MONETARY POLICY CHALLENGES IN THE NEW NORMAL ERA: A SYSTEMATIC LITERATURE REVIEW

Samsul Arifin[*], Sayifullah

Faculty of Economics and Business, Universitas Sultan Ageng Tirtayasa, Serang, Indonesia

*Corresponding author: samsularifin@untirta.ac.id

ARTICLE INFO	ABSTRACT
	This paper aims to provide a systematic literature review (SLR) of studies conducted on the economic impact of the epidemic using the DSGE model. This research is guided by the PRISMA Preferred Reporting Items for Systematic Review and Meta-Analyses) statement, utilizing a systematic literature review (SLR) with Harzing's Publish or Perish software and Google Scholar as the primary sources, specifically focusing on the DSGE model's application. Under PRISMA, research is researched through three processes: 1) Defining clear research questions that allow systematic research, 2) Identifying inclusion and exclusion criteria, and 3) Examining a large database of scientific literature within a set time. A total of 11 out of 38 papers were identified and analyzed to provide a better understanding of the epidemiological model, the tradeoff of the lockdown policy between health and economy and the methodology adopted in the previous studies while the rest of the most recent studies appear to be related to the DSGE model with the adaptation of the epidemiological model during the Covid-19 pandemic. A total of four studies agree that many countries are imposing "lockdowns," if not generally implementing "social distancing" to contain and potentially eliminate the virus.

1. INTRODUCTION

This paper aims to explore the significant impact of the Covid-19 pandemic on the global economy, emphasizing the necessity to understand government policies through a systematic approach. We know that currently, Covid-19 has spread throughout the world. The implementation of city and provincial "lockdowns" as a response to prevent pandemic disease, as stated by Piguillem & Shi (2020), has resulted in many businesses and industries being locked, resulting in unemployment rising sharply and causing a negative supply shock to the world economy, by forcing factories to close and disrupting global supply chains (OECD, 2020) including its direct impact on society, giving rise to "panic buying" (Keane & Neal, 2021) due to increasing uncertainty in conditions during the Covid-19 pandemic (Altig et al., (2020) and even a decline in foreign direct investment, financial assets (sovereign bonds, commodities and significant exchange rates) (Hanspal et al., 2020; Khoo & Lantos, 2020; Yu et al., 2020).

Prior to the Covid-19 pandemic, several studies incorporated epidemiology into macroeconomic theory, although this was not the case for microeconomics (Fenichel et al., 2011; Horan & Fenichel, 2007; Horan & Wolf, 2005; Morin et al., 2014, 2015). Recent studies have examined the potential economic impact of the pandemic on a macroeconomic scale using the Susceptible-Infected-Recovered (SIR) epidemiological model in line with the macro model developed by Eichenbaum et al. (2020) as well as Kaplan et al. (2020) using DSGE-SEIR to model interactions between economic decisions and epidemic dynamics and studying optimal government policy in the presence of infection externalities adds household heterogeneity to this type of analysis and focuses on the distributional consequences of pandemics and policy responses (Vásconez et al., 2021) with a DSGE-SIR model of the financial sector and examining the effects of unconventional monetary policy.

Several studies have used the small open economy version of the DSGE model for various neoclassical and Keynesian specifications to describe a country's economy and analyze policies carried out by the government, such as models with fully flexible prices or with nominal rigidity (Litsios et al., 2021). DSGE models have representative households or heterogeneous households and firms (Auray & Eyquem, 2020; Bayer et al., 2020). There are standard NK DSGE development models (Auray & Eyquem, 2020; Bayer et al., 2020; Faria-e-Castro, 2021; Fornaro & Wolf, 2020). Some studies build the likelihood functions of DSGE models and maximize them or use them to obtain posteriors for Bayesian analysis (Lie, 2021; Taguchi & Gunbileg, 2020). There are DSGE models with full rationality or with behavioural bias (Gabaix, 2020). Up to the application of combining DSGE and epidemiological models, such as DSGE-SIR model with the financial sector (Angelini et al., 2020; Bodenstein et al., 2020; Eichenbaum et al., 2020; Krueger et al., 2020; Vásconez et al., 2021) and DSGE-SEIR model with HANK (Kaplan & Violante, 2020).

As far as the author is aware, there is a dearth of previous research that has attempted to address the challenges posed by Fernández-Villaverde & Guerrón-Quintana (2021) in the context of DSGE models. The dynamic field of DSGE models is rife with open challenges, particularly in the current landscape of the Covid-19 pandemic. Recent strides in the field, such as tempered particle filters, approximate Bayesian computing, Hamiltonian Monte Carlo, variational inference, and machine learning, hold significant promise but have yet to be fully explored by the DSGE community. Future challenges for DSGE model estimation are the use of continuous time, the use of HANK models, and the incorporation of machine learning methods. So far, the existing studies are limited to DSGE models without the issue of the Covid-19 pandemic (Bongers et al., 2020; Fernández-Villaverde & Guerrón-Quintana, 2021; Litsios et al., 2021; Liu & Ou, 2021; Quadrini, 2020; Ravn & Sterk, 2021; Taguchi & Gunbileg, 2020; Zhang et al., 2020), or discussing the issue of the Covid-19 pandemic without using DSGE models (Alvarez et al., 2020; Atkeson, 2020; Auerbach et al., 2021; Bachas et al., 2020; Berger et al., 2020; Eichenbaum et al., 2020; Glover et al., 2020; Guerrieri et al., 2020; Jinjarak et al., 2020; Jordà et al., 2021; Krueger et al., 2020; Piguillem & Shi, 2020; Zhang et al., 2020), and DSGE models with the issue of the Covid-19 pandemic (Auray & Eyquem, 2020; Bayer et al., 2020; Faria-e-Castro, 2021; Fornaro & Wolf, 2020; Kaplan et al., 2020; Lie, 2021; Shults, 2020; Vásconez et al., 2021). Auray & Eyquem (2020) and Bayer, Born, Luetticke, & Müller (2020) research tries to answer the challenges of HANK, and Lie (2021) approximate Bayesian calculations and DSGE-SEIR (SIR) models (Angelini et al., 2020; Bodenstein et al., 2020; Eichenbaum et al., 2020; Kaplan et al., 2020; Krueger et al., 2020; Vásconez et al., 2021).

This paper will show the close connection between economic issues and the Covid-19 pandemic. A recent study regarding the Covid-19 pandemic is linked to the economy; for example, Guerrieri et al. (2020) emphasize that the economic fallout from the pandemic can affect supply and demand. They argue that asymmetric lockdowns across sectors could create a demand shortfall. Eichenbaum, Rebelo, and Trabandt (2020), model the interaction between economic decisions and epidemic dynamics and study optimal government policy in the presence of infection externalities by considering optimal rational responses by private agents. Glover et al. (2020) emphasize the importance of household heterogeneity, but their focus is on age rather than income.

This research investigates the influence of the infectious disease Covid-19 on the economy with a DSGE model close to or by the challenges presented by Fernández-Villaverde & Guerrón-Quintana (2021). Various studies on the use of DSGE models with elements of the Covid-19 pandemic as a depiction of real life today or even over the next few years include, for example, Fornaro & Wolf (2020) model adopting the standard New Keynesian model Gali (2009) with pandemic elements Covid-19 was adapted to a model structure with an aggregate demand equation where the magnitude of the job determining parameters referring to Lorenzoni (2009). NK Castro (2021) standard development research is based on a study of various forms of fiscal policy in a calibrated NK-DSGE model. This model builds on Castro (2018) and presents an incomplete market in the form of borrowers and savers with financial frictions. The pandemic is modelled as a large negative shock to consumption utility, focusing on the supply shock impact of lockdowns, especially on demand. Auray & Eyquem (2020) use the HANK model with the behaviour of households, companies, governments, and monetary policy with elements of the Covid-19 pandemic depicted in Lockdown policy behaviour by the majority of research, which agrees that the most likely effect occurs through the utilization of labour used for producing goods that are calibrated according to the conditions of the Covid-19 pandemic.

2. RESEARCH METHODS

The SLR method was used to review the articles in this research, inspired by Kayani, U., De Silva , T., & Gan, C. (2019). According to Tranfield, SLR is a type of literature review that uses systematic methods to identify and critically evaluate existing literature. SLR was designed for targeted extensive database searches (Müller, F., Denk, A., Lubaway, E., Sälzer, C., Kozina, A., Perše, T. V.,& Jurko, 2020; Lagorio, A., & Pinto 2020).

The author used a method called PRISMA, which includes resources taken from Google Scholar by utilizing Harzing Publihs or Perish software to carry out a systematic review, determine eligibility and exclusion criteria, carry out the steps of the review process (identification, screening, eligibility), and conduct data abstraction and analysis. According to PRISMA developers, Petticrew, M., & Roberts (2008) and Dezi, L., Battisti, E., Ferraris, A., & Papa (2018), this method offers three unique advantages, namely: 1) Defining research questions precise data that allows systematic research 2) Identifying inclusion and exclusion criteria, and 3) Examining an extensive database of scientific literature within the specified time after the study by Li, Z. S., & Hasson (2020); Müller, F., Denk, A., Lubaway, E., Sälzer, C., Kozina, A., Perše, T. V., & Jurko (2020); Shaffril, H. A. M., Krauss, S. E., & Samsuddin (2018); Shaffril, H. A. M., Samah, A. A., Samsuddin, S. F., & Ali (2019). The research questions were answered by encompassing previous research through PRISMA (see Figure 1).

Several eligibility and exclusion criteria were defined. With regard to the type of literature, only complete and accessible articles were selected, of various types ranging from reviews, book series, books, chapters in books, editorials, notes, and conference proceedings to reputable ones. Secondly, to avoid confusion and translation difficulties, only articles published in English were considered. In terms of timeline, a two-year period (2020 to 2021) was chosen, which is in line with the Covid-19 pandemic.

In this paper, four stages were involved in the systematic review process conducted. The first stage involves the identification of keywords in the search process. Researchers searched using keywords such as "epidemiology", "DSGE", and "Covid-19". The second stage involved a screening process. At this stage, out of 200 articles eligible for review, 148 articles were removed due to inaccessibility. The third stage involved 52 eligible articles where the full articles were accessed. After careful scrutiny, a total of 14 articles were removed, of which nine articles did not discuss epidemiological models in addition to papers discussing DSGE and Covid-19 models, and another five articles only focused on qualitative research papers. The last stage of the review resulted in a total of 38 empirical quantitative articles used for further analysis.
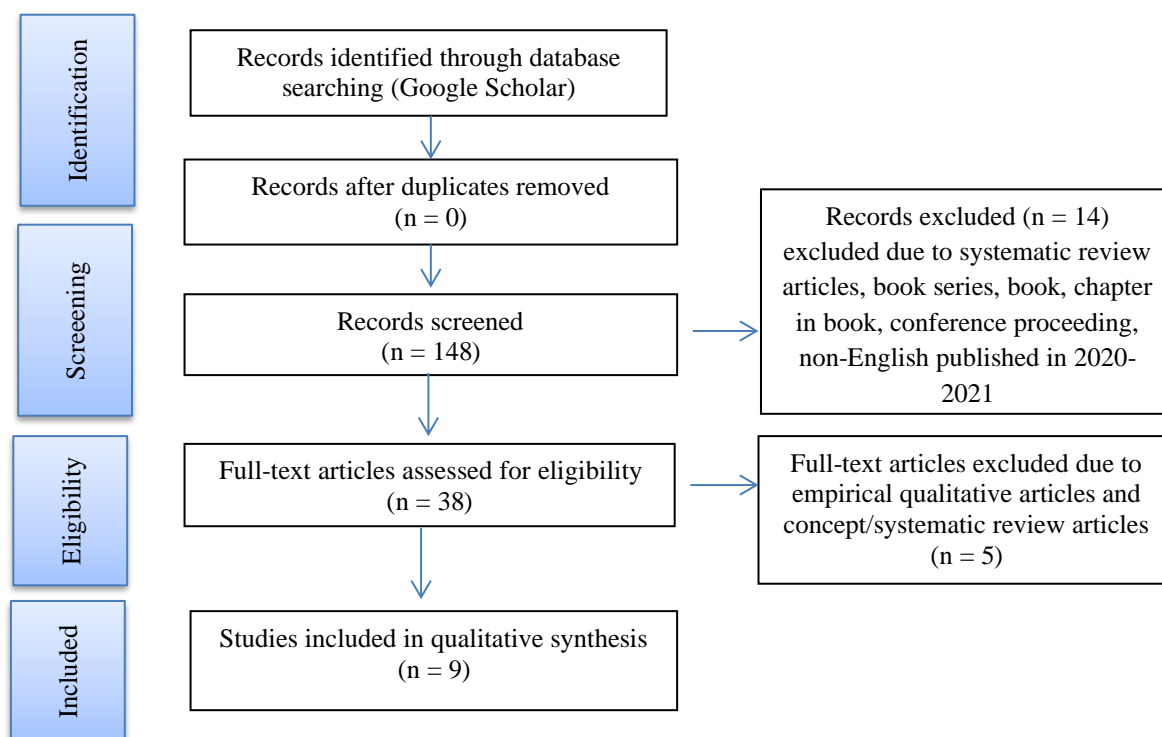
Figure 1. The Flow diagram of the study adopted by PRISMA Group
Source: Moher, D., Liberati, A., Tetzlaff, J., Altman (2009)

As shown in Table 1 below, empirical qualitative methods (case studies/multiple case studies) were used most frequently, with 32 papers applying this type of sample section criteria. Empirical quantitative methods were used 39 times, while conceptual and systematic literature review methods were used the least, with only nine papers using these methods.

Table 1. Sample Selection Criteria

Research Design	Number of Papers	(%)
Empirical quantitative research	38	73,08
Empirical qualitative research	5	9,62
Concep/systematic review	9	17,31
Total research design	52	100

Source: Processed data (2021)

3. RESULTS AND DISCUSSION
3.1. RESULTS

Journals addressing the title of this study were retrieved by keying in specific criteria such as title, abstract, and keywords presented in Table 1. The first step was to identify the journals in which the papers were published. In total, 52 eligible articles from 43 different journals were found to address this topic, and 9 addressed SLR and PRISMA methodology techniques. The key findings consist of two parts: the first part presents a summary of the SLR findings, and the second part describes a summary of the qualitative content analysis findings.

Table 2 below provides a summary of the findings from the SLR based on five classifications.

Table 2. Summary of SLR Findings

Category	Findings
Publication year 2020-2021	Most articles were published in 2020. Furthermore, there was a shifting trend in the literature studying the continued impact of the epidemic on a more application scale in 2021.
Research methodology	The dominance of empirical research methods and attention to theory testing, such as Guerrieri et al. (2020)
Journal publication	Most articles are published on ssrn.com, in addition to NBER Woring papers and CPER Discussion papers.
Geographical analysis	Most articles examine the impact of the epidemic on the US and Europe and pay less attention to the impact of the epidemic on developing countries. In addition, fewer articles on multi-country studies highlighted the need for comparative findings across different study contexts (beyond finance) and different practices.
Citation analysis	Of the seventy-seven articles cited, thirty were cited less than ten times, suggesting that these articles were published recently.

Source: Processed data (2021)

Content analysis provides an in-depth understanding of the important themes covered by the literature. This approach is particularly valuable in identifying knowledge and gaps in the current literature related to government policy during the Covid-19 pandemic and the DSGE modeling approach, a crucial tool in economic analysis. These findings can be leveraged by policymakers and financial institutions to reform their strategies and to survive future crises.

The selected articles were meticulously categorized into four main themes, each of which holds significant relevance to the research. These themes are based on important concepts reviewed by the researchers, as depicted in Table 3. Our extensive and systematic literature review revealed that the appropriate theme used in this research is government policy during the Covid-19 pandemic to overcome health and economic problems. This was achieved through observing common patterns reported in previous literature. Three articles examined epidemiological models to study the interaction between economic decisions and epidemics (Atkeson, 2020; Berger et al., 2020; Eichenbaum et al., 2020), while the other four articles studied various studies related to policies taken to contain and potentially eliminate virus, namely the majority implementing (Alvarez et al., 2020; Berger et al., 2020; Glover et al., 2020; Piguillem & Shi, 2020), as well as three articles related to the lockdown policy tradeoff between health and the economy that often appears, there are large negative shocks to the economy (Auray & Eyquem, 2020; Faria-e-Castro, 2021; Lie, 2021). The remaining articles investigate monetary policy during the Covid-19 pandemic with DSGE models (Fornaro & Wolf, 2020; Guerrieri et al., 2020; Vásconez et al., 2021). DSGE Modeling for the Economic Impact of Covid-19.

Table 3. Summary of Content Analysis Findings

Category	Findings
Model structure	The model adopts the standard New Keynesian model of Gali (2009) and its development, such as HANK, through small open economy dynamic stochastic general equilibrium (DSGE).
Calibration and Simulation	DSGE modelling adapts to the Covid-19 pandemic directly by combining epidemiological and economic models or adjusting economic model parameters based on epidemic conditions. This has an impact on how the calibration and magnitude are determined.
Theoretical aspects	Most studies see epidemic cases impacting the economy through the demand aspect due to Keynesian supply shocks.

Category	Findings
Analyze the economic response to epidemic shocks and investigate the impact of monetary policy	The development study of the ECB-BASIR model of Angelini, Pariès, Zimic, & Damjanović (2020) conducted by Vásconez with a DSGE-SIR model that no UMP can eliminate the negative effects of the epidemic crisis, except perhaps an exogenous increase in the share of claims originating from Central Banks ("epi loans") however, analysis on developed countries dominates the literature. In addition, Guerrieri et al. (2020) mentioned that, in theory, Keynesian supply shocks monetary policy, as long as the zero lower bound does not hinder it, can have a more significant effect by preventing firm closures. Fornaro & Wolf (2020) states that negative supply shocks triggered by the coronavirus led to a decline in demand and forced unemployment, so to restore this situation, central banks may need to respond by loosening monetary policy.

Source: Processed data (2021)

Several studies use DSGE models integrating economic decisions and epidemic dynamics to analyze optimal government policies during the Covid-19 pandemic. Alvarez et al. (2020) employed a DSGE-SEIR model to explore optimal lockdown strategies minimizing deaths and economic losses. Assuming 1% initial infections, no cure, and possible testing, their findings recommend a severe lockdown starting two weeks post-outbreak, impacting 60% of the population within a month, then decreasing to 20% over three months. The lockdown's intensity is driven by death rate gradients, with the absence of testing raising economic costs and shortening the lockdown period.

Atkeson (2020) introduces economists to a simple SIR model of the development of Covid-19 in the United States over the next 12-18 months. The SIR model is a Markov model of the spread of an epidemic in a population where the total population is divided into categories susceptible to disease (S), actively infected with the disease (I), recovered (or dead) and no longer infectious (R). The degree of transition between these three states determines how the epidemic develops over time. This model allows for a quantitative statement of the tradeoff between the severity and timing of disease suppression through social distancing and disease progression in the population.

Berger et al. (2020) extend the basic SEIR model to explore the role of case-dependent testing and quarantine. They show that testing can detect infections during asymptomatic stages, allowing early identification of known positive cases. Case-dependent quarantine policies vary based on whether a case is unknown, known positive, negative, or recovered, facilitating the isolation of infected individuals and the release of uninfected ones. The study compares simple testing and quarantine policies, starting with a baseline that mirrors the U.S. quarantine rate in March 2020. Findings suggest that looser quarantine measures, combined with increased random testing of asymptomatic individuals, could have led to similar death rates. Higher testing levels, paired with targeted quarantine, could reduce the economic impact of the virus and peak symptomatic infections, alleviating hospital capacity constraints.

Piguillem and Shi (2020) explored the effectiveness of lockdowns in containing Covid-19 and whether testing could complement or replace such measures. They extended the SEIR model to include information friction about virus carriers and testing technology. The study found two types of optimal lockdown policies: suppression, which involves shutting down large parts of the economy, and mitigation, which closes some activities over a longer period. The intensity and duration of these policies depend solely on virus dynamics, not the welfare function. Combining testing with lockdowns, the need for lockdowns diminishes significantly, potentially becoming unnecessary, as testing can effectively control virus spread without economic losses.

Eichenbaum et al. (2020) extended epidemiological models to analyze interactions between economic decisions and epidemics. They found that individuals reduced consumption and work to lower infection risks, lessening the epidemic's severity but exacerbating the recession. The competitive balance was not socially optimal because infected individuals did not fully internalize how their economic decisions influenced virus spread. In their benchmark model, a simple containment policy, though increasing recession severity, could save around half a million lives in the U.S.

During the Covid-19 pandemic, many countries have taken various measures, mostly "lockdowns", to contain and potentially eliminate the virus Alvarez et al. (2020); Piguillem and Shi (2020) studies optimal lockdown policies for planners who want to control pandemic deaths while minimizing lockdown output costs by expanding the Susceptible-Exposed-Infectious-Recovered (SEIR) infectious disease epidemiological model. Several studies have looked at the impact of lockdown policies during the pandemic on the economy, especially the financial sector, including Zhang et al. (2020) looking at the impact of monetary policy taken by the US in response to the pandemic in the form of zero percent interest rates and QE has the potential to introduce further uncertainty into global financial markets Jinjarak et al. (2020) discuss the evolution of Eurozone (EZ) country spreads during the first half of 2020. Vásconez et al. (2021) developed the DSGE-SIR model with the financial sector considering the existence of Central Banks that carry out conventional and unconventional monetary policies with elements of the Covid-19 pandemic.

Glover et al. (2020) examined partial lockdown policies implemented by many countries to slow down Covid-19, using a model where economic activity and disease progression are jointly determined. The study differentiates individuals by age, sector, and health status, with disease transmission occurring in various settings. Findings indicate that older people benefit the most from slowing viral spread, while younger workers in shuttered sectors face the most significant losses. They concluded that closures implemented in mid-April were too broad, suggesting a partial closure until fall. A deeper, longer shutdown would be preferable if a vaccine were imminent.

Bachas et al. (2020) analyzed US household-level bank account data to understand the pandemic's heterogeneous effects on spending and savings. Initially, spending dropped across income levels from March to early April but recovered faster among low-income households by mid-April. Liquid asset balances increased across all income groups, with low-income households contributing disproportionately to the aggregate balance increase. These findings suggest that the early decline in spending was driven mainly by the pandemic's direct effects, with government stimulus and insurance programs playing a crucial role in mitigating the impact on low-income households.

Guerrieri et al. (2020) explored government policy responses to economic shocks from the Covid-19 epidemic using Keynesian supply shock theory. They noted that standard fiscal stimulus might be less effective due to the muted Keynesian multiplier in sectors that were shut down. Monetary policy could effectively prevent company closures if not constrained by the zero lower bound. Optimal policies should involve closing contact-intensive sectors while providing full insurance payments to affected workers to mitigate economic disruption.

Research on the influence of the infectious disease Covid-19 on the economy using DSGE and DSGE-SIR models, and how Covid-19 pandemic elements are incorporated into these models and steady-state parameter calibration, is presented as follows: Angelini et al. (2020); Bodenstein et al. (2020); Eichenbaum et al. (2020); Krueger et al. (2020); Vásconez et al. (2021). The DSGE-SIR model with the financial sector is used to study the economic impact of the epidemic and the potential of unconventional monetary policy. These studies combine simple neoclassical macroeconomic models, where agents consume goods and work, with standard disease models from epidemiology literature.

However, they treat the labor market differently; we assume sick individuals are prohibited from working. This avoids introducing additional assumptions like homogeneous mixing and maintains reasonable results without affecting the findings.

Angelini et al. (2020) use the ECB-BASIR model, which is the result of integrating the standard compartment SIQR model a la Kermack and McKendrick (1927) with Quarantined policies into ECB BASE where it is assumed that the epidemiological model influences decision problems covering consumption, investment and market blocks workforce in the economic block. The SIQR model calibration assumes that infectious contact is 8% so that the total number of people infected without measurement reaches 60% of the total population, infected people recover 0.07114296 or die 0.00025704; both parameters in total reflect the results of disease discovery on average after 21 days. The death rate reached 0.37%, and the calibration of various policies for effective infections.

Bodenstein et al. (2020) comprehensively calibrated the SIR model. They set disease-specific parameter values, contact rates that depend on the groups of 3 groups, where each is assigned a recovery rate, and the death rate and size of the three groups. Without social distancing, the three groups were identical from an epidemiological perspective. More specifically, the effective contact rates within and between groups are identical and constant. As per the latest paper by economists on the spread of the Covid-19 disease, it is set at 0.2 and the recovery rate at 1/20 which implies a disease duration of 20 days.

Kaplan et al. (2020) developed the DSGE-SEIR model, which is particularly relevant to the current Covid-19 pandemic. The model was built in two blocks, namely the epidemiological block and the economic block. The epidemiology block consists of a standard compartment SEIR model a la Kermack and McKendrick (1927) with two-way feedback between pandemic dynamics and individual employment and consumption choices while the economic model block consists of households, firms and government. In the paper, calibration regarding the state of the Covid-19 pandemic was carried out on the second measure of lockdown to produce a 50% reduction in working hours and social consumption relative to mid-February 2020 and included calibration parameters for the epidemiological model.

Vásconez et al. (2021) DSGE-SIR model with the assumption that epidemics affect the economy through labour supply by first determining the calibration of the epidemiological model as in the following table:

Table 4. Calibration of Epidemiologic Models

Parameter	Calibration Value/Baseline
Initial condition of susceptibel	0.9
Initial condition of infected	0.1
Initial condition of recovered	0
Tranmission rate	0.4
Recovery rate	0.1

Source: Processed data (2021)

A significant theoretical contribution to understanding the economic impact of the Covid-19 pandemic is the work of Fornaro and Wolf (2020). They adapted pandemic-related elements into a model with an aggregate demand equation, adjusting job-determining parameters in line with Lorenzoni (2009) to reflect the Covid-19 situation. This adaptation demonstrated that the pandemic caused a decline in inefficient employment levels and a permanent drop in productivity growth. The negative supply shock triggered by the coronavirus resulted in a decline in demand and forced unemployment, implying that central banks might need to ease monetary policy in response to the pandemic.

Empirical research also examined these dynamics. Shults (2020) considered the Covid-19 pandemic by adjusting parameters to calculate relevant recession factors, including a 6% decline in external demand due to the global recession and the OPEC+ agreement, a 15% ruble depreciation, and a 2% GDP decline from quarantine measures.

Auray & Eyquem (2020) explored the shock effects of lockdowns, which included a negative impact on labor utilization, a positive shock on the separation rate, and mixed shocks, such as negative impacts on the cost of posting vacancies and workers' insurance. Lie (2021) treated Covid-19 as exogenous shocks, with labor supply modeled through negative labor supply shocks and adverse preferences. This led to a significant decline in aggregate demand as consumers reduced spending due to precautionary saving behavior amid rising income uncertainty.

Research examining the role of fiscal policy during the pandemic, focusing on health and economic issues, includes the work of Bayer et al. (2020). They emphasized the government's role in using transfer payments to households to reduce income risks and the negative impact of lockdowns. Their model adjusted calibration factors such as a 0.68 labor share, reflecting 62% labor income, an 11% elasticity of substitution within sectors with a 10% price markup, and a government tax rate from 0.2 to 0.15. Faria-e-Castro (2021) analyzed the impact of the $2.2 trillion Coronavirus Aid, Relief, and Economic Security (CARES) Act of 2020, focusing on reducing negative shocks to consumption utilities through supply shocks and addressing the impact of lockdowns on demand. The steady-state model was calibrated to the U.S. economy, considering the pandemic's intensity and duration on the unemployment rate between 2020Q1 and 2021Q2. Key components, such as UI expansion and liquidity assistance to companies, were identified as critical to stabilizing income and employment.

3.2. DISCUSSION

This study systematically analyzes the literature on government policies addressing health and economic issues during the Covid-19 pandemic using the DSGE model approach. Four studies concur that many countries have implemented "lockdowns" or "social distancing" to control the virus's spread (Alvarez et al., 2020; Berger et al., 2020; Glover et al., 2020; Piguillem & Shi, 2020). Optimal lockdown strategies involve "suppression" by closing a significant part of the economy or "mitigation" by limiting certain activities for extended periods. Lockdown policies face criticism due to the health-economic tradeoff, prompting discussions on whether testing and quarantine could replace or complement lockdowns. Higher testing levels, combined with targeted policies, can mitigate economic impacts and reduce peak infections that challenge hospital capacities.

The health-economic tradeoff inherent in lockdown policies often leads to significant economic downturns (Faria-e-Castro, 2021). Lie (2021) noted that negative supply shocks decrease consumption utility, while adverse preferences and a notable drop in aggregate demand arise as consumers limit spending due to precautionary savings. This aligns with Auray and Eyquem (2020), who suggest that lockdown policies primarily affect labor utilization in goods production, as reflected in much of the research.

Angelini et al. (2020) developed the ECB-BASIR model, a large-scale semi-structural model for the euro area, using SIR model dynamics to explore interactions between Covid-19's epidemiological aspects, policy responses, and macroeconomic impacts. This model has served as a foundation for further studies, such as Vásconez et al. (2021), which employed a DSGE-SIR model to analyze the financial sector and the effects of unconventional monetary policies. They found that no unconventional monetary policy could fully counteract the pandemic's negative economic impacts, except through an exogenous increase in Central Bank "epi loans."

Guerrieri et al. (2020) posited that Keynesian monetary policy shocks could significantly prevent firm closures, provided the zero lower bound does not restrict them. Fornaro & Wolf (2020) argued that the negative supply shocks caused by Covid-19 reduce demand and production. To remedy this situation, central banks may need to adopt accommodative monetary policies to combat the pandemic's economic consequences.

4. CONCLUSION

In this paper, we adopted the SLR method using a systematic literature review (PRISMA). Although 200 articles were collected from Google Scholar on Harzing's Publish or Perish software in the preliminary search, only 52 articles were selected as the final sample to study 2020 to 2021.

Detailed content analysis highlighted gaps in the literature, with fewer studies examining developing countries. In addition, fewer articles were multicountry studies, highlighting the need for comparative findings across different contexts, cultures and practices. This paper provides future research avenues where future studies can focus on multicountry comparisons of the impact of the Covid-19 pandemic rather than focusing on the impact on individual countries. This expands the scope of future research in emerging markets, which has yet to be explored on a larger scale, especially in multicountry settings.

5. REFERENCES

Altig, D., Baker, S., Barrero, J. M., Bloom, N., Bunn, P., Chen, S., Davis, S. J., Leather, J., Meyer, B., Mihaylov, E., Mizen, P., Parker, N., Renault, T., Smietanka, P., & Thwaites, G. (2020). Economic uncertainty before and during the COVID-19 pandemic. *Journal of Public Economics*, *191*, 104274. https://doi.org/10.1016/j.jpubeco.2020.104274

Alvarez, F., Argente, D., & Lippi, F. (2020). A Simple Planning Problem for COVID-19 Lockdown. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3569911

Angelini, E., Pariès, M. D., Zimic, S., & Damjanović, M. (2020). ECB-BASIR: a primer on the macroeconomic implications of the COVID-19 pandemic. *ECB Working Paper No. 20202431*, *Juni*.

Atkeson, A. (2020). What Will Be the Economic Impact of COVID-19 in the US? Rough Estimates of Disease Scenarios. In *NBER Working Paper Series* (Vol. 53, Issue 9). https://doi.org/10.3386/w26867

Auerbach, A. J., Gorodnichenko, Y., & Murphy, D. (2021). Inequality, fiscal policy and COVID19 restrictions in a demand-determined economy. *European Economic Review*, *137*, 103810. https://doi.org/10.1016/j.euroecorev.2021.103810

Auray, S., & Eyquem, A. (2020). The macroeconomic effects of lockdown policies. *Journal of Public Economics*, *190*, 104260. https://doi.org/10.1016/j.jpubeco.2020.104260

Bachas, N., Ganong, P., Noel, P., Vavra, J., Wong, A., Farrell, D., & Greig, F. (2020). Initial Impacts of the Pandemic on Consumer Behavior: Evidence from Linked Income, Spending, and Savings Data. In *Brookings Papers on Economic Activity* (Vol. 2020, Issue Special Edition). https://doi.org/10.3386/w27617

Bayer, C., Born, B., Luetticke, R., & Müller, G. (2020). The Coronavirus Stimulus Package: How large is the transfer multiplier? *CEPR Discussion Papers*, *724204*.

Berger, D., Herkenhoff, K., & Mongey, S. (2020). An SEIR Infectious Disease Model with Testing and Conditional Quarantine. In *National Bureau of Economic Research.* Wiley Online Library. https://doi.org/10.3386/w26901

Bodenstein, M., Corsetti, G., & Guerrieri, L. (2020). Social Distancing and Supply Disruptions in a Pandemic. *CEPR Discussion Paper No. DP14629*, *May*.

Bongers, A., Gómez, T., & Torres, J. L. (2020). Teaching dynamic General equilibrium macroeconomics to undergraduates using a spreadsheet. *International Review of Economics Education*, *35*(August), 100197. https://doi.org/10.1016/j.iree.2020.100197

Dezi, L., Battisti, E., Ferraris, A., & Papa, A. (2018). The link between mergers and acquisitions and innovation: A systematic literature review. *Management Research Review*, *41*(6), 716–752.

Eichenbaum, M., Rebelo, S., & Trabandt, M. (2020). The Macroeconomics of Epidemics. In *Angewandte Chemie International Edition, 6(11), 951–952.* https://doi.org/10.3386/w26882

Faria-e-Castro, M. (2021). Fiscal Policy during a Pandemic. *Journal of Economic Dynamics and Control*, *125*, 104088. https://doi.org/10.20955/wp.2020.006

Fenichel, E. P., Castillo-Chavez, C., Ceddia, M. G., Chowell, G., Parra, P. A. G., Hickling, G. J., Holloway, G., Horan, R., Morin, B., Perrings, C., Springborn, M., Velazquez, L., & Villalobos, C. (2011). Adaptive human behavior in epidemiological models. *Proceedings of the National Academy of Sciences*, *108*(15), 6306–6311. https://doi.org/10.1073/pnas.1011250108

Fernández-Villaverde, J., & Guerrón-Quintana, P. A. (2021). Estimating DSGE models: Recent advances and future challenges. *Annual Review of Economics*, *13*.

Fornaro, L., & Wolf, M. (2020). Covid-19 Coronavirus and Macroeconomic Policy : Some Analytical Notes. *Barcelona GSE Working Paper Series*, *1168*, 1–8.

Gabaix, X. (2020). A Behavioral New Keynesian Model. *American Economic Review*, *110*(8), 2271–2327. https://doi.org/10.1257/aer.20162005

Glover, A., Heathcote, J., Krueger, D., & Ríos-Rull, J.-V. (2020). Health versus Wealth: On the Distributional Effects of Controlling a Pandemic. In *The Review of Economics and Statistics*. https://doi.org/10.3386/w27046

Guerrieri, V., Lorenzoni, G., Straub, L., & Werning, I. (2020). Macroeconomic Implications of COVID-19: Can Negative Supply Shocks Cause Demand Shortages? *SSRN Electronic Journal*, 1–36. https://doi.org/10.2139/ssrn.3570096

Hanspal, T., Weber, A., & Wohlfart, J. (2020). Income and Wealth Shocks and Expectations during the COVID-19 Pandemic. *CESifo Working Paper, No. 8244*.

Horan, R. D., & Fenichel, E. P. (2007). Economics and Ecology of Managing Emerging Infectious Animal Diseases. *American Journal of Agricultural Economics*, *89*(5), 1232–1238. https://doi.org/10.1111/j.1467-8276.2007.01089.x

Horan, R. D., & Wolf, C. A. (2005). The Economics of Managing Infectious Wildlife Disease. *American Journal of Agricultural Economics*, *87*(3), 537–551. https://doi.org/10.1111/j.1467-8276.2005.00746.x

Jinjarak, Y., Ahmed, R., Nair-Desai, S., Xin, W., & Aizenman, J. (2020). Pandemic Shocks and Fiscal-Monetary Policies in the Eurozone: Covid-19 Dominance during January-June 2020. *NBER Working Paper Series*, *June*.

Jordà, Ò., Singh, S. R., & Taylor, A. M. (2021). Longer-Run Economic Consequences of Pandemics. *The Review of Economics and Statistics*, 1–29. https://doi.org/10.1162/rest_a_01042

Kaplan, G., Giovanni, B. M., & Violante, G. L. (2020). The Great Lockdown And The Big Stimulus: Tracing The Pandemic Possibility Frontier For The U.S. *National Bureau of Economic Research*.

Kayani, U., De Silva , T., and Gan, C. (2019). A Systematic literature review on working capital management - an identification of new avenues. *Qualitative Research in Finance*, *11*(3), 352–366.

Keane, M., & Neal, T. (2021). Consumer panic in the COVID-19 pandemic. *Journal of Econometrics*, *220*(1), 86–105. https://doi.org/10.1016/j.jeconom.2020.07.045

Kermack, W. O., & McKendrick, A. G. (1927). A contribution to the mathematical theory of epidemics. *Proc. R. Soc. Lond.*, *115*, 700–721. https://doi.org/10.1098/rspa.1927.0118

Khoo, E. J., & Lantos, J. D. (2020). Lessons learned from the COVID-19 pandemic. *Acta Paediatrica*, *109*(7), 1323–1325. https://doi.org/10.1111/apa.15307

Krueger, D., Uhlig, H., & Xie, T. (2020). Macroeconomic Dynamics and Reallocation in an Epidemic: Evaluating the "Swedish Solution." In *National Bureau of Economic Research*. https://doi.org/10.3386/w27047

Lagorio, A., & Pinto, R. (2020). Food and grocery retail logistics issues: A systematic literature review. *Research in Transportation Economics*, *100841*.

Li, Z. S., & Hasson, F. (2020). Resilience, stress, and psychological well-being in nursing students: A systematic review. *Nurse Education Today*, *104440*, 262.

Lie, D. (2021). Implications of state-dependent pricing for DSGE model-based policy analysis in Indonesia. *Economic Analysis and Policy*.

Litsios, I., Pilbeam, K., & Asteriou, D. (2021). DSGE modelling for the UK economy 1974–2017. *Bulletin of Economic Research*, *73*(2), 295–323. https://doi.org/10.1111/boer.12255

Liu, C., & Ou, Z. (2021). What determines China's housing price dynamics? New evidence from a <scp>DSGE-VAR</scp>. *International Journal of Finance & Economics*, *26*(3), 3269–3305. https://doi.org/10.1002/ijfe.1962

Lorenzoni, G. (2009). A Theory of Demand Shocks. *American Economic Review*, *99*(5), 2050–84. https://doi.org/10.1257/aer.99.5.2050

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G. (2009). Perrefered reporting items for systematic review and meta-analyses: the PRISMA statement. *Plos Med*, *6*(7), e1000097.

Morin, B. R., Perrings, C., Kinzig, A., & Levin, S. (2015). The social benefits of private infectious disease-risk mitigation. *Theoretical Ecology*, *8*(4), 467–479. https://doi.org/10.1007/s12080-015-0262-z

Morin, B. R., Perrings, C., Levin, S., & Kinzig, A. (2014). Disease risk mitigation: The equivalence of two selective mixing strategies on aggregate contact patterns and resulting epidemic spread. *Journal of Theoretical Biology*, *363*, 262–270. https://doi.org/10.1016/j.jtbi.2014.07.037

Müller, F., Denk, A., Lubaway, E., Sälzer, C., Kozina, A., Perše, T. V.,& Jurko, S. (2020). Assessing social, emotional, and intercultural competences of students and school staff: A systematic literature review. *Educational Research Review*, *29*.

OECD. (2020). *Economic Outlook, Interim Report March 2020*.

Petticrew, M., & Roberts, H. (2008). Systematic Reviews in the Social Sciences: A Practical Guide. *In Systematic Reviews in the Social Sciences: A Practical Guide.*

Piguillem, F., & Shi, L. (2020). Optimal COVID-19 Quarantine and Testing Policies. *CEPR Discussion Paper No. DP14613*, *April*(1), 356.

Quadrini, V. (2020). The Impact of Industrialized Countries' Monetary Policy on Emerging Economies. *IMF Economic Review*, *68*(3), 550–583. https://doi.org/10.1057/s41308-020-00115-3

Ravn, M. O., & Sterk, V. (2021). Macroeconomic Fluctuations with HANK & SAM: an Analytical Approach. *Journal of the European Economic Association*, *19*(2), 1162–1202. https://doi.org/10.1093/jeea/jvaa028

Shaffril, H. A. M., Krauss, S. E., & Samsuddin, S. F. (2018). A systematic review on Asian's farmers' adaptation practices towards climate change. *Science Of The Total Environment*, *644*, 683–695.

Shaffril, H. A. M., Samah, A. A., Samsuddin, S. F., & Ali, Z. (2019). Mirror-mirror on the wall, what climate change adaptation strategies are practiced by the Asian's fishermen of all? *Journal of Cleaner Production*, *232*, 104–117.

Shults, D. N. (2020). DSGE-MODEL FOR RUSSIAN ECONOMY WITH BANKS ANDFIRM-SPECIFIC CAPITAL IN CORONAVIRUS PANDEMIC. *Вестник Пермского Университета. Серия «Экономика» = Perm University Herald. ECONOMY*, *15*(2), 218–230. https://doi.org/10.17072/1994-9960-2020-2-218-230

Taguchi, H., & Gunbileg, G. (2020). Monetary Policy Rule and Taylor Principle in Mongolia: GMM and DSGE Approaches. *International Journal of Financial Studies*, *8*(4), 71. https://doi.org/10.3390/ijfs8040071

Vásconez, V. A., Damette, O., & Shanafelt, D. W. (2021). Macroepidemics and unconventional monetary policy: Coupling macroeconomics and epidemiology in a financial DSGE-SIR framework. *Covid Economics*, *67*, 199–253.

Yu, L., Du, J., & Dang, H. (2020). Special issue on FDI and integration of Chinese economy. *China Economic Review*, *61*, 101460. https://doi.org/10.1016/j.chieco.2020.101460

Zhang, D., Hu, M., & Ji, Q. (2020). Financial markets under the global pandemic of COVID-19. *Finance Research Letters*, *36*(March), 101528. https://doi.org/10.1016/j.frl.2020.101528