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Survey articles'

The economics of COVID-19 pandemic: A survey

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ABSTRACT

Through a survey of the literature on the economics of the coronavirus (COVID-19) pandemic, this study explores the effects of the pandemic and proposes potential policy directions to mitigate its effects. Our survey reveals that adverse economic effects have been observed due to the COVID-19 pandemic in addition to fatalities. Furthermore, the survey indicates the need for greater coordination at national and international levels. This study concludes by suggesting coordination among monetary, macroprudential, and fiscal policies (trio) to mitigate the adverse economic effects of COVID-19. Finally, this study explores potential directions for future research.

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1. Introduction

This paper undertakes a survey of literature on the economics of COVID-19¹ pandemic.² The goal is to explore the economic effects of the COVID-19 and suggest policy directions to mitigate its magnitude.

Clark (2016) opined that a pandemic is a serial killer that can have devastating consequences on humans and the global economy. For instance, the Spanish flu in 1918 killed 50 million people worldwide. In addition to fatalities, a pandemic can lead to economic and health crises. Furthermore, a pandemic can result in socio-psychological disturbances to the society wherein the poor witness the burden of the crisis more than their richer counterparts. The effects of a pandemic remain uncertain owing to the lack of a predictive pattern of its occurrence, particularly in the absence of a pharmaceutical invention.

Our study is motivated by the ongoing coronavirus pandemic and its multifaceted effects on the economies worldwide. At the beginning of December 2019, Wuhan City, China, witnessed the origin of the novel “coronavirus” (COVID-19 hereafter) at first. The COVID-19 is a highly transmittable and pathogenic viral infection. On March 11, 2020, the World

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¹ The short form COVID-19 is used for the Coronavirus disease of 2019, throughout the paper.

² The word pandemic is derived from the Greek word “Pandemos”, which means ‘common to all people’. The World Health Organization affirms that a pandemic is a situation of the global spread of a new disease. Cholera in 1817, Spanish flu in 1918, Asian flu in 1957, and the H1N1 pandemic in 2009 are the few examples of pandemic events that the world has already witnessed earlier.

Health Organization (WHO) declared the COVID-19 as a global outbreak of pandemic on March 11, 2020. The COVID-19 is considered to be a “once-in-a-century pathogen” owing to the following reasons. First, the fatality risk associated with the COVID-19 is 1%, which is more miserable than that of typical influenza, as it can kill healthy as well as elderly people. This fatality risk can be compared with that of the 1857 influenza pandemic (0.6%) and of the 1918 Spanish flu (2%). However, the actual fatality rate of the COVID-19 remains unpredictable, owing to the absence of pharmaceutical inventions. Second, the exponential rate of transmission of this disease indicates that the COVID-19 will be much more severe than any other pandemic.

The economic effects of the COVID-19 can be broadly categorized into supply and demand effects. Supply effects result from the loss of working hours, and the decline in aggregate demand results from the decline in income due to unemployment associated with lockdowns. Maliszewska et al. (2020) claimed that the pandemic affects the economy through the following channels: (1) the direct effect of a reduction in employment; (2) the increase in international transaction costs; (3) the sharp decline in travel, and (4) the decline in demand for services requiring proximity between people. First, reduction in employment leads to lower demand for capital, thereby resulting in output loss. Second, the rising costs of imports and exports for goods and services result in trade reduction and productivity loss. Third, the sharp decline in international tourism generates less revenue, thereby leading to production loss. Finally, the decline in demand by households, who purchase fewer services than before, considerably decreases the consumption of goods and services. In addition, the contraction in foreign direct investment, real effects of financial shocks, and falling oil prices widen the economic costs associated with the COVID-19. In this context, several questions arise: (1) What are the detrimental effects of COVID-19 pandemic? (2) What are the policy decision to be adopted for mitigating its effects?

Our approach in this study is as follows. First, we focus on the effects of the COVID-19 the world has experienced until now. Second, we extend the work of Maliszewska et al. (2020) to include the stock market, exchange rate, and oil market as the channels of economic consequences. Third, we emphasize four policy aspects in response to the COVID-19: monetary policy, macroprudential regulation, fiscal policy, and policy coordination. Finally, we establish a research agenda for future research.

Accordingly, we followed several steps: (1) we identified several literatures on pandemic and the COVID-19, thereby acquiring 80 papers. These papers were obtained from the *Journal of Economic History*, *Applied Economic Letters*, *Asian Economic Letters*, *Economic Analysis and Policy*, *Emerging Markets Finance and Trade*, *Energy Economics*, *Energy Research Letters*, *Journal of Behavioral and Experimental Finance*, and *Finance Research Letters*. Furthermore, we acquired 11 working papers from *International Monetary Fund (IMF)*, *National Bureau of Economic Research*, *CEPR*, *Bank for International Settlements*, and *World Bank*; content from the IMF blog; 3 books (IT Governance Publishing and VOX EU.); and 5 chapters and reports from the *World Economic Outlook*, *Banks for International Settlements*, and *European Commission*. This filter technique is attributed to the history and consequences of pandemics, including the COVID-19. Considering that the literature on the COVID-19 pandemic is evolving, we incorporated most papers published on or before December 10, 2020. These papers and journals were selected based on their relevance to the research questions of this paper. Further, this study encompasses different facets of economies and demonstrates the effects of the COVID-19 through a comparative analysis of the COVID-19 with earlier pandemics in terms of the number of fatalities. Accordingly, we selected ten economies with the highest number of cases until September 17, 2020, and indicated stock market indicators and exchange rate performance in the pre-COVID and the COVID-19 periods. (3) We emphasized four policies in response to COVID-19: monetary policy, macro prudential regulation, fiscal policy, and policy coordination. Finally, we identified the limitations of existing studies and created an agenda for future research.

This study contributes to the literature in many ways. First, this study is one of the first attempts to document the economic effects of the COVID-19 pandemic. Second, this study extends the work of Maliszewska et al. (2020) by incorporating the effects of the COVID-19 on the stock market, exchange rate, and oil market. Third, this study is the first attempt to propose a comprehensive policy direction in response to the COVID-19 by emphasizing policy coordination. Finally, our study is in line with Goodell (2020), who conducted a comprehensive literature survey and highlighted unprecedented global economic loss due to the COVID-19.

This paper is organized as follows. Section 2 presents the effects of the COVID-19. Sections 3 and 4 indicate the effects of the COVID-19 on the stock market and exchange rate, respectively. Section 5 covers the effects of the pandemic on the oil market. Section 6 proposes policy suggestions. Section 7 highlights the limitations of the existing literature and offers future research directions. Finally, Section 8 concludes the study and suggests policy implications.

2. Effects of the COVID-19

The COVID-19 pandemic has resulted in an unprecedented decline in global activity. The intensifying pandemic in developed and emerging economies led to stringent lockdowns and large disruptions in economic activity at an extraordinary speed and scale (Baldwin and di Mauro, 2020; Gopinath, 2020). For instance, the global GDP declined by more than 4.9% in the second quarter of 2020 due to economic disruption. The decline in trade in goods and services was likely higher than that during the 2007–08 global financial crisis (IMF, 2020). Consequently, the global trade contracted by 3.5% in the second quarter of 2020 due to weak demand and supply. The subsequent lockdown across economies due to the COVID-19 disrupted global supply chains, reducing the aggregate demand (Vidya and Prabheesh, 2020). The consumption of goods and services witnessed a marked decline due to steep income loss and weak consumer confidence.

Similarly, the consumers were reluctant to consume certain goods and services due to the fear of the COVID contagion (Eichenbaum et al., 2020). Firms were required to cut back the investment due to a precipitous decline in demand, supply interruptions, and uncertain future earnings. The world lost nearly 300 million full-time jobs in the second quarter of 2020 from 130 full-time job losses in the first quarter of 2020 (IMF, 2020). The decline in aggregate demand resulted in lower inflation and fuel prices (IMF, 2020). The World Travel and Tourism Council (WTTC) estimated a 25% decline in global travel in 2020 due to the COVID-19 pandemic.

The emerging economies experienced significant capital outflows owing to the pandemic, thereby reducing investment and causing production loss (BIS, 2019). During the COVID-19 period, Russia–Saudi Arabia oil war reduced the value of oil prices from \$ 31.05 per barrel on March 8, 2020, to \$ 19.23 per barrel on April 30, 2020. Similarly, stock markets worldwide started crashing from February 25th. For instance, Wall Street witnessed a large single-day drop in the stock price in the second week of March 2020 due to a lack of investor confidence after the US's travel ban declaration and unchanged interest rate by the European central bank. Conclusively, the ongoing pandemic has adversely affected the global economy; these consequences may be more severe in the future considering the increasing fatalities.

2.1. A synthesis of empirical literature on the COVID-19

Existing literature on the effects of COVID-19 has emphasized various issues. For instance, Barro et al. (2020), Choi (2020), Lyke (2020c), Jorda et al. (2020), and Liu et al. (2020b) observed output and credit contraction due to the COVID-19. Liu et al. (2020c), Maliszewska et al. (2020), and Yu et al. (2020) demonstrated a decline in consumption and investment. Ertugrul et al. (2020) indicated an increase in consumption volatility. Bauer and Weber (2020) confirmed a decline in the labor force participation rate. Furthermore, the COVID-19 negatively affected firm and industry performances (Gu et al., 2020; He et al., 2020a,b; Lyke, 2020a; Qin et al., 2020a; Xiong et al., 2020). In addition, the COVID-19 adversely affected corporate performance (Shen et al., 2020), the insurance market (Wang et al., 2020), herding behavior (Espinosa-Méndez and Arias, 2020), and property price (Wang et al., 2020).³

Table 1 presents the details of the empirical literature on the effects of the COVID-19.

3. COVID-19 and stock market

The outbreak of the COVID-19 pandemic has increased global financial risks, thereby adversely affecting the global financial markets (Al-Awadhi et al., 2020; Baker et al., 2020; Cao et al., 2020; Gil-Alana and Claudio-Quiroga, 2020; Gormsen and Kojien, 2020; Harjoto et al., 2020; Liu et al., 2020a; Phan and Narayan, 2020). The COVID-19 negatively affected the stock market in the forms of uncertainty and reduction in stock return worldwide, thereby reducing capital flows. This reduction due to stock market uncertainty, eventually created obstacles in investment, project funding, and liquidity availability in the global financial system.

Empirical evidence suggests that the pandemic negatively affected stock market return (Al-Awadhi et al., 2020; Ambros et al., 2020; Mishra et al., 2020; Topcu and Gulal, 2020) and increased stock return volatility (Corbet et al., 2020; Haroon and Rizvi, 2020a,b; Sharma, 2020; Zaremba et al., 2020). Akhtaruzzaman et al. (2020) and Corbet et al. (2020) confirmed the stronger role of financial contagion in generating stock return volatility.⁴ Goodell (2020) affirmed that the decline in the stock market during the pandemic resulted from investors' delay in investment decisions.

Fig. 1 exhibits the trends in the stock market of the top 10⁵ economies affected by the pandemic. In the figure, a drastic decline can be observed during March.⁵ Colombia and Spain experienced the highest decline. Furthermore, the experience of recovery of the stock market varies across these countries. For instance, the stock markets in Argentina, South Africa, and the US recovered within two months and reached the pre-crisis level at the end of May. The remaining seven countries have still not recovered from the negative effects of the pandemic. Clearly, these observations indicate that the COVID-19 pandemic adversely affected stock market performance.

³ It cannot be generalized that the COVID-19 has only adverse repercussions. For instance, Ming et al. (2020) indicated that the COVID-19 pandemic has improved air quality, which can be helpful for improving GDP later. Appiah-Otoo (2020) indicated that the COVID-19 positively affected domestic credit. Apergis and Apergis (2020b) supported the positive effects on inflation expectations. Differently, Salisu and Akanni (2020) constructed a global fear index and indicated its significance in predicting stock returns and improving forecast performance. As a mitigating force, lockdowns, travel restrictions, and economic stimulus package positively affected the stock market in G7 countries (Narayan, 2020b). In case of forex market, Narayan et al. (2020) affirmed the depreciation leads to fall in Japanese stock returns. Narayan (2020b) confirmed that Yen had a transitory effect and that the COVID-19 changed the resistance of the yen to shocks. Salisu and Sikiru (2020) supported the hedging potential of Asia-Pacific Islamic stocks, whereas Ferriani and Natoli (2020) confirmed investors' preference for low ESG risk funds. Further, Mariana et al. (2020) and Mnif et al. (2020) supported the efficiency of cryptocurrency as a safe haven. Erdem (2020) affirmed that freer countries are associated with smaller increase in volatility. In the context of the capital market, Prabheesh (2020) confirmed that foreign portfolio investment improved the predictability of stock market returns. Chen et al. (2020b) confirmed the positive effect on remittance inflows. In case of government decision, Haldar and Sethi (2020) indicated that demographic and government policies significantly determine the COVID-19. Further, see Sha and Sharma (2020) for more details.

⁴ Chen et al. (2020a), Conlon and McGee (2020), and Grobys (2020) confirmed that Bitcoin is no longer a safe haven during this pandemic period, indicating a significant fall in portfolio diversification.

⁵ The top 10 economies were selected based on the no. of confirmed cases until September 17th, 2020. Further, 6 out of 10 selected economies are also ranked in terms of fatalities. See Appendices A and B for more details.

⁶ Stock markets witnessed (global stock market crash) Black Monday on March 9, 2020.

Table 1

Empirical literature on the effects of COVID-19

Source: Author's compilation

Authors	Objective	Countries and sample period	Methodology	Empirical findings	Channel/remarks
Fu and Shen (2020)	Corporate performance in the energy sector.	China 2014–2020	Difference in Difference Modeling, Parallel Trend Test	Negative	Goodwill impairment
Apergis and Apergis (2020a)	US partisan conflict index	US 21/01/2020–30/04/2020	MIDAS	Mitigate political polarization	US political environment
Liu et al. (2020a)	Crude oil return and stock return relation	US 21/01/2020–06/05/2020	Time-varying VAR	Negative	Unaltered economic performance
Prabheesh et al. (2020a)	Stock market and oil price return relation	Net oil-importing 01/01/2020–08/06/2020	Summary Statistics DCC-GARCH	Positive	Signal for future demand contraction
Prabheesh et al. (2020b)	Stock market and oil price return relation	Net oil-exporting 01/01/2020–10/08/2020	DCC-GARCH Perron Test	Positive	Restricted portfolio diversification
Qin et al. (2020a)	Pandemic and oil price relation	Global 1996Q1–2020Q1	Granger Causality Parameter Stability	Inconsistent intertemporal CAPM	Oil price cannot be ignored
Narayan (2020a)	Oil price news on oil price	Global 02/01/1995–05/05/2020	Narayan–Popp Test Threshold Regression	Bigger effect on oil price	Negative oil price news dominates
Gil-Alana and Monge (2020)	Crude oil price	Global 04/03/2010–04/05/2020	Fractional Integration	Inefficient market	Transitory shock
Devpura and Narayan (2020)	Oil price volatility evolution	Global 01/07/2019–12/06/2020	Narayan–Popp Test OLS	Positive	Cases and death contributes
Huang and Zheng (2020)	Change in investor sentiment and crude oil futures	Global 02/01/2019–11/05/2020	Gregory and Hansen cointegration	Structural change	Change in crude oil price elasticity
Polemis and Soursou (2020)	Impact on Greek energy firms	Greece 02/12/2019–02/07/2020	Event Study MEARM MARM Model	Influenced the returns of majority of the listed firms	Market efficiency hypothesis
Iyke (2020a)	Reaction of oil and gas producer	US 21/01/2020–05/05/2020	EGARCH	Heterogeneous reaction	Firm specific attributes
Devpura (2020)	Relationship between Japanese Yen and crude oil price futures	Japan Hourly data 01/07/2019–04/09/2020	Descriptive Statistics Predictive Regression	Limited evidence that oil prices predict the Yen	No time-varying predictability
Iyke (2020b)	Exchange rate return and volatility prediction	25 Countries 31/12/2019–08/05/2020	Summary Statistics GARCH	Better predictive power over volatility	Disease outbreak channel
Garg and Prabheesh (2021)	Nexus between exchange rate and interest rate	BRICS 31/01/2020–30/06/2020	Toda–Yamamoto Causality Test	Improve predictability of exchange rate	Forward looking investors
Salisu and Adediran (2020)	Predicting energy market volatility	Global 21/03/2011–06/04/2020	OLS GARCH	Market uncertainty good predictor	Portfolio diversification

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Table 1 (continued).

Authors	Objective	Countries and sample period	Methodology	Empirical findings	Channel/remarks
Ali et al. (2020)	Reaction of financial market	9 countries 01/01/2020–30/03/2020	EGARCH Bivariate Regression	Global market free fall	Global spread of volatility
Narayan (2020b)	Impact on exchange rate persistence to shocks	Japan 01/07/2019–04/09/2020	Time-varying NarayanPopp Unit root Test OLS	Resistance of Yen to shocks has changed	Transitory effect
Narayan (2020c)	Bubble type behavior of exchange rate	Japan, Canada, Europe and Britain July 2019–September 2020	Bubble test Generalized Sup Augmented ADF	Increased in bubble activity	Market become relatively inefficient
Narayan et al. (2020)	Japanese yen and stock return relation	Japan 04/01/2010–16/08/2020	Narayan–Popp Unit root Test VAR GARCH-M	Depreciation leads to gain in Japanese stock returns	Stronger relationship
Rai and Garg (2021)	Relationship between stock prices and exchange rate	BRIICS 02/01/2020–15/09/2020	DCC-GARCH BEKK-GARCH	Relationship strengthened	Significant risk transfer
Narayan et al. (2021)	Effect of government response to stocks	G7 01/07/2019–16/04/2020	ARCH Regression	Positive	Lockdowns most effective
Haroon and Rizvi (2020a)	Sentiment generation and equity volatility	World and US 01/01/2020–30/04/2020	Asymmetric GARCH	Panic news generate volatility	Panic news contribute to volatility
Haroon and Rizvi (2020b)	Equity market, a real human costs and government response	23 Emerging 01/01/2020–30/04/2020	GARCH Panel Regression	Decreasing cases, Improve liquidity	Flatter curve reduce uncertainty
Al-Awadi et al. (2020)	Stock market outcomes	China 10/01/2020–16/03/2020	Panel Regression	Significant impact of rising cases and death	Negative effect on stock returns
Gil-Alana and Claudio-Quiroga (2020)	Impact on Asian Stock markets	Asia July 2006–September 2020	Fractal Integration	Transitory effect on Japan and permanent effect on China and Korea	Temporary and Permanent shocks
Topcu and Gulal (2020)	Impact on emerging stock markets	26 Emerging 10/03/2020–30/04/2020	Pooled OLS Driscoll–Kraay estimator	Negative impact and began to taper off by mid-April	Higherst in emerging Asia and lowest in emerging Europe
Ambros et al. (2020)	Impact of COVID-19 news on 8 stock markets	US, Asia and Europe 01/01/2020–31/03/2020	Descriptive Statistics CAPM OLS	Do not find sensitiveness of stock returns to news	Strong positive impact on the stock market volatility
Cao et al. (2020)	Document the stock market index's negative response	14 stock index 21/01/2020–30/06/2020	Regression	Stock market elasticity is -0.028	Do not panic message
Ferriani and Natoli (2020)	Analyzes the ESG risks	World 20/01/2020–01/05/2020	Pooled Regression	Investors preferred low ESG risks funds	Low ESG positively affect flows
Sharma (2020)	Commonality in Volatility	5 Asian Economies 01/01/2019–25/09/2020	Descriptive Statistics ADF Test GARCH	More prominent in case of Singapore	Stronger commonality
Akhtaruzzaman et al. (2020)	Occurrence of financial contagion	World, China and G7 01/01/2013–20/03/2020	VERMA DCC-GARCH Diebold and Yilmaz	Increase in stock return correlation	Higher role of financial contagion

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Table 1 (continued).

Authors	Objective	Countries and sample period	Methodology	Empirical findings	Channel/remarks
Zhang et al. (2020)	Mapping risks Policy interventions	Global 22/01/2020–27/03/2020	Correlation Minimum Spanning Tree	Substantial increase in market risks	Need of global policy coordination
Zaremba et al. (2020)	Government intervention and Stock return volatility	67 Countries 01/01/2020–03/04/2020	Summary Statistics Regression	Non-pharmaceutical interventions increase volatility	Role of information campaign and public event cancellation
Harjoto et al. (2020)	Stock market reaction to the WHO and Federal Reserve announcement	Developed and emerging Daily 13/03/2019–23/04/2020	Event Study Approach	Negative shock to global stock markets	More shock to emerging markets and small firms
Salisu and Sikiru (2020)	Hedging potential of Asia-Pacific Islamic stocks	15 Countries 31/08/2020–15/09/2020	GARCH based Unit root Test UPE based model	Low hedging effectiveness	Role of global factor
Conlon and McGee (2020)	Bitcoin as safe heaven or risky heaven	Global July 2010–March 2020	Value at Risk	Do not act as safe heaven	Bitcoin with S&P500 downward risk
Chen et al. (2020a)	Fear sentiment on Bitcoin dynamics	Global 15/01/2020–24/04/2020	VAR Granger Causality	Fear sentiment exacerbates	Bitcoins fails as safe heaven
Grobys (2020)	Bitcoin's performance to hedge equity risk	Global 19/03/2015–18/03/2020	Dynamic correlation	Bitcoin performed poorly in hedging the tail risk	Unpredictable and uncertain dynamic correlation
Mariana et al. (2020)	Testing Bitcoin and Ethereum as safe heaven	Global 01/07/2019–06/04/2020	DCC cDCC OLS Regression	Negative effect with stock return and support safe heaven	Ethereum as better safe heaven than bitcoin
Mnif et al. (2020)	Cryptocurrency as hedging	Global 31/12–2019–19/05/2020	MFDFA General Hurst Exponent	Positive impact on efficiency	Cryptocurrency become more efficient
Corbet et al. (2020)	Contagion effect on stock market	China 11/03/2019–10/03/2020	Dynamic Correlation GARCH	Volatility relationship evolve significantly	Development of a new product
Espinosa-Méndez and Arias (2020)	Effect on herding behavior in the stock market	Australia 10/06/2008–19/06/2020	Cross-section absolute deviation model	COVID-19 increases the herding behavior	Manifestation of herding behavior during crisis
He et al. (2020a)	Compilation of accounting index	China 01/01/2019–31/03/2020	Big Data Portrait Analysis	Industries significantly affected except basic industry	Service sector significantly affected
He et al. (2020b)	Market performance of industries	China 03/06/2019–13/03/2020	Event Study Approach	Transportation, mining, electricity, heating and environment affected	Manufacturing, IT, Education and Health Care remains less affected
Salisu and Akanni (2020)	Construct global fear index & predictability	OECD & BRICS 11/03/2020–30/04/2020	Descriptive Statistics Scenario Analysis	Good predictor of performance	Improve forecast performance
Phan and Narayan (2020)	Stock market reaction to real time	25 Countries 11/03/2020–30/04/2020	Event Analysis	Market overreacts to unexpected news	No uniformity in travel ban
Qin et al. (2020a)	Firm level cash holdings	China Q1: 2014–2020	Difference in Difference Method Parallel Trend Test	Positive impact for serious impact industries	Rising firms' cash holdings
Mishra et al. (2020)	Indian financial markets	India 03/01/2003–20/04/2020	Markov-Switching VAR	Negative	Severe than demonization and GST
Yue et al. (2020)	Household investment decision	China China Household Finance Survey	Linear Probability Probit Model	Household with infected loss confidence and change in investment	Household financial decision

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Table 1 (continued).

Authors	Objective	Countries and sample period	Methodology	Empirical findings	Channel/remarks
Gu et al. (2020)	Economic activity	China 01/12/2019–31/01/2020	Difference in Difference Method Descriptive Statistics	Manufacturing industries highest negative effect	Smaller firms experience more 30% decline
Choi (2020)	Impact of economic uncertainty	US January 2008–May 2020	Wavelet Coherence Analysis	Affects the sectoral volatility more than global financial crisis	More affect than global financial crisis
Shen et al. (2020)	Corporate performance	China Q1: 2014–2020	Propensity Score Matching Regression	Negative	Association between pandemic and firm performance
Yu et al. (2020)	Labor force participation	134 Countries 1970–2015	Regression Impulse Response	Negative	High uncertainty avoidance index
Xiong et al. (2020)	Market reaction	China 23/01/2020–30/04/2020	Event Study Correlation	More intense effect on industries with vulnerability to virus and high institutional investors	Effect depends on the financial structure of industries
Erdem (2020)	Investor's reaction to different date announcement	75 Countries 20/01/2020–30/04/2020	Descriptive Statistics Panel Regression	Negative impact on stock returns. Freer countries experience smaller volatility	Depends on level of freedom
Wang et al. (2020)	Insurance Market	China, 29 Provinces Q1: 2018–2020	Panel Regression Mean Variance Test	Negative	Importance of level of social security and personal insurance
Vidya and Prabheesh (2020)	Trade connectedness and future trade forecast	15 Countries 2016Q4–2020Q1	Trade Network Analysis Artificial Neural Network	Drastic reduction Change in structure of trade China's trade as center unaltered	Decline in trade until December 2020
Liu et al. (2020b)	Macro-financial variables and its resilience	China 1993Q1–2020Q1	Time–Frequency Analysis Wavelet Analysis	Business and financial cycle in contraction phase	Extraordinary macroeconomic policies needed
Liu et al. (2020c)	Household consumption	China China Household Finance Survey	Summary Statistics GARCH	Significant decline in household consumption	Rural households less affected
Ertugrul et al. (2020)	Effect on Turkish diesel consumption volatility	Turkey 01/01/2014–15/06/2020	GARCH Type Models	High volatility pattern	Dynamic volatility over time

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Table 1 (continued).

Authors	Objective	Countries and sample period	Methodology	Empirical findings	Channel/remarks
lyke (2020c)	Impact on economic policy uncertainty	5 Countries 1990M01–2020M09 31/12/2019–01/09/2020	Regression Analysis	Positive impact on economic policy uncertainty	Higher policy uncertainty
Haldar and Sethi (2020)	Effect of demographic, socio-economic and public response	10 Countries 15/03/2020–30/09/2020	Negative Binomial Regression	Demographic and government policies are significant determinant	Implementation of periodic lockdown
Prabheesh (2020)	Stock returns and portfolio flows causality	India 02/01/2019–30/09/2020	Narayan–Popp Unit root Test Toda–Yamamoto Causality Test	Unidirectional causality from portfolio flows to stock returns	More exposure to portfolio flows volatility
Chen et al. (2020b)	Impact on remittance inflows to Samoa	Samoa 2012M05–2020M07	Narayan–Popp Unit root test Gregory–Hansen Cointegration and VECM	Increased remittance from Australia and New Zealand	Declined from US
Appiah-Otoo (2020)	Impact on domestic credit	China January 1, 2020–June 30, 2020	Descriptive Statistics Regression Impulse Response Function	Increase in confirmed case/death increase domestic credit	Positive response in both long-run and short-run
Bauer and Weber (2020)	Evaluates short-term labor market impact of COVID-19 containment	Germany 13/03/2020–14/04/2020	Diff-in-diff Regression	60% increase from employment into unemployment	Shut down increased unemployment of 117,000 person
Apergis and Apergis (2020b)	Role in the course of inflation expectations and their volatility	US 02/01/2019–31/07/2020	GARCHX	Positive effect on inflation expectation and volatility	Risk of inflation expectation

This table covers various empirical issues addressed in the context of the COVID-19 with the authors, data coverage, empirical findings, and channels/remarks. Further, it covers the tabulation of all cited papers on the empirical literature on the COVID-19.

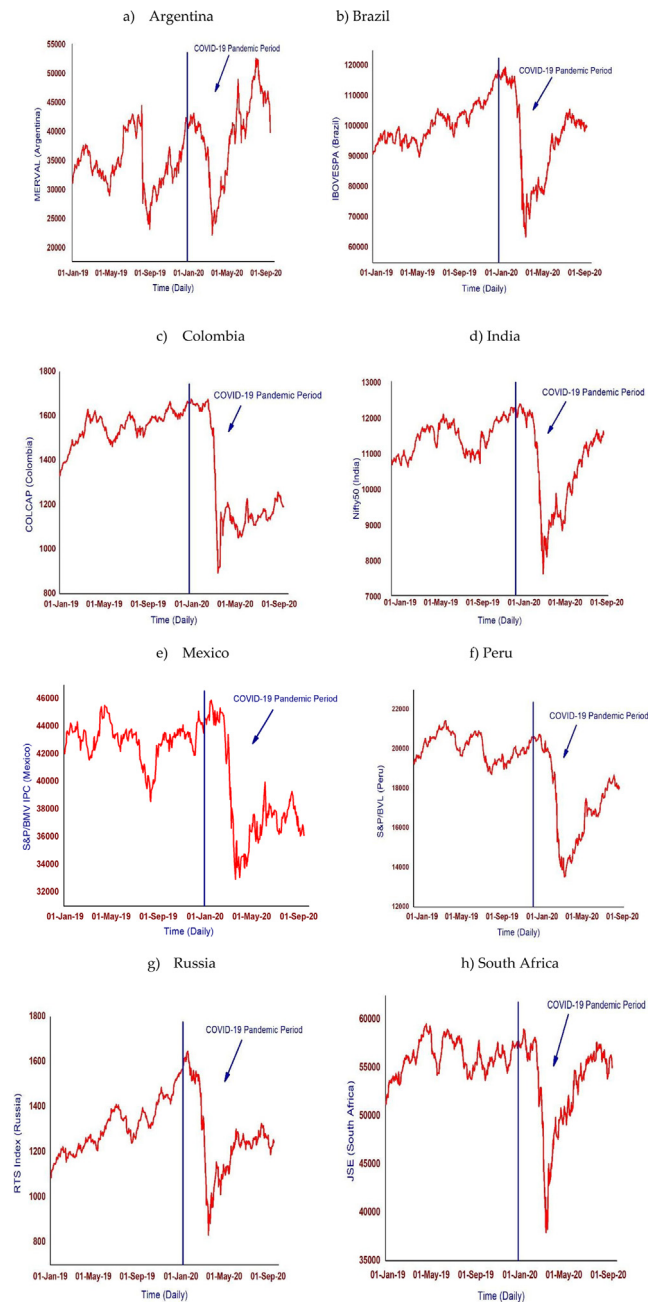


Fig. 1. Stock indices of most affected countries.

This figure indicates the plots of stock indices of the most affected countries during the COVID-19. It covers stock indices for Argentina, Brazil, Colombia, India, Mexico, Peru, Russia, South Africa, Spain, and the USA. The blue line indicates the data period's division into two such as pre and during the COVID-19 period. We can observe that the stock indices experience high volatility during the COVID-19 period. The period spans from January 1, 2019, to September 17, 2020. The stock data are collected from the CEIC Database. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

4. COVID-19 and exchange rate

The exchange rate is crucial for maintaining an economy's external stability. As exchange rate directly associates with trade balance, export competitiveness, foreign debt, and capital flows, maintaining a stable exchange rate is one of the policymakers' major concerns. During this pandemic period, most economies have experienced exchange rate volatility and currency depreciation due to capital outflows and market sentiments. For instance, the negative sentiments associated

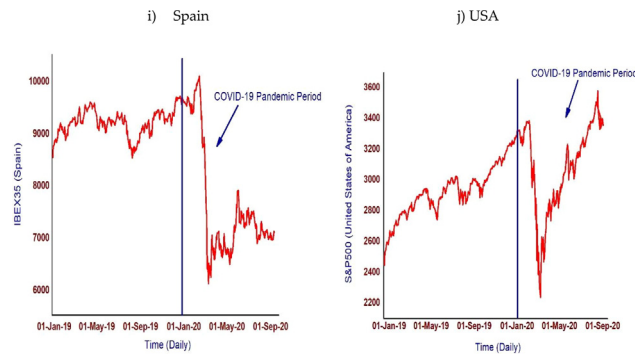


Fig. 1. (continued).

with the COVID-19 substantially affected the financial markets (Ali et al., 2020; Fang and Zhang, 2020; Fu and Shen, 2020; Narayan, 2020c; Garg and Prabheesh, 2021; Rai and Garg, 2021) and had a better predictive power over exchange rate volatility than return (Iyke, 2020b). Iyke (2020b) affirmed that the outbreak of the COVID-19 is associated with valuable information and can be effectively used to predict exchange rate return and volatility. The volatile exchange rate and currency depreciation could have detrimental effects on stock price, capital inflow, current account deficit, external debt obligations, and financial instability.

Fig. 2 illustrates excessive volatility in the exchange rate of most countries affected by the pandemic. All economies experienced a currency depreciation immediately after the outbreak of the COVID-19 until mid-April. Thereafter, most economies' exchange rates significantly improved, excluding that of Argentina. More specifically, Spain witnessed a tremendous recovery in its exchange rate after mid-May. However, the figure depicts that none of these countries' exchange rates reached their pre-crisis level by the end of September, implying the pandemic's adverse effects on the exchange rates of the economies.

5. COVID-19 and oil price

Negative supply and demand shocks can be observed in the oil market during the COVID-19 period. The reduction in labor availability, travel restrictions, and disruptions in transport and business, directly and indirectly, resulted in negative supply shocks. The negative demand shock is caused due to economic difficulties, and the disruption of global value chains, reducing oil demand (Vidya and Prabheesh, 2020). These negative shocks on the oil are considered to reduce global consumption and investment.

Numerous studies have addressed the effects of the COVID-19 on the oil price. For instance, the decline in oil price due to the pandemic adversely affected the performance of the energy sector (Apergis and Apergis, 2020a; Devpura, 2020; Devpura and Narayan, 2020; Fu and Shen, 2020; Gil-Alana and Monge, 2020; Huang and Zheng, 2020; Kartal, 2020; Narayan, 2020a; Polemis and Soursoy, 2020; Qin et al., 2020b). Fu and Shen (2020) affirmed that COVID-19 negatively affected energy industries. Salisu and Adediran (2020) observed that market uncertainty can predict energy market volatility. Devpura and Narayan (2020) and Narayan (2020a) observed that COVID-19 cases and fatalities increased oil price volatility and largely affected oil prices. Huang and Zheng (2020) indicated structural changes in the relationship between investors' sentiment and crude oil futures. Gil-Alana and Monge (2020) stated the inefficiency of the oil market due to the pandemic. Furthermore, the COVID-19 affected the dynamics between the oil and stock markets. For instance, Liu et al. (2020a) identified a negative relationship between oil and stock returns. Prabheesh et al. (2020a,b) observed a positive relationship for net oil-importing and oil-exporting countries.

Fig. 3 illustrates that crude oil prices started declining during the outbreak of the COVID-19 from December 31, 2019, till the last week of April 2020. This was the first time in history that oil price became negative (US\$ –36.98) on April 20th, 2020. Although the recovery can be observed from May, the price has not reached the pre-COVID period level.

Crude oil is one of the key ingredients of the production process. The decline in oil prices may reduce production costs and increase economic growth (Filis, 2010; Sadorsky, 1999) and affect monetary policy (Prabheesh and Rahman, 2019). Thus, falling oil prices were beneficial for net-oil importing countries. In contrast, net-oil exporting countries witnessed a severe reduction in oil revenue, stock market crashes, and financial market volatility. The reduction in oil revenue resulted in an insufficient net export surplus, thereby leading to current account unsustainability (Garg and Prabheesh, 2017, 2020) and insolvency (Garg and Prabheesh, 2018). Oil-exporting countries experienced sharp recessions during the COVID-19 period, such as Russia (–6.6%), Saudi Arabia (–6.8%), and Nigeria (–5.4%).

6. COVID-19 and policy suggestions

This section discusses the relevance of four policy options to mitigate the effects of the COVID-19: monetary policy, macro-prudential regulation, fiscal policy, and policy coordination.

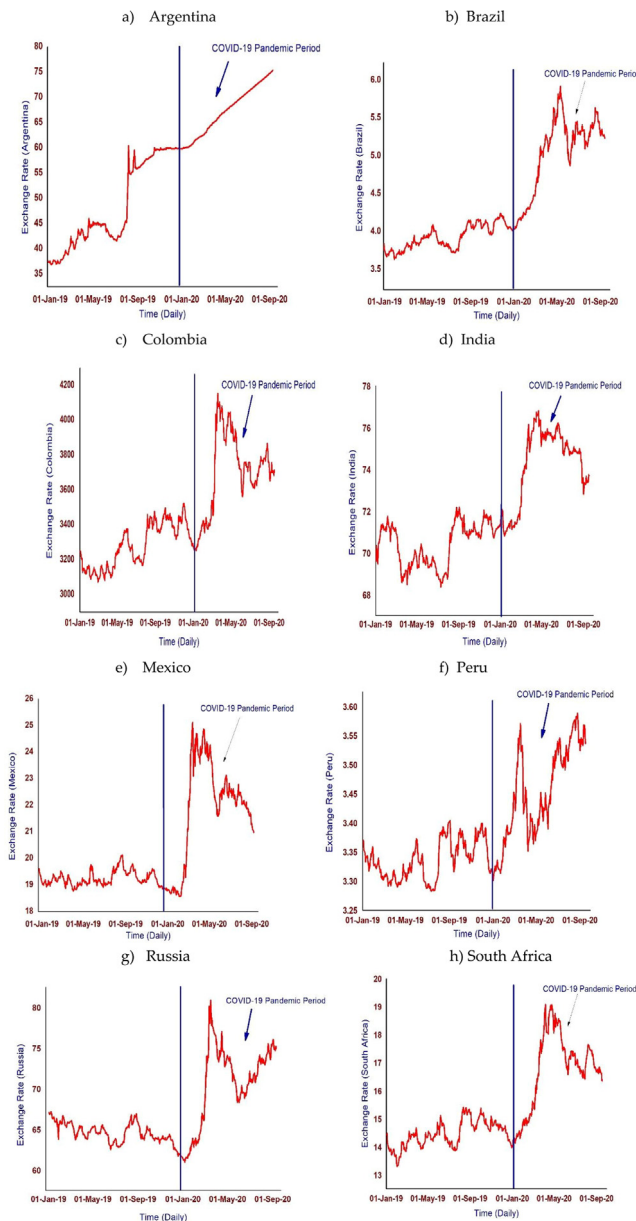


Fig. 2. Exchange rate of most affected countries.

This figure indicates the plots of exchange rates of the most affected countries during the COVID-19. It covers stock indices for Argentina, Brazil, Colombia, India, Mexico, Peru, Russia, South Africa, Spain, and the USA. The period spans from January 1, 2019, to September 17, 2020. The exchange rate data are collected from the CEIC Database. The blue line indicates the data period's division into two, such as the pre-COVID-19 and the COVID-19 period. The USA's exchange rate is not considered as it is the benchmark currency for all other economies. We can observe that all the economies witness currency depreciation during the COVID-19 period. Most currencies witness depreciation till mid-April and show a slower improvement in the aftermath. However, the exchange rate of all economies witness high volatility except that of Argentina. Argentina indicates a steep increase in its exchange rate, implying continuous depreciation of the Argentinian Peso to the dollar in the COVID-19 period. In terms of recovery, all other economies' currency is improving but far behind than the pre-COVID period. Surprisingly, Spain indicates tremendous appreciation after the mid-May period. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

6.1. Monetary policy

Monetary policy could play a crucial role in mitigating the effects of the COVID-19. However, the nature of the adoption of monetary policy may differ across economies in terms of their economic condition during the ongoing pandemic. Hofmann et al. (2020) argued that the adoption of monetary policy by the emerging economies in response to the COVID-19 pandemic may not be effective due to excessive volatility in the exchange rates and capital flows. However, emerging

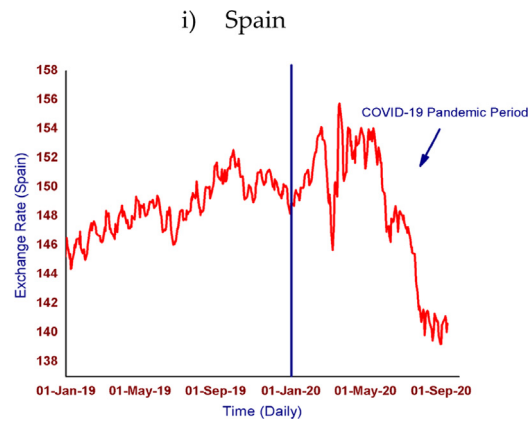


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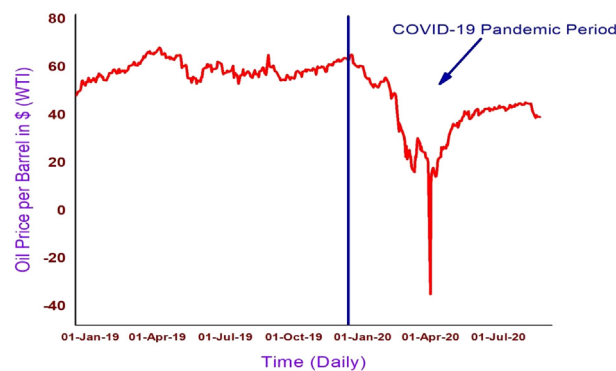


Fig. 3. Trends in oil prices.

The figure plots the oil prices from January 2, 2019, to September 15, 2020. WTI stands for West Texas Intermediate. The daily oil price is based on the West Texas Intermediate and collected from the Energy Information Administration. The blue line indicates the division of the data period into two such as pre and COVID-19 periods. We can observe that the oil prices during the COVID-19 period are lesser than the pre-COVID-19 period. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

economies can adopt a combination of inflation targeting and macroprudential tools as well as forex reserve accumulation as their policy framework to tackle the changes in capital flows and exchange rates (BIS, 2019). Considering that this policy framework facilitates financial stability, the emerging economies can adopt the same combination of policies to respond to the instability caused by the pandemic. Inflation targeting could help mitigate the effects of exchange rate on inflation. Macroprudential tools promote the resilience of the financial system. Furthermore, the accumulation of reserves can help absorb shocks and alleviate financial stress on emerging economies as the central banks are capable of dealing with currency depreciation, default risk on external borrowings, and capital outflows (Hofmann et al., 2020; Prabheesh, 2013). The economies with large forex reserves would be able to manage their currency depreciation by intervening in the foreign exchange market during the pandemic. In this context, the central banks of emerging economies have to adopt monetary policies by considering domestic liquidity and foreign exchange market condition.

As the COVID-19 is associated with lower inflation in advanced economies, expansionary monetary policy could facilitate higher economic growth and higher investment in the productive sector. However, the monetary policies of advanced and emerging economies are not independent of each other. The global monetary policy and its shocks play a dominant role in determining domestic macroeconomic conditions and monetary policy. Accordingly, the adoption of monetary policy in advanced economies influences the emerging economies' monetary policy decisions (Prabheesh and Vidya, 2018; Shareef and Prabheesh, 2020). Furthermore, the role of trade and financial integration fosters shock transmission and creates the fear of a financial contagion (Padhan and Prabheesh, 2019). Therefore, the effectiveness of the domestic monetary policy will depend on shock transmissions from the advanced economies. In this context, the adoption of monetary policy with macroprudential measures could improve an economy's policy effectiveness.

6.2. Macroprudential regulation

Considering financial instability caused by the COVID-19, macroprudential policies could help maintain stability and reduce systematic risk in the financial system. Accordingly, a broad range of macroprudential measures can enhance

resilience to global financial shocks. For instance, these measures include the tools that boost bank capital and liquidity, limit foreign exchange exposures, and prevent risky credit (Drehmann et al., 2020; Restoy, 2019). These tools have a heterogeneous effect in reducing the global financial shocks hitting an economy. Furthermore, macroprudential regulation reduces the sensitivity of domestic credit to global financial shocks. This claim is in line with the hypothesis that a stronger bank balance sheet leads to a steadier credit supply. In addition, macroprudential regulation stabilizes nominal and real exchange rates as a safer financial system that reduces currency premium volatility (IMF, 2020).

Macroprudential regulation will help control fluctuations in exchange rates and capital flows that may undermine financial stability. In this situation, monetary policy along with macroprudential regulation can reduce the negative effects of the COVID-19 and promote higher economic growth. Accordingly, a possible channel could be the adoption of countercyclical monetary policy along with macroprudential regulation in response to global financial shocks. At a higher level of macroprudential regulation, central banks respond more counter-cyclically by lowering policy rates to maintain stability in exchange rates and capital outflows (IMF, 2020).

6.3. Fiscal policy

Fiscal policy can effectively protect people, stabilize demand, and facilitate recovery across economies during the ongoing pandemic as well as in the aftermath of this event. Considering the continuity of lockdowns across economies, fiscal policies should be accommodated to healthcare services to provide emergency lifelines to protect people (Chakraborty and Thomas, 2020). While lockdowns are easing, fiscal policies should be aimed at household supports and firms to take care of the informality of the economy. Furthermore, employment support measures could help encourage the safe return to jobs and facilitate structural shift for the quick recovery of the economy after the pandemic. Once the pandemic slows down, the fiscal stimulus will be crucial for public investment, healthcare systems, and physical and digital infrastructure. In the case of limited fiscal space, economies should generate revenue, increase spending, and promote productive investment. All the policy measures need to be organized in a medium-term fiscal framework with transparent management to mitigate fiscal risks (IMF, 2020).

6.4. Policy coordination

A need for domestic as well as global efforts is felt to mitigate the effects of the COVID-19. In the context of global policy change, World Economic Outlook (June 2020) has considered the effects of the COVID-19 as “A Crisis Like No Other, An Uncertain Recovery” and listed few policy actions to mitigate its adverse effects.

1. Fiscal Monitor Database of Country Fiscal Measures (June 2020) announced an amount of \$11 trillion for fiscal measures worldwide.
2. According to the Global Financial Stability Report (June 2020), major central banks experienced a rise in liquidity and borrowing costs. Some emerging economies adopted quantitative easing⁷ for the first time, whereas some advanced economies increased the scale of asset purchases. Portfolio flows into emerging economies re-established after the outflows during February–March, and currency bond insurance became stronger for economies with strong credit ratings. Furthermore, modification of bank loan repayment terms and release of capital and liquidity buffers increased the supply of credit globally.
3. Oil prices increased in May–June close to stable current spot prices after West Texas Intermediate witnessed a negative value on April 20, 2020.
4. As of mid-June, several currencies for advanced and emerging economies weakened substantially. A need for systematic intervention exists to face the challenges associated with currency depreciation.

The magnitude of economic costs necessitates international policy coordination to respond to the pandemic. Chakraborty and Thomas (2020) highlighted the need for more fiscal policy–monetary policy coordination to boost policy response to the COVID-19. Furthermore, a need for global coordination exists in health and medical infrastructure as well as in trade, finance, and macroeconomic policies.

In the context of domestic policy effort at the national level, policy coordination among the trio, i.e., monetary, macroprudential, and fiscal policies, could effectively reduce the effects of the COVID-19.

The macroprudential policy’s major objective is to ensure financial stability and avoid systematic risk, whereas the monetary policy aims to maintain price stability and manage liquidity. The objective of fiscal policy is to boost aggregate demand and facilitate fiscal buffer. All three have different tools such as loan-to-value, debt-to-income, and leverage ratios (macroprudential policy); CRR, SLR, the repo rate, and reverse repo rate (monetary policy), and tax and discretionary countercyclical measures (fiscal policy). Time inconsistency problems⁸ exist between macroprudential and monetary policies under a central bank’s dual objective to promote price and financial stability (Ueda and Valencia, 2014). Thus, these two policies can be used ex-ante and ex-post simultaneously. As per BASEL III, one group of economists supports

⁷ Quantitative easing is an unconventional monetary policy adopted by central banks to increase money supply in the economy.

⁸ Time inconsistency is a situation in which preference of decision makers changes over time.

the major benefits of implementation, whereas another group of specialists opposes the adoption of the new rule due to higher implementation costs. Conclusively, higher policy coordination would yield higher policy effectiveness in mitigating the effects of the COVID-19.

Suppose, if policymakers have the motive of implementing monetary policy to reduce the value of public debt by generating higher inflation, the fall in the real interest rate due to expansionary monetary policy will lead to more capital outflow and exchange rate depreciation. In that case, the prime solution is to stabilize the exchange rate by depletion of reserves. A country should have enough reserves to undertake the stabilization process in the world market. Differently, in the case of expansionary fiscal policy, an increase in fiscal deficit reflects an increase in the current account deficit by supporting the “twin deficit hypothesis.”⁹ The country has to borrow or print money to finance the deficit, which may either increase foreign debt level or inflation. Furthermore, the increase in foreign debt may lead to debt sustainability, whereas an increase in inflation leads to capital outflows due to a fall in the real interest rate. In this context, the macroprudential policy tools help reduce the cost of intermediation and support price stability and debt sustainability. The tools of macroprudential, monetary, and fiscal policies must act together by promoting policy coordination to mitigate the costs of the COVID-19 and achieve price stability, financial stability, and a sustainable level of debt. Under a strong financial system, the adoption of liquidity circulation and fiscal buffer could mitigate the consequences in the post-pandemic period.

7. The missing link? A direction to future research

The existing studies on the COVID-19 have identified the facets of consequences caused by this pandemic. However, they have several shortcomings. First, existing studies have either focused on the effect of the government's adopted policies on the COVID-19 or on macroeconomic and financial issues caused by the COVID-19. However, they have failed to trace a balance between these two. Policies should be framed to tackle the health crisis and macroeconomic and financial issues simultaneously. Second, existing studies have not addressed any theoretical background of health crisis and their occurrence pattern. Finally, although the macroeconomic effects of the COVID-19 can indicate the consequences of a health crisis, existing studies have failed to determine the explanatory variables of health crisis and economic transmission channel across economies.

In this context, several missing links have been identified, which pave the way for future research. The first missing link is the balance between the government's adopted policies on the COVID-19 and macroeconomic and financial issues. Maintaining a balance between these two policies is challenging for policymakers and a key challenge for future research. The second missing link is the absence of theoretical background to health crisis and occurrence patterns. The occurrence pattern of the financial crisis can never be compared with that of the health crisis, calling for a separate section of theories to explain the health crisis' economic channels. Given that the occurrence pattern of a health crisis differs, the advancement of theoretical models on health crisis could be crucial to explain the occurrence pattern of a pandemic. The third link revolves around the explanatory variables of health crisis and identification of economic transmission channel. A comparative analysis with the previous pandemic could no longer explain the explanatory variables and transmission channels because of the different situations and types of economic channels. Therefore, identifying the explanatory variables of health crisis and transmission channels needs serious progress. Finally, modeling the economic channels will be a daunting task in the absence of a theoretical explanation of a health crisis. This opens up avenues for greater future research, and researchers should focus on resolving the above ideas.

8. Conclusion and policy implications

The COVID-19 pandemic has caused unprecedented damage to the global economy in terms of human tolls and economic consequences. It posed a greater challenge for the investors and policymakers to mitigate the consequences of this pandemic.

This study has highlighted the economic effects of the COVID-19 and emphasized policy options to reduce its effects. The study concludes that through monetary, macroprudential, and fiscal policies can independently help mitigate the effects; the combined trio could be more effective in the post-pandemic period. Therefore, coordination is required among “trio”, i.e., monetary, macroprudential, and fiscal policies, to reduce the effects of the COVID-19.

This study has several policy implications. The monetary expansion will increase aggregate demand and induce firms to boost their investment from the monetary policy perspective. From the fiscal policy perspective, government policies such as subsidizing firms' investment and the introduction of public investment programs could help promote investment. Independently, monetary expansion could fall into expectation-driven stagnation traps,¹⁰ adversely affecting the growth fundamentals of an economy. Accordingly, conventional macroeconomic theories should be modified as per the situation and coordinated to maintain the aggregate demand–supply equilibrium effectively. Apparently, conventional

⁹ The “twin deficits hypothesis” indicates that there is a connection between fiscal and current account deficits.

¹⁰ It refers to a situation where the inflation and unemployment remain steadily high, whereas economic growth remains low. The conventional monetary policy operating in the zero lower bound will not be effective to counteract the drop in demand. This will eventually lead to fall in employment, investment, and economic activity. This will result in self-fulfilling pessimistic expectations of weak growth once the fundamentals are too weak, leading to expectation driven stagflation trap.

Table A.1

Historical footprints on pandemics.

Source: Alfani and Murphy (2017) and Jorda et al. (2020).

Pandemic event	Start year	End year	Death
Black Death	1331	1353	75,000,000
Italian Plague	1623	1632	280,000
Great Plague of Seville	1647	1652	2,000,000
Great Plague of London	1665	1666	100,000
Great Plague of Marseille	1720	1722	100,000
First Cholera Pandemic	1816	1826	100,000
Second Cholera Pandemic	1829	1851	100,000
Russia Cholera Pandemic	1852	1860	1,000,000
Global Flu Pandemic	1889	1890	1,000,000
Sixth Cholera Pandemic	1899	1923	800,000
Encephalitis Lethargica Pandemic	1915	1926	1,500,000
Spanish Flu	1918	1920	100,000,000
Asian Flu	1957	1958	2,000,000
Hong Kong Flu	1968	1967	1,000,000
H1N1 Pandemic	2009	2010	203,000

This table covers the historical record of large pandemic events with at least 100,000 deaths. We can observe that the Spanish Flu was the largest in terms of death, followed by Black Death.

macroeconomic policies cannot be restricted only to conventional measures. It should complement social policies such as a whole government approach¹¹ to face the health emergency caused by the COVID-19. Conventional macroeconomic policies need to be organized into relief measures, recovery policies, and international coordination measures.

Future research should focus on the effects of the COVID-19 on capital flows, exchange rates, and various sectors of the economy. It will be a challenging task for the policymakers to face the health crisis or to correct the macroeconomic and financial issues posed by the COVID-19. Furthermore, there is greater scope for future research to examine how the developed and emerging economies function in the pandemic situation and adopt policies to face the health crisis as well as macroeconomic and financial issues.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Pandemics: A historical perspective

The earliest known pandemic, Black Death in 1331, is considered to be the costliest pandemic, with 75 million fatalities out of 450 million in the world. The Spanish flu in 1918 that occurred during the 20th century was classified as “severe”, followed by the Asian flu in 1957 and Hong Kong flu in 1968. The H1N1 pandemic in 2009 was the first pandemic in the 21st century, with more than 2 million fatalities. From the table below, we can observe that every pandemic has resulted in millions of fatalities (see Table A.1).

Appendix B. COVID-19: A novel experience

The COVID-19, the 2nd pandemic of the 21st century, has driven all attention of policymakers and is set to become the most devastating pandemic that the world has witnessed so far. In the context of the historical pandemics, Ferguson et al. (2020) considered COVID-19 as the most serious pandemic since the Spanish flu in 1918. The absence of pharmaceutical inventions will contribute to the death tolls and could make the COVID-19 the most devastating pandemic event of the 21st century (see Table B.1).

As of September 17, 2020, COVID-19 has affected 213 countries with 937,391 fatalities and 29,737,453 confirmed cases reported by the WHO. The following table shows the top 10 worst-affected countries with the most cases due to COVID-19.

¹¹ It refers to all social and economic policies like social protection, urban management, public communication, and financial and goods market under same roof.

Table B.1

Statistics on COVID-19 and countries' ranking.

Source: WHO emergency dashboard.

Countries	Confirmed cases	No. of fatalities	Ranking 1	Ranking 2
United States of America	6,530,324	194,434	1	1
India	5,118,253	83,198	2	3
Brazil	4,382,263	133,119	3	2
Russia	1,085,281	19,061	4	12
Peru	738,020	30,927	5	7
Colombia	728,590	23,288	6	11
Mexico	676,487	71,678	7	4
South Africa	653,444	15,705	8	13
Spain	614,360	30,243	9	9
Argentina	577,338	11,910	10	15

This table covers no. of confirmed cases and death due to COVID-19 till September 17, 2020. Ranking 1 is done on the basis of no. of confirmed cases, whereas ranking 2 is based on the no. of fatalities caused by this disease.

The table shows that the USA experienced the largest effect in the world and ranks first in terms of confirmed cases and death. India becomes the second most affected country in terms of confirmed cases and third in terms of fatalities. Brazil ranks third in terms of confirmed cases and second in terms of fatalities. Further, out of the top 10 most affected countries in terms of confirmed cases, 6 are ranked in terms of fatalities. Surprisingly, China does not occupy any place in rankings either in terms of confirmed cases or fatalities, indicating improved COVID conditions and medical facilities. Major economies like the USA, India, Russia, Mexico, and Spain witnessed the severity of COVID-19 and may experience more economic consequences in the future. Among the top 10 economies, the major economies like the USA (center economies), Russia (oil-exporting economies), and India (one of the Asian giants and large market) would lead to more downturn in production, investment, and consumption, resulting in a downturn in the global economy.

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