency, and methodologies used in COVID-19-related economic research.

Regarding bibliometric research, Mobin et al. (2020) conducted the first bibliometric study on COVID-19 research, analyzing articles published between January 1 and October 15, 2020, using the Scopus database. Their study identified top authors, journals, countries, and collaboration patterns to guide researchers in the field. Similarly, Mahi et al. (2021) performed a bibliometric study of 1,636 articles from the Web of Science (WOS) database, focusing on three keywords: coronavirus, pandemics, and epidemics. Their research spanned economic-related literature dating back to 1974. Nagy et al. (2021) conducted a bibliometric study for the first 15 months of the pandemic, analyzing 1,671 articles. Using the WOS database, they searched for several keywords, including "COVID," "SARS-CoV-2," "2019-nCoV," "coronavirus 2019," and "coronavirus disease 2019." They refined their dataset to articles in the "Business and Economics" category and indexed in the Social Science Citation Index. Their findings highlighted the pace of publications, collaboration among authors from different countries, authors' affiliations, and the countries dominating research in the field, with a particular focus on the performance of Central and Eastern European countries. Barutçu et al. (2023) investigate COVID-19-related publications on newborns, emphasizing research trends, leading contributors, and knowledge gaps in the literature. Beyond bibliometric studies, some research has focused on literature surveys related to COVID-19, specifically within the field of economics (Padhan and Prabheesh, 2021; Brodeur et al., 2021).

In this paper, we employ a hybrid analysis approach, combining bibliometric research with an in-depth literature review to provide a comprehensive perspective on the economic research surrounding COVID-19. This paper contributes to the literature in several ways; (i) Our study differs from previous previous research by employing a combined bibliometric analysis and deep reading approach. This dual methodology enabled us to identify critical aspects of early research on the economic impacts of COVID-19, including prominent keywords, highly cited publications, influential sources and authors, international collaboration networks, and dominant methodologies. (ii) Unlike prior studies, this paper focuses specifically on econometric studies, providing more precise insights into the quantitative aspects of COVID-19 research. It offers a detailed description of the data, sources, and econometric models employed in studies on the pandemic's economic effects. (iii) We conducted a comprehensive review of the 100 most-cited econometric studies on COVID-19 economics, uncovering the primary research themes. By performing an in-depth analysis, we categorized these studies into five main topics—financial markets, public health, labor markets, well-being, and macroeconomic impacts—thereby offering a clear framework for understanding the diverse economic consequences of the pandemic.

The structure of this paper is organized as follows; Section 2 presents the methodology and data Section 3 presents bibliometric research findings for both full sample and sub-sample. Section 4 covers the main research topics and provides a deep reading analysis and section 5 concludes the article.

2. Methodology and Data

We extracted our data from the Web of Science (WOS) Core Collection, as WOS is one of the largest and most comprehensive databases for academic research. We constructed two separate samples: a full sample and a sub-sample. The full sample includes all relevant studies employing both descriptive and computational methods. The dataset was downloaded on June 27, 2022.

Our methodology for constructing the full sample is as follows: First, we searched for the terms "coronavirus (topic)" or "COVID-

19 (topic)" within the year span 2020–2022. The "topic" field ensured that the terms appeared in the title, keywords, or abstract. The initial search yielded 301,178 documents. We then refined the results by limiting the search to the Web of Science indices "SSCI" and "ESCI," the Web of Science category "Economics," the English language, and document type "Article." These refinements reduced the dataset to 4,300 documents.

Next, we conducted a relevancy check, excluding review studies, earlier versions of papers, and documents with no citations. After these adjustments, the final number of documents in the full sample was 2,553. Papers with no citations were excluded to focus on the most connected and frequently referenced research patterns in early COVID-19 economics literature.

Secondly, we constructed a smaller sample from the full sample by ranking the articles based on their citation counts and selecting only those that employed econometric tools. The full sample comprises 2,553 articles authored by 6,644 individuals, covering the year span 2020–2022. The distribution of documents published across these years is as follows: 707 articles in 2020, 1,613 in 2021, and 233 in 2022. The sub-sample consists of 100 articles authored by 337 individuals. Detailed information about both samples is provided in Table 1. We conducted bibliometric analyses separately for the full sample and the sub-sample. For data extraction and analysis, we used the R package *Bibliometrix*, and for mapping and visualization, we utilized Vosviewer.

Table 1. Main Information About Data

Description	Full Sample	Sub Sample
Sources	352	35
Documents	2553	100
Average citations per document	12,03	80,99
Authors	6644	337
Single-authored documents	406	8
Documents per author	0,384	0,306

3. Bibliometric Research

3.1 Full sample

In the first step, we conducted a bibliometric analysis of the 2,553 articles. This section presents the findings of the network analysis performed using *Bibliometrix*.

Table 2 displays the top 10 most frequently publishing sources. *World Development* stands out as the leading journal, with 105 publications, followed by *Transport Policy* with 94 articles. The third most published journal is *Economic Research-Ekonomska Istraživanja*, with 56 publications. Together, these top 10 journals account for 555 articles, representing 22% of the total publications. The remaining 78% of articles were published across 342 other sources, highlighting an imbalanced distribution of publications among journals.

Table 3 lists the most productive authors in economic research on COVID-19. *Vo, X.V.* leads with 12 publications, followed by *Huynh, D.V.* with 10 publications. Unlike the publication distribution among journals, the productivity among authors shows a more balanced pattern. The number of publications per author is relatively similar, suggesting no significant dominance by a few authors, as is often observed in other research fields. However, it is important to note that this research spans a relatively short time frame, which may influence these patterns.

Table 2. Top 10 Most Relevant Sources

Num	Sources	Articles
1	WORLD DEVELOPMENT	105
2	TRANSPORT POLICY	94
3	ECONOMIC RESEARCH-EKONOMSKA ISTRAZIVANJA	56
4	EMERGING MARKETS FINANCE AND TRADE	55
5	ECONOMICS LETTERS	46
6	APPLIED ECONOMICS LETTERS	44
7	JOURNAL OF PUBLIC ECONOMICS	44
8	ENVIRONMENTAL & RESOURCE ECONOMICS	39
9	APPLIED ECONOMICS	36
10	CANADIAN JOURNAL OF AGRICULTURAL ECONOMICS	36

Table 3. Top 10 Most Relevant Authors

Num	Authors	Articles
1	Vo, XV.	12
2	Huynh, D.V.	10
3	Beck, M.J.	9
4	Hensher, DA.	9
5	Bouri, E.	8
6	Kang SH	8
7	Lee S	8
8	Umar, Z.	8
9	Zhang, A.M.	8
10	Brodeur, A.	7

Table 4 presents the top 20 most highly cited papers on economic research related to COVID-19. The most cited paper is McKibbin and Fernando (2021), with 765 citations. This study employs a hybrid DSGE/CGE analysis to examine the macroeconomic impacts of COVID-19. The second most highly cited paper is Ivanov (2020), which explores the implications of the pandemic on the global supply chain using simulation methods.

A significant portion of the top 20 papers focuses on the stock market's response to the pandemic, with 7 papers addressing this subject. For instance, Al-Awadhi et al. (2020) analyze the impact of COVID-19 deaths and confirmed cases on stock returns, while Ali et al. (2020) investigate market reactions during different phases of the pandemic. Phan and Narayan (2020) and Haroon and Rizvi (2020) study the influence of news on the stock market. Ashraf (2020) examines market reactions to government measures, He et al. (2020) focus on industry-specific stock market responses, and Shen et al. (2020) analyze corporate performance during the pandemic period.

Regarding the labor market, two notable studies appear in the top 20. Dingel and Neiman (2020) classify occupations based on their feasibility for remote work, while Adams-Prassl et al. (2020) investigate the unequal distribution of the pandemic's effects on the labor market. Other studies among the top 20 address a range of topics, including public health measures (Bargain, 2020; Qiu et al., 2020), increasing uncertainty (Altig et al., 2020), childcare (Del Boca, 2020), inequalities (Blundell et al., 2020), education (Aucejo et al., 2020), food insecurity (Hobbs, 2020), and environmental impacts (Hepburn et al., 2020).

Table 4. Top 20 Most Cited Papers

Num	Paper	Total Citations	TC per Year
1	MCKIBBIN and FERNANDO (2021)	765	382,5
2	IVANOV (2020)	474	158
3	AL-AWADHI ET.AL. (2020)	416	138,66
4	HOBBS (2020)	361	120,33
5	DINGEL and NEIMAN (2020)	306	102
6	ADAMS-PRASSL ET.AL. (2020)	267	89
7	ALI ET.AL. (2020)	224	74,66
8	BLUNDELL ET.AL. (2020)	221	73,66
9	PHAN and NARAYAN (2020)	220	73,33
10	QIU ET.AL. (2020)	211	70,33
11	ALTIG ET.AL. (2020)	185	61,66
12	GOVINDAN ET.AL. (2020)	185	61,66
13	ASHRAF (2020)	184	61,33
14	HAROON and RIZVI (2020)	183	61
15	HE ET.AL. (2020)	177	59
16	BARGAIN (2020)	163	54.333

Num	Paper	Total Citations	TC per Year
17	AUCEJO ET.AL. (2020)	163	54,33
18	DEL BOCA D. (2020)	159	53
19	SHEN ET.AL. (2020)	159	53
20	HEPBURN ET.AL. (2020)	158	52,66

Table 5 presents the top 10 most frequently cited journals, highlighting the influential sources in early economic research on COVID-19. Among these, two journals stand out in particular: American Economic Review and Finance Research Letters. These journals have played a prominent role in shaping the research landscape during the initial stages of economic literature on COVID-19.

Table 5. Top 10 Most Local Cited Sources

Num	Source	Article
1	AMERICAN ECONOMIC REVIEW	929
2	FINANC. RES. LETT.	862
3	J. FINANC.	548
4	ENERG ECON	530
5	J. FINANC. ECON.	519
6	Q. J. ECON.	498
7	J. PUBLIC ECON.	463
8	EMERG. MARKET FINANC. TR.	413
9	INT. REV. FINANC. ANAL.	406
10	ECONOMETRICA	396

Another key aspect of bibliometric research is the country-specific distribution of publications. Table 6 presents the country-specific characteristics of our dataset. The column “Article” indicates the number of articles associated with the corresponding author’s country. “SCP” refers to single-country production, while “MCP” represents multiple-country production. The “MCP ratio” reflects a country’s collaboration rate with other countries in the dataset and is calculated as the number of a country’s total articles divided by its MCP.

According to the table, 2,050 of the 2,553 articles are attributed to the top 20 countries, indicating a highly concentrated distribution of publications among countries. In particular, the top three countries—the USA, China, and the UK—account for 52% of all publications. The average collaboration rate across countries is 0.37. The USA leads with 572 articles, of which 380 are SCP and 192 are MCP, demonstrating its high productivity. However, its collaboration rate of 0.34 is below the average. China ranks second with 272 articles, followed by the UK with 230 articles. Their MCP ratios are 0.45 and 0.49, respectively, indicating higher collaboration rates than the USA. Pakistan and South Korea exhibit the highest MCP ratios at 0.62 and 0.58, respectively, reflecting strong international collaboration. In contrast, Poland and India have the lowest MCP ratios at 0.12 and 0.14, respectively, suggesting limited international cooperation.

Regarding Turkey, the total number of articles produced is 34, placing it 15th among all countries in terms of article production. However, Turkey has a relatively low MCP ratio compared to other countries, indicating less international collaboration in its COVID-19 economic research.

Table 6. Country Specific Production

Country	Articles	SCP	MCP	MCP Ratio
USA	572	380	192	0.336
CHINA	272	149	123	0.452
UNITED KINGDOM	230	118	112	0.487
CANADA	107	74	33	0.308
GERMANY	103	58	45	0.437
INDIA	97	83	14	0.144
ITALY	97	59	38	0.392
AUSTRALIA	96	67	29	0.302
SPAIN	68	47	21	0.309
JAPAN	53	42	11	0.208
FRANCE	51	26	25	0.490
NETHERLANDS	42	26	16	0.381
RUSSIA	40	33	7	0.175
POLAND	34	30	4	0.118
TURKEY	34	24	10	0.294
KOREA	33	14	19	0.576
ROMANIA	31	23	8	0.258
SWITZERLAND	31	16	15	0.484
VIETNAM	30	14	16	0.533
PAKISTAN	29	11	18	0.621

Keyword analysis is one of the most significant components of bibliometric research. It helps identify researchers' areas of interest and highlights the main themes or most frequently studied aspects of a particular field. Table 7 presents the most frequently used keywords in descending order, based on both *Keyword Plus* (generated by the WOS algorithm) and *Author's Keywords*.

According to the table, there is a strong focus on financial implications, including terms such as "stock market," "returns," "transmission," and "volatility." Social implications are also prominently featured, with keywords like "lockdown," "social distancing," "inequality," "poverty," "uncertainty," and "public health." Additionally, labor market implications are represented by terms such as "employment" and "unemployment." Geographical implications are also notable, with keywords like "China" and "India" frequently appearing.

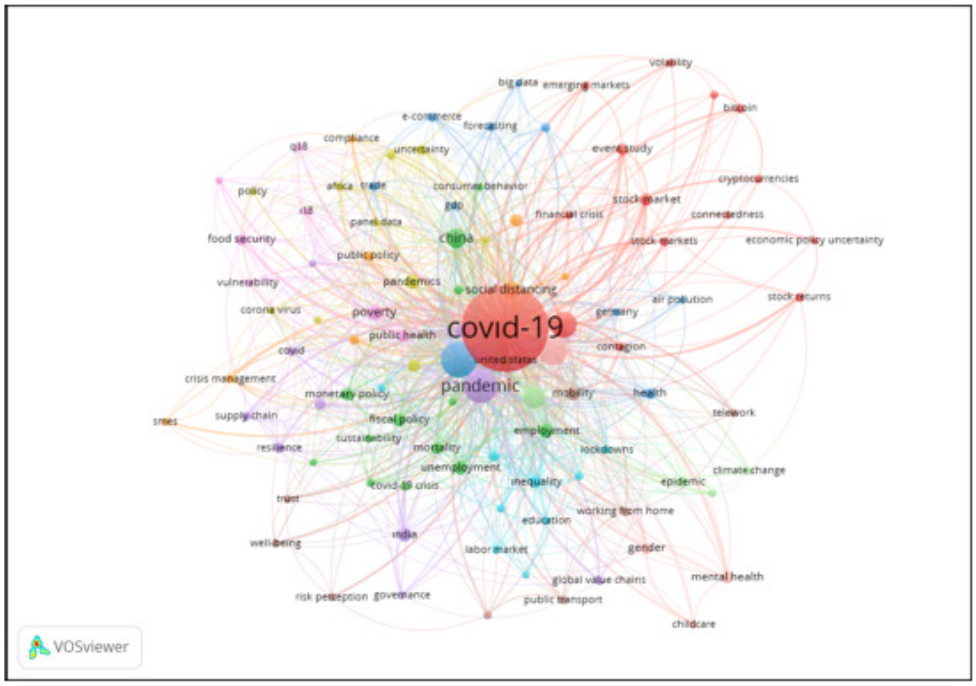
Table 7. Most Frequent Words

Keyword Plus	Author's Keywords
risk	pandemic
covid-19	lockdown
behavior	china
growth	social distancing
policy	inequality
volatility	crisis
returns	india
crisis	employment
poverty	pandemics
uncertainty	unemployment
stock market	mobility
shocks	fiscal policy
transmission	monetary policy
management	sars cov 2
crude-oil	public health

To enhance the keyword analysis, we utilized visualized maps generated with Vosviewer mapping software. Figure 1 illustrates the most frequent keywords that appeared at least ten times in our dataset. Out of 6,278 keywords, 99 met this threshold. The different colors and links in the visualization represent clustering effects and connections between keywords. Keywords of the same color can be identified as related subjects.

One of the clusters focuses on the stock market, represented by keywords such as "stock market," "volatility," "spillover," "connectedness," "oil," "bitcoin," "gold," and "financial crises." The labor market cluster includes terms like "working from home," "occupations," "self-employment," "gender," "child care," and "mental health." The supply chain cluster highlights issues like "food consumption," "food security," "food systems," "poverty," "Africa," "resilience," and "trade." Social issues are grouped under a cluster containing keywords such as "social distancing," "lockdown," "public policy," and "air pollution." Macroeconomic problems are represented by terms like "exchange rate," "international trade," and "inflation." Interestingly, "inflation," which is a potential consequence of prolonged quarantine and lockdown periods, has not appeared as frequently as expected in the analysis.

Figure 1. Keyword Analysis



3.2 Sub-sample

In this subsection, we formed a sub-sample from our full sample by selecting 100 articles that employed econometric tools, ranked based on their citation counts. This section presents the findings from the network analysis conducted on the sub-sample.

Table 8 presents the most frequent keywords in the sub-sample, listed in descending order for both *Keyword Plus* and *Author's Keywords*. Finance-related terms, such as "risk," "returns," and "volatility," dominate the top of the list. In contrast, *Author's Keywords* emphasize social implications, with terms like "social distancing," "childcare," "inequality," and "lockdowns" appearing prominently. To further enhance the keyword analysis, we generated visualized maps using Vosviewer mapping software.

Figure 2 illustrates the most frequent keywords that appeared in the sub-sample. Similar to Figure 1, different colors and links represent clustering effects and the connections between keywords. Several clusters are evident: one focuses on financial markets, represented by keywords such as "bitcoin," "gold," "financial crises," and "cryptocurrencies." Another cluster centers on public health, with keywords like "lockdowns" and "social distancing." A third cluster is related to well-being issues, including terms like "childcare," "boredom," "poverty," and "mental health."

After carefully examining Figure 1 and Figure 2, along with conducting an in-depth reading of the 100 articles in the sub-sample, we identified five main clusters to classify the articles: financial markets, public health, labor market, well-being, and macroeconomic impacts. The classification of the sub-sample articles is presented in Table 9.

We further divided these five main clusters into subcategories and calculated the frequency of articles in each cluster. Financial markets emerged as the most studied cluster, accounting for 34% of the articles, followed by macroeconomic impacts with 24%, public health with 19%, and both the labor market and well-be-

ing clusters with 12% each. Financial Markets includes studies analyzing the reactions of financial assets, stock markets, and corporate performance to the COVID-19 pandemic. The Public Health cluster includes studies focusing on the effectiveness of public health measures, compliance with those measures, and the transmission of the virus between cities and countries. The Labor Market cluster primarily covers studies on new working arrangements, inequalities created by these arrangements, gender inequality, and unemployment. The Well-Being cluster examines life changes caused by the pandemic, including its effects on childcare, increased housework, mental health, and education. Finally, the Macroeconomic Impacts cluster, unlike the other clusters, is more heterogeneous and encompasses a wide range of studies on topics such as uncertainty, fear, food insecurity, environmental impacts, and consumption patterns.

Table 8. Most Frequent Words in Sub-sample

Keyword Plus	Author's Keywords
returns	lockdown
volatility	pandemic
mortality	childcare
bitcoin	inequality
children	bitcoin
contagion	china
crude oil	event study
returns	google trends
energy	predictability
social distancing	shelter in place
growth	stock returns
financial crisis	unemployment
inflation expectations	well being
investor sentiment	working from home
nitrogen dioxide	air pollution

Table 9. Frequency of Clusters in Sub-sample

Cluster		Frequency	%
Financial Markets			33 %
	Financial markets	16	
	Stock markets	11	
	Corporate performance	6	
Public Health			19 %
	Effectiveness	10	
	Compliance	7	
	Transmission	2	
Labor market			12 %
	Working arrangements	3	
	Inequality	2	
	Gender gap	3	
	Employment	4	
Well-being			12 %
	Domestic violence	2	
	Childcare	4	
	Mental health	2	
	Education	4	
Macroeconomic Impacts			24 %
	Uncertainity	4	
	Fear	3	

Cluster		Frequency	%
	Consumption	3	
	Investment	1	
	Globalization	1	
	Environment	4	
	Food insecurity	5	
	Sectoral impacts	2	
	Trade	1	
Total		100	100 %

Figure 2. Keyword Map in Sub-sample

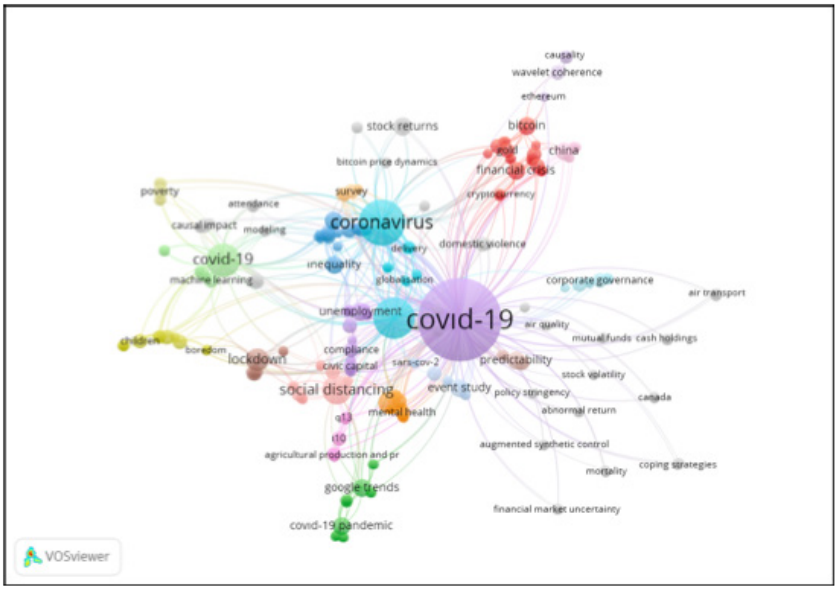


Table 10 presents the frequency of empirical methods used in the studies. The difference-in-differences (DiD) approach is the most frequently employed method, accounting for 26% of all studies. This is followed by GARCH-type models and VAR models, which are particularly prevalent in financial market studies, with a combined share of 16%. Other commonly used empirical methods include OLS regression, panel regression, event study methods, and logit and probit models. Additionally, other methods, which collectively make up the remainder, primarily consist of decomposition methods, machine learning techniques, two-stage least squares (2SLS), and instrumental variable (IV) regression methods.

Table 10. Frequency of Empirical Methods

Method	%
Difference-in-Differences/ Synthetic Controls	26 %
Garch Models / VAR	16 %
OLS	14 %
Panel Regression	14 %
Event Study	7 %
Logit & Probit Models	5 %
Others	18 %
Total	100 %

4. Literature Review

In this section, we provided a detailed literature review of our sub-sample to offer a deeper understanding of COVID-19 research during its first two years. Through a close reading of the sub-sample, we identified five main research topics corresponding to our primary clusters: financial markets, public health, labor markets, well-being, and macroeconomic impacts. While this section briefly outlines the main research directions within these categories, the extended reviews of the sub-sample are presented in Table 11.

4.1 Financial Markets

This group of articles primarily examines the effects of COVID-19 cases, death rates, and containment policies on financial markets. The majority of studies confirm the adverse impact of COVID-19 on stock

markets (Al-Awadhi, 2020; He et al., 2020; Ashraf, 2020; Liu et al., 2020; Schell et al., 2020; Ahn and Gan, 2020). Additionally, empirical evidence shows that COVID-19 has significantly increased volatility in financial markets (Haroon and Rizvi, 2020a; Corbet et al., 2020b; Ali, Alem, and Rizvi, 2020; Salisu et al., 2020). Global uncertainty and fear have amplified volatility spillovers and financial contagion. However, Salisu and Akanni (2020a) found that commodity returns increased globally during periods of heightened fear.

Another stance of the literature focuses on exchange rate movements during the pandemic (Narayan et al., 2020; Umar and Gubarevo, 2020). Iyke (2020) found that COVID-19 provides better predictability for exchange rate volatility compared to stock returns. Additionally, the cryptocurrency market's reaction during the pandemic has been analyzed in terms of its safe-haven properties, volatility, trading volume, and fear-driven sentiments (Demir et al., 2020; Corbet et al., 2020a; Chen et al., 2020). Another group of studies within this domain examines corporate performance during the COVID-19 period, as discussed by Shen et al. (2020), Fahlenbrach et al. (2021), and Xiong et al. (2020).

4.2 Public Health

This group of articles evaluates the impact of public health measures in two main categories: the effectiveness of measures and compliance behavior. Regarding effectiveness, studies have shown that lockdowns and containment policies are associated with lower case numbers and reduced virus transmission (Qiu et al., 2020; Fang et al., 2020; Dave et al., 2020; Bonacini et al., 2020a; Cho, 2020). Some studies further examine how heterogeneity affects the effectiveness of containment measures, focusing on population characteristics (Bennett, 2020; Chernozhukov et al., 2020) and income disparities (Balmford et al., 2020).

The compliance behavior of individuals with public health measures has been explored in several studies, emphasizing the influence of socioeconomic factors (Papageorge et al., 2021), trust in politicians (Bargain and Aminjonov, 2020), civic capital (Durante et al., 2021; Barrios et al., 2021), population characteristics (Borkowski et al., 2021; Wright et al., 2020), and fear (Goolsbee and Syverson, 2021).

4.3 Labor Markets

This group of articles primarily examines new working arrangements, such as working from home, and their consequences on inequality and the gender gap. Empirical studies confirm that containment policies and shutdowns across various industries led to significant unemployment, particularly during the early stages of the pandemic (Bauer and Weber, 2020; Couch et al., 2020; Baek et al., 2021; Kong and Prinz, 2020). Additionally, containment measures like stay-at-home orders resulted in widespread adoption of remote working arrangements, affecting a substantial number of workers.

Dingel and Neiman (2020) classified jobs based on their feasibility for remote work. Similarly, Bonacini et al. (2020b) and Gallacher and Hossain (2020) investigated the feasibility of working from home and identified varied impacts on workers.

Another focus within labor market outcomes addresses inequality and the gender gap. Adams-Prassl et al. (2020) highlighted the unequal distribution of COVID-19's impact on the labor market. Dang and Nguyen (2021) estimated gender inequality in terms of expected labor income and found that the pandemic has exacerbated the gender gap in the labor market.

4.4 Well-being

This group of articles primarily focuses on the well-being of households, particularly in areas such as childcare, domestic violence, mental health, and education. Studies on childcare (Del Boca et al., 2020; Huebener et al., 2020; Baron et al., 2020) report a decline in the well-being of parents and an unequal distribution of additional childcare responsibilities, with a disproportionate increase in the burden on women.

Another significant topic is domestic violence. Studies (Augero, 2020; Leslie and Wilson, 2020) indicate an increase in household violence as a result of stay-at-home policies. Mental health outcomes of these policies have also been examined, with Brodeur et al. (2020) and Cheng et al. (2021) finding substantial mental health deterioration in households.

Education is another critical area affected by the pandemic. COVID-19 led to school closures globally, and the disruptive effects of confinement policies on education have been investigated in several studies (Andrew et al., 2020; Aucejo et al., 2020; Bacher-Hicks et al., 2020). These studies highlight the significant challenges posed by lockdowns on learning and educational outcomes.

4.5 Macroeconomic impacts

This group of articles evaluates the macroeconomic effects of the COVID-19 pandemic across various domains. The pandemic has caused a substantial increase in economic uncertainty, as highlighted by Gupta et al. (2020), Caggiano et al. (2020), Altig et al. (2020), and Fetzer et al. (2020). Similarly, Salisu and Akanni (2020b) and Keane and Neal (2020) developed a global fear index, reporting widespread consumer panic.

The pandemic also led to significant changes in consumption patterns, particularly in the food and grocery market (Chenarides et al., 2020; Liu et al., 2020; Chang and Meyerhoefer, 2021). Lockdowns disrupted supply chains, caused a decline in agricultural production, and exacerbated food insecurity, as indicated by studies such as Yu and Liu (2020), Gundersen et al. (2020), Mahmud and Riley (2021), Kansiime et al. (2021), and Zhang et al. (2020).

Another key area of focus is the environmental effects of the pandemic. Cole et al. (2020a) and Coker et al. (2020) reported a positive relationship between air pollution and COVID-19 cases and deaths. Furthermore, Cole et al. (2020b) examined the effects of lockdowns on air pollution, revealing heterogeneous impacts on air quality.

Table 11. Deep Literature Review of Sub-sample

Paper	Cluster	Sample	Methodology	Motive of Paper	Findings
Iyke (2020)	Financial markets	25 countries, daily data	GARCH	Examine Covid-19 effect on predictability of returns and volatility of exchange rates	Evidence of better predictability on volatility than returns.
Narayan et.al. (2020)	Financial markets	Japan, 04/01/2010-30/12/2019 (pre-Covid) 31/12/2019-16/08/2020(post-Covid), daily data	GARCH-M, VAR	Examine how pandemic influenced the exchange rates-stock return relationship before and after for Covid-19 period.	Evidence of depreciation of exchange rate leads to gains in stock returns.
Chen et.al.(2020)	Financial markets	Jan 15-April 24 2020, hourly data	VAR	Examine the impact of fear sentiment on Bitcoin prices.	Evidence of the negative impact of fear on Bitcoin prices, fear sentiment caused increased volatility, and Bitcoin fails to act as a safe haven during Covid-19.
Haroon and Rizvi (2020b)	Financial markets	12 Emerging markets, Jan 1-April 30 2020, daily data	E-GARCH	Examine pandemic impact of real human cost and government response on liquidity in emerging markets.	Evidence of decreasing number of cases and movement restrictions are associated with improving liquidity in financial markets.
Yarovaya et.al. (2021)	Financial markets	Spain, Italy, France, Belgium, Germany, Jan 1- June 2 2020,	Panel Regression	Evaluate the impact of human capital efficiency on equity fund performance.	Higher ranked human capital efficiency funds outperformed from low ranked ones.
Corbet et.al. (2021)	Financial markets	China, 5 min data	DCC-GARCH, VAR model	Evaluate the volatility spillover from Chinese financial markets upon traditional financial assets.	Evidence of the pronounced and persistent effect of coronavirus upon financial markets.
Umar and Gubareva (2020)	Financial markets	World, Jan-May 2020, daily data	Wavelet coherence	Examine the impact of Covid-10 related panic on the volatility of major fiat and cryptocurrencies market.	Exchange rate movements are well synchronized with panic level dynamics.
Salisu and Akanni (2020a)	Financial markets	US, March 11-May 18 2020, daily data	Panel regression	Evaluate the predictive power of global fear index on commodity price returns.	Results confirm that commodity returns increase with Covid-19-related fear.
Demir et.al. (2020)	Financial markets	World, 09/2019-03/2020, daily data	Wavelet coherence	Examine the relationship between cryptocurrencies and Covid-19 related death cases.	Evidence of the initial negative relationship between Bitcoin and death cases but after some period this relationship turn to positive and Bitcoin play a hedging role of cryptocurrencies against uncertainty raised by Covid.
Corbet et.al.(2020a)	Financial markets	World, Jan 1- 31 March 2020	GARCH	Examine the effect of Covid-19 related sentiment on cryptocurrency returns.	Significant growth in both returns and trading volume, cryptocurrencies act as a store of value during this period.
Akhtaruzzaman et.al.(2021)	Financial markets	World, 2 Jan 2018-24 Apr 2020, hourly data	DCC–GARCH model, generalized vector autoregression	Examine the role of gold as a hedge or safe-haven asset in different stages of the COVID-19 pandemic	Evidence of a strong safe-haven role for Phase I (31/12/19-16/03/2020) gold lost its safe-haven role during Phase II (17/03/20-24/04/20).
Corbet et.al.(2020b)	Financial markets	China, 01/05/2019-1/05/2020, hourly data	DCC-FIGARACH, Generalized VAR	Evaluate spillover from oil to renewable energy firms and coal markets	Positive and significant effect from falling oil to both renewable energy and coal.
Ali, Alem, and Rizvi (2020)	Financial markets	World, Jan 1-March 10 2020, daily data	Exponential GARCH	Investigate stock and commodity markets reaction by different financial securities through dividing sample to phases.	Volatility increased tremendously from epidemic to pandemic period, highest volatility in the US phase, gold was found to least volatile.
Mishra et.al. (2020)	Financial markets	Indian, Jan 2003-April 20 2020, daily data	MS-VAR	Analyse the impact of Covid-19 on the Indian financial market by comparing its effects with the demonetization and good and services tax.	Deeper effect of Covid-19 compared to the other two structural changes.
Salisu et.al. (2020)	Financial markets	15 countries (worse hit by Covid-19), Jan 4 2019-May 29 2020	Panel VAR, Logit Regression	Examine the response of oil and stocks to Covid-19 shocks distinctively for before and after periods of Covid-19 outbreak.	Evidence of greater initial impact on both oil and stock in after period with a larger impact for former.

Liu et.al. (2020)	Financial markets	China, 1993-2020, quarterly data	Wavelet Decomposition	Evaluate the resilience of the Chinese economy to Covid-19 shock by investigating the business and financial cycles.	cycles are in the contraction phase before COVID-19. Also, the Chinese business and financial cycles are decoupled from the global financial cycle since 2015.
Al-Awadhi et.al. (2020)	Stock market	China, 10 Jan-16 March 2020, daily data	Panel Regression	Whether contagious infectious diseases affect stock market outcomes	Stock returns are significantly negatively related to both growth of confirmed cases and deaths.
Haroon and Rizvi (2020a)	Stock market	World, US, 1 Jan-30 April 2020, daily data	Exponential GARCH	Examine the effect of coronavirus related news on the volatility of the stock market.	Evidence of positive effect, increasing panic lead increasing volatility on the stock market, deeper impact on cost affected sectors.
He et.al. (2020)	Stock market	China, daily data	Event study	Examines the response of the Chinese stock market to Covid-19 outbreak across industries.	Evidence of various impacts across industries, deep impact on traditional industries like transportation, mining, electricity but positive impact on high-tech, information tech, education, health.
Ashraf (2020)	Stock market	77 countries, Jan 22-April 17 2020, daily data	Panel Regression	Examine the effect of government measures on the stock market.	Evidence of direct negative impact on stock returns via decreasing economic activity but indirect positive effect on returns via decreasing Covid-19 cases.
Liu et.al. (2020)	Stock market	World, March 2020,daily data	Event Study	Evaluate the response of the market to 11 March 2020 WHO announcement	Considerable negative effect on stock market around the world, various responses with different income level countries, higher-income countries overreacted and back bound ore rapidly than lower ones.
Schell et.al.(2020)	Stock market	World, 22/04/2008-12/03/2020, daily data	Event Study	Evaluate the impact of six Public Health Risk Emergency of International Concern (PHEIC) announcements including Covid-19 one on stock markets.	Among all 6 PHEIC announcements only the Covid-19 announcement had a significant negative impact on stock markets at least lasting 30 days.
Anh and Gan (2020)	Stock market	Vietnam, Jan 30-May 30, daily data	Panel data regression	Evaluate the impact of daily Covid-19 cases on the stock market before and after lockdown.	Evidence of various effects pre-lockdown and lockdown period, in pre-lockdown daily cases had a significant negative impact on returns however in lockdown period there is a significant positive impact on stock performance.
Liu et.al. (2020)	Stock market	China, October 2019-May 2020, daily data	Event Study	Evaluate the impact of the Covid-19 outbreak on Chinese and Asian stock markets with a sector-based analysis.	Evidence of heterogeneous responses across industries, negative impact on transportation, lodging, and catering, and positive impact on pharmaceutical manufacturing, software, and IT services.
Gao et.al. (2021)	Stock market	US, China, daily data	quantile-on-quantile method, Wavelet decomposition	Compare the impact of Covid-19 on stock market volatility between US and China	Us stock market more sensitive to Covid-19 in the earlier period and initial impact exceed oil price volatility but in later periods adapted to higher daily death cases while the volatility of China's stock market lower than oil price fluctuations imply lower interest rates effective surpasses fluctuations on market.
Ambros et.al. (2020)	Stock market	EU, US, Jan 1-March 31 2020, 5 min data	OLS Regression	Examine the impact of Covid-19 related news on stock market indices.	Evidence of Covid-19 news has no impact on stock returns, however, volatility is highly affected significantly in both EU and US markets.
Harjoto et.al. (2020)	Stock market	World, US, 03/2019-04/2020, daily data	Event Study	Evaluate the stock market reaction to WHO announcement(pandemic) and FED announcement(stimulus)	Evidence of a negative shock to global stock market especially in emerging markets and small firms while US stock market experienced a positive impact from the stimulus, especially in large firms

Xiong et.al. (2020)	Corporate performance	China, 23/01/2020(event day), daily data	Event Study	Examine financial market reaction to Covid-19 outbreak	Evidence of firms with larger scale, good financial conditions experience less adverse impact from Covid-19, firms with high institutional investors and located in vulnerable sectors affected more intensely.
Shen et.al. (2020)	Corporate performance	China, 2013-2019, quarterly data	Difference-in-Differences	Analyse impact of Covid-19 on firm performance.	Evidence of negative impact, deeper impact in small scale firms (in terms of investment and sales revenue), seriously affected industries.
Ding et.al. (2020)	Corporate performance	61 countries, Jan 3 - May 22 2020,daily data	Cross-country panel analyze	Examine how firm's conditions affect the response to Covid-19.	Evidence of stronger financial conditions firms experiences milder effect in stock returns.
Fahlenbrach et.al (2021)	Corporate performance	US, Feb 3-March 23 2020, daily data	Cross-sectional regression	Examine the relation of firms' financial flexibility with their stock's price reaction to Covid-19 outbreak.	High financial flexibility is related to low stock price drop also a revenue shortfall affect less a firm's stock price if the firm is more financially flexible.
Qin et.al. (2020)	Corporate performance	China, 2014-2020,	Difference-in-Differences	Covid-19 impact on firm's cash holdings.	Evidence of significant positive impact on cash holdings in seriously impacted industries but goodwill and goodwill impairment can weaken this positive impact of Covid-19.
Gu et.al. (2020)	Corporate performance	China, Jan-March 2020, daily data	Difference-in-Differences	Examine the impact of Covid-19 on economic activity of micro-enterprises.	Evidence of more negative impact on private firms and smaller firms, by industries, greatest negative impact on manufacturing while information, computer services, software, health care impacted positively from Covid-19
Qiu et.al. (2020)	Effectiveness	304 Cities in China, Jan 19-Feb 29 2020, daily data	2SLS, IV Regression	Assessment the impact of public health measures like lockdowns, social distancing on the transmission rate.	Evidence of effectiveness, stringent health policies reducing transmission.
Alfano and Ercolano (2020)	Effectiveness	World, Jan 22-10 May 2020, daily data	Cross-Country Panel Analyse	examine the effectiveness of lockdown policies	Evidence of effectiveness of lockdown in reducing new cases.
Beck and Hensher (2020)	Effectiveness	Australia, late of March 2020, survey data	OLS Regression	Examine the impact of government restrictions on travel activity.	Evidence of effectiveness of policies on limiting ravel activity and flattening the curve.
Fang et.al. (2020)	Effectiveness	China, Jan 12-March 12 2019 and Jan 1-Feb 29 2020, daily data	Difference-in-Differences	Examine the casual impact of Wuhan lockdown on human mobility and spread of the virus.	Evidence of effectiveness in reducing spread, counterfactual evidence suggests that cases would be higher in 347 Chinese cities if Wuhan had not been locked.
Dave et.al. (2021)	Effectiveness	US states, March 8-April 17 2020, daily data	Difference-in-Differences	Examine the effects of stay in home orders	Evidence of stay in home orders increased 10% of residents stay at home full time, following orders after three weeks lead 53,5% decrease in cumulative Covid-19 cases.
Chernozhukov et.al. (2021)	Effectiveness	US States,07/03/2020-03/06/2020, daily data	SIR Model, Counterfactual experiment	Evaluate the dynamıc ımpact of public health measures.	Substantial decline in the growth of cases is related to personal behavior but governmental policies played an important role as well.
Balmford et.al. (2020)	Effectiveness	37 OECD Countries,	Cross-country regression	Examine the Covid-19 variations across multiple countries by assessing policy tools like timing, rapidity or duration of lockdown.	Provide evidence of policy tools are responsible for the majority of variations rather than income differences or inequality.
Bonacini et.al. (2021a)	Effectiveness	Italy, Feb 24–April 24 2020, daily data	Fixed effects panel model	Evaluate the effectiveness of different lockdown periods.	Evidence of the first lockdown was the most effective one but delayed effect and the last lockdown is a less impacted one.
Bennett (2020)	Effectiveness	Chile, March 15-May 4 2020, daily data	Augmented Synthetic Control Method	Evaluate effects of lockdown and testing policies for different population characteristics.	Evidence of effective lockdown in higher-income areas, insignificant impact on lower-income areas. These differences could be partially attributed to mobility, as well as different testing availability for higher and lower-income areas.

Cho (2020)	Effectiveness	Sweden, Feb-March 2020,daily data	Synthetic Control Method	Evaluate the impact of government containment policies on public health	Evidence of initial lockdown measures played an important role in limiting new cases but this impact occurred with a 5 week time lag. Lockdowns are associated with a 25% lower excess mortality rate also.
Bargain and Aminjonov (2020)	Compliance	Europe, March 1-April 5 2020, daily data	Difference-in-Differences	Examine the impact of trust in politicians and compliance of lockdown policies.	Evidence of decreased mobility with trust, a significant decrease in mobility in high trust regions for non-necessary activities.
Goolsbee and Syverson (2021)	Compliance	US, March 1 - May 16, 2020, daily data	Panel regression	Examine the economic slowdown due to governmental restrictions by comparing consumer behavior across different industries.	Evidence of individual choice and fear is far more important than legal shutdown orders for declining economic activity, shutdown orders consist of only a modest share of change in consumer behavior.
Papageorge et.al. (2021)	Compliance	US, UK, Italy, China, Japan, Korea, April 15-23, survey data	survey design	Examine the relationship of socioeconomic factors and self-protecting behavior.	Evidence of a positive relationship between higher income and self-protective behavior.
Wright et.al.(2020)	Compliance	US, Feb 23- May 1 2020, daily data	Difference-in-Differences	Evaluate the factors which affect compliance of stay at home orders.	Evidence of stay-in-home orders reduced movement and this reduction is increasing with high-income area residents.
Barrios et.al. (2021)	Compliance	US, Europe, Feb 24-April 9 2020, daily data	OLS	Examining relationship between civic capital and social distancing behavior.	Higher civic capital areas are associated with greater voluntary social distancing areas.
Borkowski et.al. (2021)	Compliance	Poland, March 24 - April 6 2020, survey data	General Linear Model	Evaluate the change in mobility in response to Covid-19 by considering different characteristics of respondents.	Results indicate a significant drop in travel times regardless of age and gender groups.
Durante et.al.(2021)	Compliance	Italy, Germany, Jan 1-May 3 2020, daily data	Difference-in-Differences	impact of civic capital on social distancing behavior	Evidence of deeper mobility decline with higher civic capital areas.
Milani (2021)	Transmission	41 Countries, Feb 15-Jun 14 2020, daily data	Global VAR model	Assess global transmission of Covid-19 and social network analysis across countries.	Domestic variables are significantly affected by foreign aggregates shocks from Italy, which significantly and strongly affected affect the risk perception and social distancing behavior across countries while shocks from the US, Spain, and the UK have a moderate effect on them.
Zhang et.al. (2020)	Transmission	China, Feb 1 and Feb 15 2020	Gravity model	Evaluate the role of transportation on Covid-19.	Evidence of flights and high-speed train services out of Wuhan are significantly affected total Covid-19 cases also the presence of an airport or train station in a city associated with the spread of the pandemic but the link with total confirmed cases is weak.
Bonacini et.al. (2021b)	Working arrangements	Italy, survey data	Quantile regression	How long-lasting working from home feasibility affected labor income distribution.	Evidence of unequal effects of working from home arrangements, an increase in working from home would benefit to male, older, educated, highly-paid employers.
Bauer and Weber (2020)	Working arrangements	Germany, April 2020	Difference-in-Differences.	Short-run labor market impact of containment measures.	Due to shutdown measures 60 % considerably increase in inflow from employment into unemployment.
Gallacher and Hossain (2020)	Working arrangements	Canada, Feb-April 2020, survey data	OLS regression	Estimate the feasibility of working from home across workers	Various impact on workers, poor workers, small firm workers, contractual workers, without a college degree workers less likely to perform at home and experience larger employment loses. However female workers and immigrants tend to work in higher work-at-home feasibility occupations.
Adams-Prassl et.al. (2020)	Inequality	UK, US, Germany, April 2020, survey data	OLS regression	Analyze the immediate impact on labor market.	Evidence of unequal distribution of impacts.

Heggeness (2021)	Inequality	US, Jan-May 2019-2020,monthly data	Difference in Differences	Examine the impact of Covid-19 shock on parents' labor supply.	Evidence of no effect on parents who had no school-age children suffered no changes, in contrast to those who had school-age children. The COVID-19 pandemic reinforces different gender-based roles of parenting as a significant driver of the wage gap.
Hupkau and Petrongolo (2020)	Gender gap	UK, 24-30 April, 27 May-2 June, survey data	Survey Design	Evaluate the impact of the pandemic on labor market outcomes with unequal consequences on gender.	Evidence of similar employment losses or furloughing for men and women. Within the household, however, women provide a larger share of increased childcare needs but also an important share of households fathers became the primary childcare providers.
Dang and Nyugen (2021)	Gender gap	China, S.Korea, Japan, Italy, UK, US, April 15-23 2020, survey data,	Oaxaca-Blinder decomposition	Examine the impact of Covid-19 on gender inequality.	Women expect a fall in their labor income far more than men do also women are 24 % more likely to permanently lose their jobs.
Qian and Fuller (2020)	Gender gap	Canada, Feb-May 2020, monthly data	Logistic regression	Examine whether gender employment gap among parents of young children widened during lockdown	Evidence of growing gap among elementary school children rather than preschoolers and among less-educated parents.
Couch et.al.(2020)	Employment	US, April-June, survey data	Difference-in-Differences	Covid-19 impact on minority unemployment like blacks, Latins	Evidence of stagnant employment gap between whites and minority groups in April 2020, but in the following month, this gap increased because whites disproportionally rehired when blacks and Latins don't, also Latins are the most unequally affected group.
Baek et.al. (2021)	Employment	US, March 14-April 4 2020,daily data	Cross-sectional regression	Evaluate labor market effects of stay-in-home(SAH) orders	SAH orders increased weekly initial unemployment insurance claims by 1.9 % in a state relative to others.Also, results indicate only 4 million of unemployment claims can be attributed to SAH orders out of 17 million.
Kong and Prinz (2020)	Employment	US, March 14–28 2020, daily data high-frequency data	Event study, Difference-in-Differences	Evaluate the impact of six non-pharmaceutical intervention announcements on employment.	Most of the short-run increases in unemployment insurance claims are likely due to factors relating to consumer demand, local policies, and policies implemented by private firms and institutions. Among six NPIs restaurants and bars, limitations can explain 6.0%, and non-essential business closures can explain 6.4% of UI claims. The other four NPIs did not directly increase own-state UI claims.
Cajner et.al. (2021)	Employment	US, Feb-Jun, weekly data	Panel regression	Evaluate labor market reaction during the first months of pandemic	Evidence of a substantial decrease in employment by 21% until late April, however, it rebounds partially through to June. Employment losses have been disproportionately affect lower wage workers.
Agüero (2020)	Domestic violence	Peru, 2007-2020, monthly data	Difference-in-Differences	Examine the effect of stay-in-home policies and violence against women	Evidence of increased call rate to helpline services by 48% in lockdown period.
Leslie and Wilson (2020)	Domestic violence	14 metropolitan cities in US, March 2019-May 2020, daily data	Difference-in-Differences	Examine impact of Covid-19 on domestic violence.	Evidence of increased domestic violence calls by 7,5%.
Del Boca et.al. (2020)	Childcare	Italıa, April 2019-April 2020, survey data	OLS Regression	Analyse new working arrangements effects on housework and childcare	Evidence of not equally distributed additional workload, women spend far more time in both housework and childcare but childcare more equally shared between man and women.

Huebener et.al. (2021)	Childcare	Germany, May-June 2020, survey data	Difference-in-Differences	Evaluate the effect of Covid-19 restrictions on parents with depending children.	Decrease in well-being in parents, especially for women, parents with low education qualification and young children parents.
Baron et.al. (2020)	Childcare	Florida, Jan 2004-April 2020, monthly data	Difference-in-Differences	Examine the impact of Covid-19 related closures of schools on reporting maltreatment against children	Evidence of negative impact on reported maltreatment.
Zamarro and Prados (2021)	Childcare	US, survey data	Multi-nominal Discrete Choice Logit Model	How parental behavior affected by Covid-19 outbreak in terms of childcare, employment, working arrangements, psychological distress level	Increased childcare responsibility associated with a reduction of working hours, burden on women increased more than men experience and increased the probability of transitioning out of employment for women.
Brodeur et.al (2020)	Mental health	Europe and US, Jan 1 2019-April 10 2020, daily data	Difference-in-Differences, RD Design	Examine the effect of lockdown on mental health.	Evidence of severe effect on mental health and well-being.
Cheng et.al. (2021)	Mental health	UK, April-May 2020, survey data	OLS Regression	Evaluate the impact of Covid-19 crises on working parents in terms of mental health, financial insecurity, and gender inequality.	Evidence of deterioration of mental health is worse for working parents, and that it is strongly related to increased financial insecurity and time spent on childcare and homeschooling.
Andrew et.al. (2020)	Education	UK, April 29-June 20 2020, survey data	Difference-in-Differences	Examine home-learning characteristics of children and their association with family income-related inequality before and after Covid-19 outbreak.	Evidence of heterogeneity across time spent learning and availability of resources. This heterogeneity is strongly associated with family income and in some instances more so than before lockdown.
Aucejo et.al. (2020)	Education	Survey data, April 2020	IV regression	Analyse the impact of the pandemic on higher education.	Evidence of negative effects in the form of delayed graduation, loss of a job offer, the expectancy of lesser earnings, and withdraw from classes.
Bacher-Hicks et.al (2020)	Education	US, June 2015-May 2020, weekly data	Difference-in-Differences	Examine the change in searching for online learning sources as schools closed.	Both school and parent-centered online learning sources search had roughly doubled after Covid, and higher-income areas saw a substantially larger increase in search intensity.
Bansak and Starr (2021)	Education	US, April-July 2020, survey data	Panel Regression	Evaluate the implications of distant learning on children and parent especially in time usage	Households spend more time on helping their children regardless of education level. Black and Hispanic households have a higher probability of spending time helping their children over the course of a given week than equivalent white non-Hispanic counterparts.
Gupta et.al. (2020)	Uncertainty	US, 25/11/1985-17/06/2020, daily data	Dynamic Nelson-Siegel three-factor model, DCC-MGARCH	Evaluate the news based uncertainty rising from infectious diseases on US treasury securities.	Evidence of safe-haven behavior of US treasury securities both in medium-term and short-term.
Caggiano et.al. (2020)	Uncertainty	World, Jan 1990-March 2020, monthly data	VAR model	Evaluate the effect of uncertainty caused by Covid-19 on output	Evidence of 1,6 % peak negative impact and over one year cumulative effect 14 % .
Altig et.al. (2020)	Uncertainty	US, monthly data	VAR Model	Analyse the response of uncertainty measures to Covid-19 and impact on output and employment.	Huge uncertainty across different uncertainty measures, negative impact on both output and employment but smaller in the latter.
Fetzer et.al. (2020)	Uncertainty	World, Jan-Feb 2020, daily data	Difference in Differences	Assessment of Covid-19 related economic anxiety	Evidence of a substantial increase in economic anxiety.
Salisu and Akanni (2020b)	Fear	OECD, BRICS 11/03/2020–30/04/2020,daily data	Scenario Analysis	Construct global fear index(GFI) and test its predictability	Evidence of good predictability of GFI.

Keane and Neal (2020)	Fear	54 Country, Jan 1 - April 30 2020, daily data	Weighted least squares	Develop a panic index to examine panic behavior during Covid-19	Evidence of widespread consumer panic, especially in March across most countries but timing and severity varies. There is a significant effect of virus transmission on panic, movement restrictions contribute to panic substantially, stimulus packages had a smaller effect on panic, and travel restrictions seem to have generated no effect on panic.
Binder (2020)	Fear	US, March 2020, survey data	Ordered Probit Model	Evaluate the effects of Covid-19 on macroeconomic expectations	He documents concern about coronavirus is related to higher inflation expectations and more pessimistic unemployment expectations.
Chenarides et.al. (2020)	Consumption	US, May 2020, survey data	Ordered Probit Model	Examine food shopping and consumption behavior during Covid-19 period.	Evidence of increased food consumption from the pre-covid level, %255 increase in the number of households using grocery pickup services and %158 increase in utilizing grocery delivery services.
Liu et.al. (2020)	Consumption	China, Jan-March 2020, survey data	OLS Regression	Impact of Covid-19 on Chinese household consumption.	Significant decline in household consumption however rural household consumption was less affected than urban households.
Chang and Meyerhoefer (2021)	Consumption	Taiwan, Jan 21- April 6, daily data	Panel Regression	How Covid-19 affected the demand for online shopping behavior.	Positive relationship confirmed cases and online sales and number of customers, most increased ones are grains, fresh fruit, vegetables.
Yue et.al.(2020)	Investment	China, Feb 12-March 22, Survey data,	Logit-Probit models	Evaluate impact of Covid on household investment decisions.	Result indicate 9,19 % decrease in total investment. Increased probability for change in household investments.
Zimmermann et.al. (2020)	Globalization	World, March 2020	Cross-country regression	evaluate the relationship between coronavirus and globalization.	Evidence of a positive relationship between spread and globalization but also globalized countries are better equipped to keep fatality rates low.
Cole et.al. (2020a)	Environment	Netherlands, Feb-Jun 2020, daily data	Negative Binomial model, Spatial Spillover model	Examine the relationship between air pollution and Covid-19.	Evidence of a positive relationship between air pollution and Covid-19 cases and a number of deaths.
Coker et.al (2020)	Environment	Italia, Jan-March 2020, daily data	Negative Binominal Regression	Evaluate the relationship between air pollution and Covid-19 deaths.	Evidence of a positive association between PM concentration and excess mortality, one unit increase in PM concentration was associated with a 9 % increase in deaths.
Rousseau and Deschacht (2020)	Environment	Europe, Jan 19-April 20 2020, daily data	Difference-in-Differences	How awareness of environment and nature evolved during Covid-19 period.	Evidence of a positive shift in public awareness of nature-related topics after March 11.
Cole et.al. (2020b)	Environment	China, Jan 2013/Feb 2020, hourly data	Augmented synthetic control method	Measure the impact of the Wuhan lockdown on local air pollution concentrations	They find that heterogeneous impact on different pollutant concentrations, no significant impact on SO_2 and CO while significant reduction in NO_2 and PM10.
Yu and Liu (2020)	Food Insecurity	China, 01/01/2019-08/04/2020, daily data	iGARCH model	Evaluate the impact of Covid-19 on food prices	No significant change on rice, wheat, flour price, poz. impact on cabbages price, various impacts on pork prices.
Gundersen et.al.(2020)	Food Insecurity	US, 2009-2018, state-level data	OLS	Project the food insecurity rate in 2020.	They projected 54 million food-insecure Americans in 2020 which a 17 million higher than in 2018.
Mahmud and Riley (2021)	Food Insecurity	Uganda, March/May 2020, survey data	Event Study	Effects of the pandemic on food security and well-being of rural households.	Evidence of a substantial decline in non-farm income as a result of the deeper impact on wealthier households since they tend to be depending on non-farm income (enterprise or salary income). Around 40% decline in food expenditure per adult and an increased number of households that reported skipping a meal.

Kansiime et.al. (2021)	Food Insecurity	Kenya, Uganda, survey data	Probit Regression	Examine pandemic impact on food security.	Evidence on worsening food security in both countries and poor income households tend to be more affected more Covid-19 related income shocks and food shortages.
Zhang et.al. (2020)	Food Insecurity	China, 2002-2018, yearly data	Dynamic panel spatial Durbin model	Investigate THE impact of epidemics on agricultural production and project Covid-19 case.	They projected a decline in the growth rate of agricultural output under different scenarios. is 0.4%–2.0% in 2020.
Wang et.al. (2020)	Sectoral impacts	China, Jan 2018-March 2020, monthly data	Panel Regression	How Covid-19 affect China's insurance market.	Evidence of negative impact on insurance market.
Batool et.al. (2021)	Sectoral impacts	World, 9 countries, 01/01/2019-10/05/2020, daily data	Difference-in-Differences	Evaluate the impact of lockdown on sharing economy, especially on five major sectors; ride-hailing, accommodation, freelance work, entertainment, and delivery services.	Evidence of heterogeneous effect; transportation and accommodation are negatively affected by lockdown while freelance work, streaming services, and online deliveries are seeing an increase in google searches.
Vidya and Prabheesh (2020)	Trade	Top 15 trading countries, 2016Q4-2020Q1	Artificial Neural Network Analysis	Analysis the impact of Covid-19 on global trade network	Evidence of an immense reduction in trade interconnectedness, connectivity, and density, change in the structure of global trade network.

5. Conclusion

This paper employs a hybrid analysis by combining a bibliometric analysis with an in-depth review of selected studies from the existing literature on early economic research related to the COVID-19 pandemic.

First, we conducted a bibliometric analysis using two samples: the full sample, which includes all economics studies with at least one citation, and the sub-sample, comprising 100 studies selected from the full sample based on their citation counts and the use of econometric tools for analysis. Through these samples, we identified the patterns of early economic research on COVID-19, focusing on key aspects such as prominent keywords, the most cited publications, relevant sources, influential authors, international collaboration patterns, countries leading the research, and the dominant methodologies used.

Second, we performed a deep reading of the 100 selected articles. We categorized the studies into five main research topics: financial markets, public health, labor markets, well-being, and macroeconomic impacts. Within these categories, we highlighted the most frequently studied concepts and perspectives, providing a comprehensive overview of the early economic research on COVID-19.

Future research directions are a crucial component of any review study. Based on our comprehensive analysis, it can be observed that within the initial economics research on the COVID-19 pandemic, the majority of studies have an interdisciplinary focus. However, certain macroeconomic impacts of COVID-19, such as inflation, economic growth, and uncertainty, remain underexplored.

Additionally, one of the pandemic's most significant global consequences has been challenges related to food security and energy issues. Despite their importance, these topics have received limited attention in our sample, highlighting a gap in the initial economics literature on COVID-19. Similarly, the negative externalities of the pandemic on regional development are also underrepresented. COVID-19 caused a structural break in the trajectory of regional development, particularly in advancing economies. Thus, future research should investigate the long-term welfare implications of the pandemic on regional development.

Another critical gap in the current literature is the lack of focus on fiscal policies and budget performance during the pandemic. The increased burden on government budgets—stemming from higher health expenditures and transfer payments—was a common phenomenon across many countries. Therefore, future research should address the fiscal dimensions of the COVID-19 pandemic, exploring how these policies impacted economic stability and recovery.

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