International Journal of Islamic Economics and Finance (IJIEF)
Vol. 8(1), page 82-102, January 2025

The Effect of Real Business Cycle on Islamic Capital Market Resilience in Indonesia

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Article History
Received: Des 13th, 2023 Revised: Sep 27th, 2024 Accepted: Jan 28th, 2025

Abstract

In an era of increasing economic volatility and financial uncertainty, understanding the impact of the Real Business Cycle (RBC) on the Islamic Capital Market (ICM) is crucial for enhancing the resilience of Islamic financial systems, which are increasingly significant in global finance. This research is important because understanding the impact of the Real Business Cycle (RBC) on the Islamic Capital Market (ICM) is crucial for enhancing the resilience of Islamic financial systems, which are increasingly significant in global finance. The research aims to investigate the extent of co-movement and the effect of the Real Business Cycle (RBC) on the Islamic Capital Market (ICM) in Indonesia. The methodology begins with the Hodrick-Prescott (HP) Filter to identify trends and cycles in the RBC and ICM data. Next, cross-correlation analysis is used to measure the co-movement between the two, determining how RBC fluctuations affect the Islamic capital market. Finally, the Vector Autoregressive (VAR) and Vector Error Correction Model (VECM) are applied to explore both the short-term and long-term causal relationships between RBC and ICM, offering insights into immediate and persistent effects on the market. The findings reveal a significant relationship between Real Business Cycle (RBC) indicators and the Islamic Capital Market (ICM), with notable shifts in investor behavior and varying impacts of GDP, unemployment, and exchange rates on Islamic financial instruments like Jakarta Islamic Index (JII) and Sukuk.

Keywords: Real Business Cycle (RBC), Islamic Capital Market (ICM), Resilience, Indonesia
JEL Classification: E32, G15, G10, O16
Type of paper: Research Paper

DOI: https://doi.org/10.18196/ijief.v7i2.20892
Web: https://journal.umy.ac.id/index.php/ijief/article/view/20892
Citation:
Ibrahim, M. Y., Indra, I., & Satifa, S. A. (2025). The Effect of Real Business Cycle on Islamic Capital Market Resilience in Indonesia. ***International Journal of Islamic Economics and Finance (IJIEF)***, *8*(1), 82-102. DOI: https://doi.org/10.18196/ijief.v7i2.20892

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I. Introduction

The business cycle, characterized by distinct economic phases, is quantified using a free algorithm model to detect periods of recession and expansion (Morley & Piger, 2006). Theoretically, it encompasses the collective factors influencing a region's economy through its institutions (Takahashi, 2020). While Lucas (1980) restricts it to GDP trend fluctuations, business cycles and GDP have separate foundations. GDP calculations are based on regional goods and services production value, whereas business cycles focus on monetary disturbances' relative price effects, not macroeconomic aggregates (Kim & Choi, 1997; Leamer, 2012).

According to Dobrescu et al. (2012), Ludwig von Mises initially proposed the theory, which Friedrich von Hayek later expanded. Despite being dismissed by macroeconomists for years, Hayek's work gained recognition in the 1980s, propelled by Ronald Reagan and Margaret Thatcher's endorsements and the Tea Party's social media promotions (Kuehn, 2013). The theory's inability to fully explain economic fluctuations led to its initial rejection (Oppers, 2002). Subsequently, the Real Business Cycle (RBC) theory emerged as an extension of Hayek's work.

Kydland & Prescott (1982) introduced the RBC concept, drawing from R. Lucas & Prescott (1971). Their research revealed that business cycle phenomena could be examined through dynamic general equilibrium models. They also proposed that business cycle and growth theories could be linked under long-term empirical consistency conditions, with their model calibrated using microeconomic parameters. These findings gave rise to the real business cycle theory in 1982, evolving from Mises and Hayek's work (Rebelo, 2005).

Real Business Cycle (RBC) theory is built on two fundamental concepts: viewing money as a secondary factor and attributing business cycles to rational agents like production growth, government expenditure, and trade activities. Economic shocks result from disturbances to these elements (Mankiw, 2000). The field of RBC research continues to progress, with Vecchi's 1999 compilation of RBC studies offering new research directions based on previous findings. Batu (2017) examines stochastic remittance shocks alongside an RBC model calibrated to match cross-country facts, including Indonesia.

Jaroensathapornkul (2013) evaluates the RBC model's ability to replicate the J-curve effect in Thailand and ASEAN. Several studies focus on Indonesia, such as Soelistyo (2017), who develops models for RBC, Keynesian, and monetarist theories. Harahap et al. (2018) explore business and financial cycles in the context of the Indonesian crisis from 2000Q1 to 2018Q3, analyzing business cycle determinants using GVAR with 2000 bootstrap replications. Their research employs Turning Point Analysis, Frequency Based Filter, and Composite Leading Indicator (CLI) approaches. Wahyuningsih & Sumantyo (2017) investigate a business cycle model using CLI, concluding that the established CLI functions effectively and that GDP movement and stock market index do not overlap.

Wahyuningsih & Sumantyo (2017) connect RBC and Islamic stock variables in an empirical study, which merits further investigation, particularly in the broader context of capital markets. Similar research has been conducted with varying objects and concepts. Liow (2016) examines co-

movements of cross-country business cycles, stock market cycles, and real estate market cycles in G7 countries, revealing cycle return spillover effects among these variables, extending beyond the relationship between business cycles and stock markets. Arshad (2017) confirms the unstable movement of the Islamic Capital Market (ICM) in the Asia Pacific and the United States during the RBC growth phase, suggesting further research into RBC's impact on the Islamic stock market.

This study addresses a significant research gap by examining the interplay between the Real Business Cycle (RBC) and the Islamic Capital Market (ICM) in Indonesia, an area that has received limited attention. Previous research has primarily focused on the relationship between business cycles and traditional financial markets, as well as comparing stock market cycles across different countries. However, few studies have delved into the specific dynamics of RBC and its direct effects on Islamic financial systems, particularly within a single nation's market context. By filling this gap, the research provides empirical evidence of quasi-periodic trends between RBC and ICM indicators in Indonesia, shedding light on how macroeconomic fluctuations affect the stability of Islamic capital markets. Furthermore, this study enhances our understanding of RBC's importance in Islamic finance, a crucial aspect for developing more resilient Islamic financial systems capable of withstanding economic shocks associated with business cycles.

The research aims to investigate the extent of co-movement and the effect of the Real Business Cycle (RBC) on the Islamic Capital Market (ICM) in Indonesia. Understanding this relationship is essential, as fluctuations in the RBC may influence the stability and performance of the ICM, which plays a growing role in the country's financial system. Specifically, the study seeks to address two key questions: first, to what extent does the movement of the RBC co-move with the ICM in Indonesia? Second, how does the movement of the RBC affect the resilience of the ICM in Indonesia? By answering these questions, the research provides insights into the dynamic interactions between macroeconomic cycles and Islamic financial markets, helping policymakers and investors navigate economic uncertainties more effectively.

To achieve these objectives, the study employs a structured analytical approach. The first stage utilizes cross-correlation analysis to measure the degree of co-movement between RBC and ICM, offering insights into how fluctuations in the business cycle align with movements in the Islamic financial market. The second stage applies the Vector Autoregressive (VAR) and Vector Error Correction Model (VECM) to examine both the short-term and long-term causal relationships between RBC fluctuations and the resilience of the ICM. Through these methodologies, the research aims to uncover the immediate and persistent effects of RBC changes on Islamic financial instruments, such as the Jakarta Islamic Index (JII) and Sukuk, ultimately contributing to a deeper understanding of the economic forces shaping the Islamic capital market in Indonesia.

II. Literature Review

Resilience Theory of Capital Market

Among financial instruments, the stock market stands out as one of the most widely utilized. The broader theoretical framework of capital market theory was expanded by Berkes & Folke (1992),

introducing the concept of the socio-ecological system. This extended theory encompasses the stability and resilience of capital markets, integrating human and natural elements (Baral & Stern, 2011). Alongside this approach, a traditional sustainability model exists, which emphasizes maintaining capital markets by ensuring a continuous flow of capital into output without depletion (Brunckhorst, 2001).

In line with this concept, any alterations will impact on the resilience of the socio-ecological system within the capital market, as resilience represents the number of changes the system can withstand while preserving its structure. Consequently, capital markets should be capable of enduring, adapting, and evolving in response to various circumstances (Carpenter et al., 2001). In essence, resilience refers to how a system handles transformation, movement, or disruption of an entity. Current research focuses on the dynamics within the Islamic capital market (ICM) (Baral & Stern, 2011; Folke et al., 2005).

Indicators of the Islamic Capital Market

The Islamic capital market (ICM) refers to capital market activities conducted in accordance with Islamic principles. In Indonesia, the National Sharia Board of the Indonesian Ulama Council, known as DSN-MUI, regulates ICM through decree No.40/DSN-MUI/X/2003. According to Hamimi & Ginting (2019), Islamic stocks and Sukuk are the two well-established ICM instruments in Indonesia. The Islamic stock index in Indonesia comprises ISSI (Indonesia Sharia Stock Index), JII (Jakarta Islamic Index), Jakarta Islamic Index 70 (JII70), and IDX-MES BUMN 17. Sukuk in Indonesia is available in three forms: retail Sukuk, savings (government) Sukuk, and waqf (linked) Sukuk (IDX Islamic, 2022).

In a particular study, Islamic stocks and Sukuk were chosen as indicators to represent the Islamic capital market, based on Hamimi & Ginting's (2019) assertion that these are the most developed ICM instruments in Indonesia. Data for Islamic stock instruments were obtained from the Jakarta Islamic Index (JII). This index was selected due to its status as the first Islamic index in Indonesia, aligning with the research requirements to examine the Islamic capital market through RBC analysis. As the pioneering Islamic index in Indonesia, JII serves as an appropriate instrument for this analysis. Additionally, Sukuk was incorporated as an ICM indicator to complement the Islamic stock data.

Real Business Cycle Theory

The Real Business Cycle (RBC) is a neoclassical macroeconomic framework that explains fluctuations in the business cycle without considering monetary policy as a determining factor (Helgadóttir, 2021; Stockman, 1988). According to RBC theory, cycles emerge naturally in a competitive market, allowing the economy to self-adjust in response to real shocks (Stadler, 1994). Unlike other business cycle theories, RBC attributes economic fluctuations to exogenous variations in real economic activities, considering aggregate economic movements as outcomes of decisions made by economic agents (Plosser, 1989). Rather than indicating market inefficiencies, RBC is viewed as a reflection of optimal economic performance. Over time, RBC methods have been integrated into macroeconomic research, reinforcing its foundation in the

neoclassical production function, particularly in relation to stochastic shocks. One of the core assumptions of RBC theory is that technological changes drive substantial economic fluctuations. Prescott (1986) identified technological shocks as a key component of the RBC model, emphasizing that these shocks predominantly affect aggregate supply rather than aggregate demand. This perspective highlights that RBC theory is fundamentally grounded in real-sector economic activity, where fluctuations are seen as rational responses to changes in real economic conditions. Consequently, the primary policy implication of RBC is the need for governments to focus on long-term structural policies. Additionally, RBC opposes discretionary fiscal and monetary interventions, arguing that such measures only yield short-term economic effects. If applied, this theory suggests that governments should optimize national economic output to maximize utility.

The foundation of RBC theory is the Walrasian model, introduced by Kenneth Arrow and Gerard Debreu, which serves as a tool for assessing economic efficiency (Arrow, 1951; Debreu, 1951; Vecchi, 1999). However, this model assumes a fully competitive market. Unlike conventional business cycle models, which emphasize market imperfections as the root of economic fluctuations, RBC attributes these fluctuations to external shocks that seamlessly integrate into the economic system. Within the RBC framework, ethical considerations are regarded as fundamental pillars of economic stability (Stadler, 1994). Any disruption in market integrity is believed to disturb equilibrium, making the application of RBC ineffective in such scenarios.

Indicator of Real Business Cycle

The movement of the Real Business Cycle (RBC) is typically analyzed through economic output indicators such as Gross National Product (GNP). To identify these fluctuations, a suitable method is required to separate trends from the raw data, making it smoother and allowing for the extraction of the actual GNP values. The Hodrick-Prescott (HP) filter is commonly used for this purpose. However, in this study, RBC indicators are represented by the Industrial Production Index (IPI) as a proxy for GDP, along with the Unemployment Rate, Exchange Rate, and Foreign Direct Investment (FDI). The selection of these indicators is based on the considerations of Becker & Wang (2013) and Takahashi (2020).

The choice of IPI as a GDP representative, rather than GNP, as an RBC indicator is based on its functional relevance. Both GNP and GDP measure the total market value of production (Leamer, 2012), but GDP is considered a more precise indicator of RBC as it is widely recognized as the most effective statistical measure for summarizing a region's economic condition (Anderson, 1993; Garces & Adriatico, 2019). GDP reflects a nation’s economic wealth through the accumulation of private consumption, business investment, government expenditures, and net exports (Biswas et al., 2019; Yamarone, 2012). Additionally, the Unemployment Rate serves as a key indicator of a country’s actual production levels. Meanwhile, the Exchange Rate and FDI play crucial roles in supporting production within the RBC framework, reinforcing their inclusion as essential variables in this study.

Previous Research

The foundation of the Real Business Cycle (RBC) theory stems from the accumulation of a neo-classical model, emphasizing market forces driven by capital investment and labor allocation. Under specific conditions, work effort, investment, and economic output tend to converge toward a steady state. A key focus of RBC theory is the trade-off between production and leisure time. The movement of RBC is influenced by government spending, which impacts overall demand. The resulting market equilibrium in RBC is attained through adjustments in the real interest rate. An increase in this rate encourages individuals to reallocate their time, leading to higher labor supply. As labor participation rises, employment opportunities stabilize, and output experiences growth (Mankiw, 2000; Plosser, 1989).

Research on RBC continues to evolve. Between 2000 and 2021, Google Scholar recorded 615 publications globally on RBC. However, only 10 studies during this period specifically analyzed RBC in Indonesia. Among them, notable works include Prasetyo & Dwianto (2018), Rizvi & Arshad (2014), and Arshad (2017). Additionally, two papers are errata published in Elsevier's Bone Report, including "Erratum regarding missing declaration of competing interest statements in previously published articles" and "Erratum: Loan growth, capitalization, and credit risk in Islamic banking" by Sobarsyah et al. (2020).

Prasetyo & Dwianto (2018) explored financial accessibility for micro-enterprises in rural Indonesia, focusing on Central Java. Limited access to financial services hinders the growth of micro-enterprises, often pushing them toward informal lenders. Their study highlighted the role of Islamic financial cooperatives as a viable solution, demonstrating their success in promoting inclusive financial growth in the region.

Arshad (2017) examined the relationship between the Islamic capital market and the business cycle. The study emphasized that while prior research attempted to link stock market performance with business cycles, findings remained inconsistent. Given the unpredictable nature of business cycles, Arshad argued that analyzing stock market behavior is essential, as fluctuations impact investors, policymakers, and other stakeholders. The research concluded that the Islamic capital market becomes volatile during economic downturns and remains unstable during periods of economic expansion.

Further RBC-related studies include Batu (2017), who tested stochastic remittance shocks within an RBC model across multiple countries, including Indonesia. Jaroensathapornkul (2013) evaluated the RBC model's ability to replicate the J-curve effect in Thailand and ASEAN economies. Meanwhile, Soelistyo (2017) constructed comparative models incorporating RBC, Keynesian, and monetarist frameworks. Harahap et al. (2018) investigated business and financial cycles, particularly in the context of the Indonesian economic crisis.

Wahyuningsih & Sumantyo (2017) empirically analyzed RBC in relation to Islamic stock market variables. Their research examined business cycles in Indonesia to identify leading investment indicators, using time-series data and the OECD method. Their findings revealed that the Jakarta

Composite Index (JCI) exhibited higher volatility than GDP, yet the Composite Leading Indicator (CLI) followed the cyclical movements of reference series with statistical significance.

Liow (2016) explored cross-country business cycles, stock market cycles, and real estate cycles in G7 economies. Using the Hodrick-Prescott (HP) filter, Diebold & Yilmaz (2012) spillover approach, and Croux et al. (2001) dynamic correlation methodology, Liow found counter-cyclical behavior across international markets. Additionally, Arshad (2017) demonstrated that the Islamic capital market exhibited unstable movements during economic growth phases in the Asia-Pacific and U.S.

A key takeaway from Arshad (2017) is the need for further exploration of RBC in conjunction with the Islamic capital market. Future studies should investigate the relationship between RBC dynamics and Islamic stock market indices, incorporating real economic activity analysis. Consequently, this research aims to provide a deeper understanding of RBC by integrating Islamic stock market perspectives within an Indonesian context.

III. Methodology

Data

The dataset selected for this research spans from 2004 to 2021, enabling an in-depth analysis of both long-term and short-term economic trends. This period provides a comprehensive perspective on the relationship between the Real Business Cycle (RBC) and the Islamic Capital Market (ICM). To measure economic activity, the Industrial Production Index (IPI) is utilized as a proxy for GDP, reflecting overall productivity and business cycle fluctuations. The Unemployment Rate serves as a key economic health indicator, typically moving inversely with growth cycles. The Exchange Rate is included to assess macroeconomic stability and international competitiveness. Additionally, Foreign Direct Investment (FDI) is analyzed as a measure of investor confidence and long-term economic potential.

Islamic financial instruments specifically Islamic stocks and Sukuk are central to this study, as they directly represent the performance of the Islamic Capital Market. Examining their response to business cycle dynamics provides valuable insights into the resilience of Islamic financial markets. To maintain consistency across variables in the time series analysis, this research applies an interpolation method to convert lower-frequency data, such as quarterly or annual indicators, into monthly data. Linear interpolation is employed, estimating intermediate values by assuming a straight-line progression between known data points. This method is particularly effective for variables like GDP (via IPI) and FDI, ensuring alignment with high-frequency data such as Exchange Rates and Islamic stock prices. By harmonizing data frequencies, this approach enhances the precision of short-term trend analysis within the time series models.

Model Development

The research aims to investigate the extent of co-movement and the effect of the Real Business Cycle (RBC) on the Islamic Capital Market (ICM) in Indonesia. The indicators of RBC are the Industrial Production Index (IPI) as a representative of GDP, Unemployment Rate, Exchange Rate, and Foreign Direct Investment (FDI). The election of those indicators is considered by Becker & Wang (2013) and Takahashi (2020). Meanwhile, the indicator of the Islamic capital market is Islamic stock (Jakarta Islamic Index or JII) and Sukuk. This research uses trial-stage analysis methods, which are a Hodrick-Prescott (HP) Filter to answer the first objective of the research, added by a cross-correlation analysis method. So, VAR/VECM to analyze the effect of RBC on ICM in this analysis.

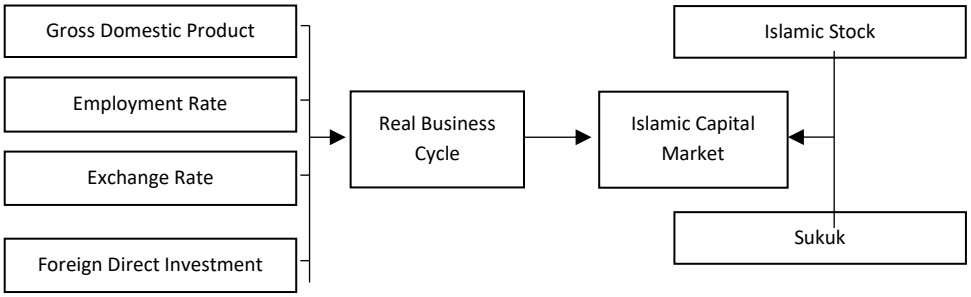


Figure 1. Research Model

Figure 1 describes the indicators that will be analyzed in this research. It is also known that this research has two objectives. To answer the objectives, this research will conduct trial-stage methods that are.

1. Hodrick-Prescott (HP) filter is used to decompose the trend and the cycle component of each indicator. This stage is used to answer the first objective of this research. Therefore, the hypothesis that is derived for this stage is.
   $H0^1$: The co-movement of RBC and ICM indicators is not quasi-periodic
   $H1^1$: The co-movement of RBC and ICM indicators is quasi-periodic
2. Cross-correlation analyses are used to identify the cross-correlation between RBC indicators and ICM indicators. The types of indicators can be lagging (-1), coincident (0), or leading (+1). Then the general hypothesis can be arranged as follows:
   $H0^2$: Indicator (X of RBC) has a lagging movement with an indicator (X of ICM)
   $H1^2$: Indicator (X of RBC) has a coincidence movement with an indicator (X of ICM)
   $H2^2$: Indicator (X of RBC) has a leading movement with an indicator (X of ICM)
3. Vector autoregression or Vector Error Correction Model (VAR/VECM) is the main method of this research that is used to answer the second objective of the research. So, it derived a general hypothesis as follows:
   $H0^3$: RBC movement has no significant effect on ICM resilience in Indonesia
   $H1^3$: RBC movement has a significant effect on ICM resilience in Indonesia

Method

The data analysis technique utilized in this research is Partial Least Squares (PLS) analysis, conducted using the SmartPLS software. The PLS approach aids in studying numerous latent variables, providing accurate estimations, and tends to analyze complex models (Hair et al., 2020). This analysis encompasses both the outer model and inner model (Sholihin & Ratmono, 2021)

The outer model is a PLS measurement used to determine the indicator values with latent variables (Sholihin & Ratmono, 2021). These values include validity (convergent and discriminant validity) and reliability (Kasri & Ramli, 2019; Sarea & Bin-Nashwan, 2021). Convergent validity testing is assessed through standard factor loading, Cronbach's α, composite reliability (CR) with recommended weights of 0.7, and average variance extracted (AVE) values of 0.5, indicating good results (Hair et al, 2019). Discriminant validity is used to ensure each concept of each latent variable differs from other variables, evaluated through the criteria of Fornell-Larcker test (FLT) where the AVE value of each latent variable is greater than others. Reliability testing indicates reliability if the factor loading on latent variables has a weight >0.6 and the Dillon-Goldstein rho ratio is >0.7 (Hair et al, 2019).

The inner model is an analysis technique used to test hypotheses (Hwang et al., 2020). This model is oriented towards several measurements to assess hypotheses such as the Average Path Coefficient (APC), Average R-square (ARS), Average Adjusted R-square (AARS), Average Block VIF, Average Full Collinearity VIF (AFVIF), Path Coefficient with a significant level of P <0.001 for APC, ARS, AARS, an ideal value of <3.3 for Average Block VIF and AFVIF, and significance levels of p <1%, 5%, 10% for Path Coefficient (Sholihin & Ratmono, 2021).

This method is essential for addressing the first research question, which aims to analyze the relationship between the Real Business Cycle (RBC) and the Islamic Capital Market (ICM) in Indonesia by determining their temporal associations.

$$\bar{Y}_{rbc,icm} = \frac{1}{N}\sum_{t=1}^{N}\left|(x_{rbc}^{t} - \bar{x}_{rbc})(x_{icm}^{t} - \bar{x}_{icm})\right| \ldots \quad (2)$$

$$\hat{\rho}_{rbc,icm} = \frac{\sum_{t=1}^{n}\left|(x_{rbc}^{t} - \bar{x}_{rbc})(x_{icm}^{t} - \bar{x}_{icm})\right|}{\sqrt{\sum_{t=1}^{n}(x_{rbc}^{t} - \bar{x}_{rbc})^2 \sum_{t=1}^{n}(x_{icm}^{t} - \bar{x}_{icm})^2}} \ldots \quad (3)$$

The cross-correlation between the Real Business Cycle (RBC) and the Islamic Capital Market (ICM) is defined as the ratio of covariance to the square root of the product of their variances. This approach involves calculating the autocorrelation of the driver variable (RBC) and the cross-correlation of the output variable (ICM) with the driver. By doing so, this method helps determine the strength and direction of their relationship over time. Cross-correlation analysis serves as a complementary technique to the Hodrick-Prescott (HP) filter, further supporting the first research objective, that is analyzing the extent of co-movement between RBC and ICM in Indonesia.

$$y_t = a_0 + a_1 y_{t-1} + a_2 y_{t-2} + \cdots + a_p y_{t-p} + e_t \ldots \quad (4)$$

The variables of the form y_{t-i} indicate that the variable's value *i* periods earlier and are called the "ith lag" of y_t. The variable c is a *k*-vector of constants serving as the intercept of the model. Ai is a time-invariant ($k \times k$)-matrix and e_t is a *k*-vector of error terms. When non-statistical data forms exist at the level, an additional constraint must be applied. The Vector Error Correction Model (VECM) incorporates cointegration restriction information into its specifications. VECM, often considered a VAR design for non-stationary series, is used to address this issue. The general model for VECM is as follows:

$$\Delta y_t = \mu 0x + \mu 1x_t + M_x yt - 1 + \Delta y_t - 1 + \varepsilon_t \ldots \quad (5)$$

where 𝒚𝒕 is the vector that contains the variables. 𝜇0x is an intercept vector. μ1x is a regression coefficient vector. 𝒕 is a time trend. 𝑴x is defined as α x β, where B contains long run cointegration equations. 𝒚t-1 is a variable in-level. The last is 𝜺t which means an error.

IV. Results and Discussions

Result of HP Filter Test & Cross-Correlation Analysis

This stage aims to find the movement of data of indicators and the solution to answer the first research question in problem identification. The method used is a time series decomposition which will be examined using HP Filter. The first step of this method is to find a lambda (λ) value. So, the determination of the frequency rule is required to obtain an ideal λ of research. Ravn & Uhlig (2002), set a frequency rule of 6.5 for their analysis in a business cycle of 20 cross-country. The current research will also set a frequency rule value of 6.5 Ravn & Uhlig (2002). Even though, the frequency rule value can be set at power rule 2. However, the selection of frequency rule of this research is regarded the Ravn & Uhlig's evaluation of the report of Backus & Kehoe (1992). The finding of the HP Filter of each indicator in this research:

Table 1. Result of Cross-Correlogram Test

Response to JII				Response to SUKUK			
Indicator	Explanation	Value	i	Indicator	Explanation	Value	i
GDP	Co-Incident	0.8691	0	GDP	Co-Incident	0.9366	0
EMP	Co-Incident	-0.8804	0	EMP	Co-Incident	-0.8330	0
EXC	Lagging	0.7541	12	EXC	Co-Incident	0.8163	0
FDI	Lagging	0.8356	8	FDI	Co-Incident	0.8789	0

Table 3 presents the HP Filter outcomes, illustrating the correlation between each RBC indicator and the ICM indicator. The results reveal that RBC indicators respond to the ICM indicator in two ways: coincidentally or with a lag. GDP and EMP exhibit coincident responses to Islamic stocks, while EXC and FDI demonstrate lagged movements relative to JII. This suggests that JII fluctuations are influenced by GDP and EMP, but not by EXC and FDI. In contrast, all RBC variable indicators move coincidentally with the Sukuk indicator.

These findings demonstrate that RBC aligns with the ICM indicator. Consequently, the hypothesis for case 2 (H02, H12, H22) is addressed as follows: H12 is accepted, indicating that RBC indicators generally move coincidentally with ICM indicators, except for EXC and FDI in relation to JII, which support H02, showing lagged movement. As a result, EXC and FDI are excluded from further analysis against JII.

Figure 2 displays the HP Filter results with a λ value of 2020264.06195 for each indicator (in natural logarithm form). The trend lines for each indicator closely follow the data, while the cycle plots exhibit irregular movements due to data noise. This non-smooth cyclical behavior is typical, as the HP Filter analysis in this study considers time series data as a combination of trends and cycles, as depicted in Figure 2.

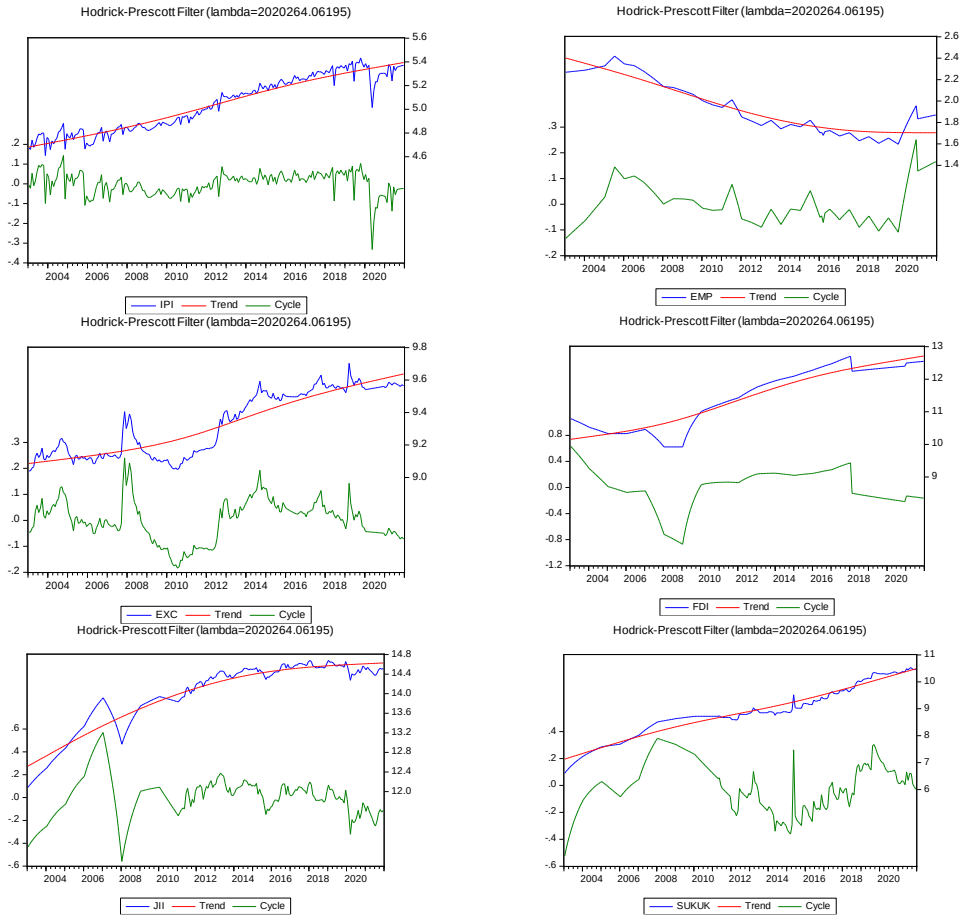


Figure 2. Filter Test Result of RBC and ICM Indicators

The HP Filter analysis encompasses six data sets (GDP represented by IPI, EMP, EXC, FDI, JII, and Sukuk), all showing similar trend patterns but with varying time-based characteristics. The cycle plots in Figure 2 reveal quasi-periodic data conditions, where similar trends recur at specific intervals. All indicators across the analyzed variables exhibit this quasi-periodic trend, moving upward or in parallel. Based on these observations, the first hypothesis in case one (H11) is accepted, confirming that RBC and ICM indicators display quasi-periodic co-movement.

These findings diverge from those of Liow (2016), who conducted similar research using the same methodology. Unlike Liow's (2016) study, this recent investigation indicates that RBC and ICM movements are quasi-periodic, following cyclical patterns. The analysis of Indonesia's case yields different results compared to Liow's (2017) aggregate analysis of G7 countries. These findings suggest that ICM movements in Indonesia align with RBC movements.

VAR/VECM Pre-requisite Test

After the first research question was answered using the HP Filter and Cross-Correlation method, the next step was to answer the second research question using the VAR/VECM method as described previously. However, before entering this stage, there are several prerequisite tests as follows.

Table 2. Result of Unit Root Test of Indicators

	IPI	EMP	EXC	FDI	JII	SUKUK
T-Statistics	-5.229698	-6.452690	-14.42805	-6.756481	-10.83299	-18.47944
P-Value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Lag Length	11	1	0	1	0	0
Test Critical Values						
1% level						-3.459362
5% level						-2.874200
10% level						-2.573594

Regarding table 5, the result shows all indicators are stationary at the first difference on all levels considering the value of the Elliott-Rothenberg-Stock DF-GLS test statistics indicated by the value of t-statistics in table 5 < test critical values. So, it is decided that the next stage is VAR according to requirements, using the critical value of 10% because the total of observed data is 228 or less than 400. So, the validity of the test result is only 90%.

Result of VAR/VECM Test

The research concludes with a VAR/VECM test addressing the second research question about the Real Business Cycle (RBC) impact on Islamic Capital Market (ICM) Resilience in Indonesia, along with the third hypothesis. The VAR Test results for RBC indicators on JII reveal.

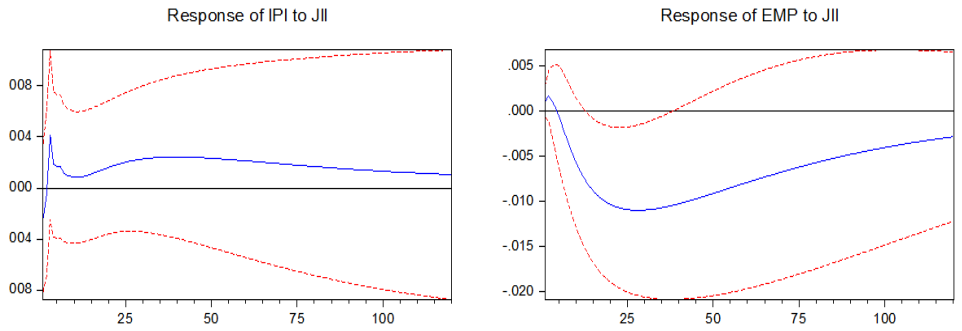


Figure 3. Impulse Response Function Result of RBC indicators on JII

Over 120 periods, JII demonstrates a positive self-influence, evidenced by the IRF shock movement above 0. The effect of RBC indicators on JII is determined by each indicator's shock movement response. GDP and IPI show a positive impact on JII with response values > 0, while EMP exhibits a negative response with values < 0. JII maintains a positive value > 0. These findings suggest that GDP, represented by IPI, positively affects JII, whereas EMP has a negative influence. This indicates that GDP and JII move in tandem positively and significantly, contrary to EMP's relationship with JII. Regarding the VAR Test of RBC indicators on Sukuk:

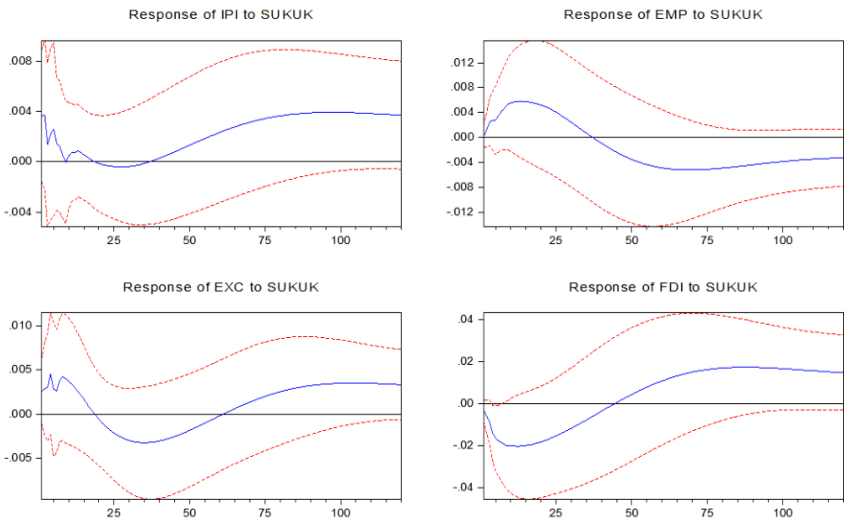
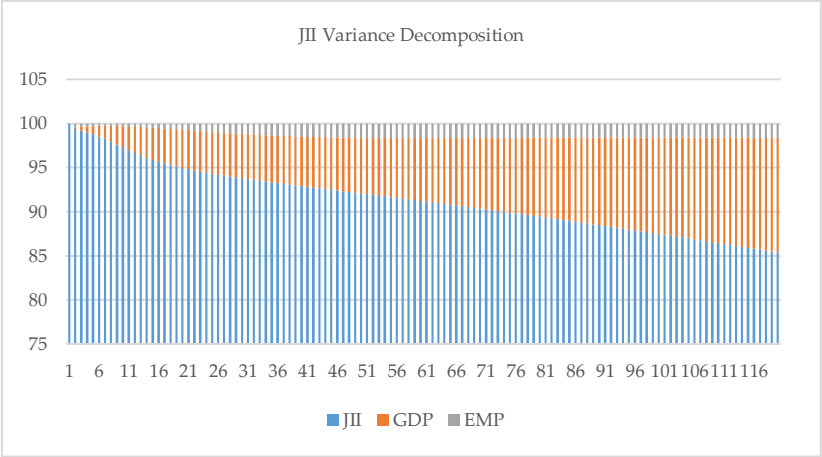


Figure 4. Impulse Response Function Result of RBC indicators on Sukuk

The variance decomposition test results in Figure 4 illustrate the extent of RBC indicator effects on Sukuk. GDP emerges as the most impactful among RBC indicators on Sukuk. Similar to JII, RBC indicators significantly influence Sukuk, as evidenced by response values < 0 or Sukuk values > 0.



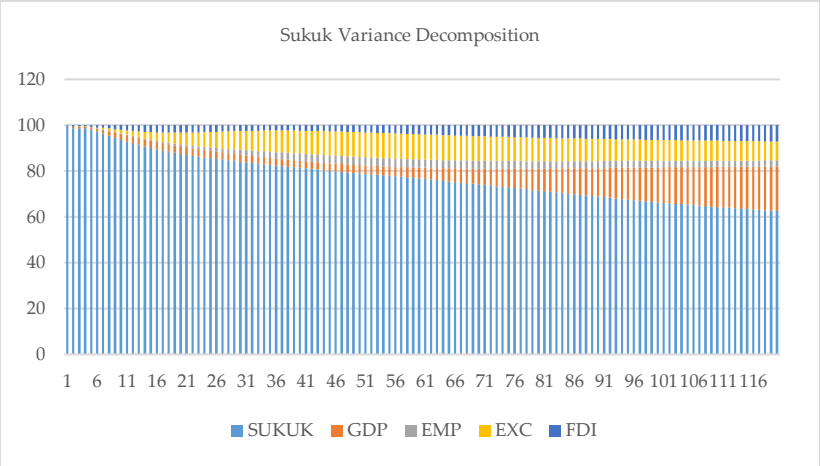


Figure 5. Impulse Response Function Result of RBC indicators on Sukuk

Figure 5 indicates that GDP, represented by IPI in this study, is the dominant factor affecting JII. The VAR test shows JII's self-response at 85.37, with GDP responding to JII at 12.96 and EMP at 1.65, as observed in the final shock of each indicator. For Sukuk, RBC indicators including GDP, EXC, and FDI provide significant positive responses, while EMP offers a negative response. These results confirm that RBC indicators significantly impact the ICM indicator, supporting H13: RBC movement significantly affects ICM resilience in Indonesia.

These findings align with previous research by Arshad (2017), who analyzed the Real Business Cycle and Islamic capital market. Arshad concluded that the Islamic capital market becomes volatile during recessions and unstable during business cycle growth periods, suggesting a significant relationship between RBC and ICM, consistent with this study's results.

Discussions

As described in the introduction chapter, this research has two primary objectives. The main goal is to investigate the level of alignment between the Real Business Cycle (RBC) and the Indonesian Capital Market (ICM). To accomplish this, researchers employ the Hodrick-Prescott (HP) filter and cross-correlation analysis methods. The results demonstrate a quasi-periodic pattern in the indicators, suggesting that comparable trends recur at regular intervals. This observation points to the existence of RBC movements in Indonesia, with the ICM following these patterns. However, this conclusion requires further empirical validation to establish the relationship between RBC and ICM. Thus, the study's secondary aim is to assess the influence of RBC on ICM, utilizing the Vector Autoregression (VAR) technique.

The findings indicate that, overall, RBC significantly impacts ICM. Specifically, gross domestic product (GDP), represented by the industrial production index (IPI), has a positive and significant effect on Islamic stock indices (Jakarta Islamic Index or JII). Furthermore, GDP positively influences Sukuk. Additional RBC indicators examined include the exchange rate (EXC) and foreign direct investment (FDI), both of which show a significantly positive impact on Sukuk. This implies that an increase in GDP, exchange rate, and foreign direct investment corresponds to a proportional

rise in Islamic stock indices (JII). These results align with previous studies, such as Irfan et al. (2021) and Karyatun et al. (2021), which report significant positive effects of GDP, exchange rate, and foreign direct investment on JII.

However, the current research presents an antithesis to previous findings regarding the relationship between the exchange rate and JII. While Primartha & Diana (2021) reported a negative correlation between the exchange rate and JII, this study reveals a significant positive relationship. The researchers hypothesize that this discrepancy may be due to changes in investor behavior between 2019 and 2021, potentially influenced by the global pandemic. Despite the appreciation of the rupiah against foreign currencies, investors appear to prefer domestic investments in Indonesia. This shift is attributed to unfavorable global financial conditions, leading investors to perceive domestic investments as safer options.

The unemployment rate (EMP) exhibits an inverse relationship with the Jakarta Islamic Index (JII). Research indicates a substantial negative correlation between unemployment and Islamic stock indices (JII). This finding contradicts Gonzalo & Taamouti (2017), who reported no significant impact of unemployment on stock indices. The current study, however, reveals a notable link between these variables. Gonzalo & Taamouti (2017) explained their results using Fisher and Philips curve approaches, suggesting that monetary policy (interest rates) from the central bank shielded stock market indices from unemployment fluctuations. The discrepancy in findings may stem from geographical differences, as Gonzalo & Taamouti (2017) focused on the United Kingdom, while this study examines Indonesia. This variation could indicate differing governmental and central bank approaches, leading to distinct relationships between unemployment and the stock market.

Regarding Sukuk, another Islamic Capital Market (ICM) indicator, the study shows that all Real Business Cycle (RBC) indicators significantly affect it. The relationship trends between Sukuk and RBC indicators mirror those of Islamic stock indices. All indicators, except unemployment, positively influence Sukuk. Gross Domestic Product (GDP) emerges as the most impactful RBC indicator on Sukuk, suggesting that overall economic conditions significantly shape investor behavior. A robust economy tends to boost investments in the Islamic capital market (Islamic stocks and Sukuk). These findings align with Cupian et al. (2020), who noted industrial production's significant effect on Sukuk development in Indonesia. Cupian et al. (2020) rationalized that increased production maximizes employment, raising aggregate public income and presumably heightening interest in Sukuk investments.

The study also reveals significant impacts of exchange rates and foreign direct investment on Sukuk. This corroborates Suriani et al. (2021), who demonstrated a causal relationship between Sukuk and exchange rates through economic growth (GDP). Furthermore, the current research shows consistency with previous studies regarding foreign direct investment's effect on Sukuk. The findings indicate a significant positive influence of foreign direct investment on Sukuk in Indonesia, aligning with Setianingsih & Widyastuti (2020). Then, this research also shows the finding on unemployment in Sukuk. The result is that the unemployment rate influences Sukuk negatively as well as JII above. So, a similar assumption such as JII before could be used in this

case. The decrease in the unemployment rate causes an increase in people's income. Thus, if the income increases, the interest of people in investing will also increase. Therefore, the decrease in unemployment influences the increase of Sukuk outstanding in Indonesia.

V. Conclusion and Recommendation

The research reveals a quasi-periodic pattern in RBC and ICM data indicators, as well as a significant influence of RBC indicators on ICM indicators. However, the relationships vary among indicators. GDP positively impacts JII, while the unemployment rate negatively affects both JII and Sukuk. Other RBC indicators demonstrate a significant positive effect on Sukuk. The study suggests a shift in investor behavior from 2019 to 2021, presumably due to the global pandemic. Despite an appreciation of the rupiah against foreign currencies, investors appear to exhibit a preference for domestic investments in Indonesia. This change is attributed to unfavorable global financial conditions, rendering domestic investments ostensibly more secure.

Regarding Sukuk and its relationship with RBC indicators and Islamic stock indices, all factors except unemployment rate positively influence Sukuk. The exchange rate and foreign direct investment significantly affect Sukuk, aligning with previous research by Suriani et al. (2021), which demonstrated a causal relationship between Sukuk and exchange rates through economic growth. Additionally, the current findings corroborate Setianingsih & Widyastuti's (2020) research, showing a significant positive impact of foreign direct investment on Sukuk in Indonesia. The study concludes that a quasi-periodic trend exists in the Islamic capital market and that RBC indicators significantly impact it. A notable finding is the shift in investor behavior, particularly regarding the exchange rate, with a preference for domestic investments despite a stronger rupiah, likely due to pandemic-induced global economic instability.

Based on these results, the government should consider establishing a tabarru fund as an economic stabilizer during crises, potentially sourced from the state budget. Collaboration between the government and Islamic capital market companies to secure essential resources could prevent sudden capital withdrawals by reassuring investors during economic shocks. The growing interest in domestic investment underscores the need for attractive investment schemes and strengthened Islamic market resilience. Future research should explore market sentiment, investor behavior during economic upheavals, and food security in crisis periods. Additionally, expanding the analysis to encompass the broader Indonesian capital market and financial institutions is recommended.

Author Contributions

Conceptualization, M. Y. I.; Literature review, M. Y. I. & I.; Methodology, M. Y. I. & I.; Investigation, M. Y. I.; Analysis, M. Y. I., & I.; Original draft preparation. M. Y. I., I, & S. A. S.; Review and editing, I, & S. A. S.; Visualization, S. A. S.; Project administration, S. A. S.

Acknowledgement

The authors would like to express their sincere gratitude to all individuals and institutions that have contributed to the completion of this research. We extend our appreciation to our colleagues and academic mentors for their valuable insights and constructive feedback, which have significantly enriched the quality of this study.

Furthermore, we acknowledge the support provided by various administrative and technical staff who assisted in data acquisition, processing, and analysis. Special thanks go to those who facilitated access to relevant datasets and research materials, as well as to individuals who provided guidance in statistical modeling and methodological refinement.

Lastly, we would like to thank our families and peers for their continuous encouragement and support throughout the research process. Their patience and motivation have been instrumental in ensuring the successful completion of this study.

Conflicts of Interest

The authors declare no conflicts of interest regarding this research. The study was conducted independently, and there were no financial, professional, or personal relationships that could have influenced the outcomes. Additionally, the funding for this research was solely provided by the authors, and no external parties had any role in the study's design, data collection, analysis, interpretation, manuscript writing, or decision to publish the findings.

References

Anderson, L. (1993). Gross Domestic Product. In *The Concise Encyclopedia of Economics*. Library of Economics and Liberty.

Arrow, K. J. (1951). An Extension of the Basic Theorems of Classical Welfare Economics. *Berkeley Symposium on Mathematical Statistics and Probability*, *2*, 507–532.

Arshad, S. (2017). The Relationship Between Islamic Stock Markets and Business Cycles: A Regional Perspective. In *Islamic Capital Markets: Volatility, Performance and Stability* (1st ed., pp. 45–65). Palgrave Macmillan. https://doi.org/10.1007/978-3-319-33991-7

Baral, N., & Stern, M. J. (2011). Capital stocks and organizational resilience in the Annapurna Conservation Area, Nepal. *Society and Natural Resources*, *24*(10), 1011–1026. https://doi.org/10.1080/08941920.2010.495372

Batu, M. (2017). International worker remittances and economic growth in a Real Business Cycle framework. *Structural Change and Economic Dynamics*, *40*, 81–91. https://doi.org/10.1016/j.strueco.2016.12.004

Becker, R., & Wang, Y. (2013). Measuring the Chinese business cycle Measuring the Chinese business cycle. *Applied Economics*, *45*(28), 3988–4003. https://doi.org/10.1080/00036846.2012.744135

Ben Ayed, W., Lamouchi, R. A., & M. Alawi, S. (2021). Does the deposit structure affect Islamic bank's maturity transformation activities? The implications of IFSB liquidity guidelines. *International Journal of Islamic and Middle Eastern Finance and Management*, *14*(3), 444–462. https://doi.org/https://doi.org/10.1108/IMEFM-05-2019-0209

Berkes, F., & Folke., C. (1992). A systems perspective on the interrelations between natural, human-made and cultural capital. *Ecol. Econ.*, *5*(1), 01–08.

Biswas, R. K., Kabir, E., & Rafi, R. B. R. (2019). Investment in Research and Development Compared to Military Expenditure: Is Research Worthwhile? *Defence and Peace Economics*, *30*(7), 846–857. https://doi.org/10.1080/10242694.2018.1477235

Brunckhorst, D. (2001). Building capital through bioregional planning and biosphere reserves. *Ethics in Science and Environmental Politics*, *1*(1), 19–32. https://doi.org/10.3354/esep001019

Carpenter, S., Walker, B., Anderies, J. M., & Abel, N. (2001). From Metaphor to Measurement: Resilience of What to What? *Ecosystems*, *4*(8), 765–781. https://doi.org/10.1007/s10021-001-0045-9

Cupian, Muasia, R., & Suparman, E. (2020). The Influence of Macroeconomics Indicators to the Growth of State Islamic Bonds (Sukuk) in Indonesia. *Equilibrium Jurnal Ekonomi Syariah*, *8*(1), 167–178. https://doi.org/10.2991/ahsr.k.200723.014

Debreu, G. (1951). The Coefficient of Resource Utilization. *Econometrica*, *19*, 273–292.

Dobrescu, M., Badea, L., & Paicu, C. (2012). Business cycle theories and their relevance to the current global crisis. *Procedia - Social and Behavioral Sciences*, *62*(February 2014), 239–243. https://doi.org/10.1016/j.sbspro.2012.09.038

Folke, C., Hahn, T., Olsson, P., & Norberg, J. (2005). Adaptive governance of social-ecological systems. *Annual Review of Environment and Resources*, *30*, 441–473. https://doi.org/10.1146/annurev.energy.30.050504.144511

Garces, E. J., & Adriatico, C. G. (2019). Correlates of High Technology Exports Performance in the Philippines. *Open Journal of Social Sciences*, *07*(05), 215–226. https://doi.org/10.4236/jss.2019.75018

Gonzalo, J., & Taamouti, A. (2017). The reaction of stock market returns to unemployment. *Studies in Nonlinear Dynamics and Econometrics*, *21*(4). https://doi.org/10.1515/snde-2015-0078

Hamimi, S., & Ginting, Y. R. F. (2019). The Development Of Islamic Capital Markets In Indonesia. *Proceeding International Seminar on Islamic Studies*.

Harahap, B. A., Bary, P., & Kusuma, M. A. C. (2018). Working Paper the Determinants of Indonesian Business Cycle the Determinants of Indonesian Business Cycle. *Working Paper of Central Bank of Indonesia*, *30*, 1–41.

Helgadóttir, O. (2021). How to make a super-model: professional incentives and the birth of contemporary macroeconomics. *Review of International Political Economy*.

https://doi.org/https://doi.org/10.1080%2F09692290.2021.1997786

Hodrick, R. J., & Prescott, E. C. (1981). Postwar U.S. Business Cycles: An Empirical Investigation. *Journal of Money Credit and Banking*, *29*(1). https://doi.org/10.2307/2953682

IDX Islamic. (2022). *Islamic Capital Market Education*. IDX Islamic. https://idxislamic.idx.co.id/en/islamic-capital-market%02education/government-sukuk/%0A

Irfan, M., Kassim, S., Dhimmar, S., Zahid, M., & Fuadi, N. F. Z. (2021). Reaction of Islamic Stock Market To Macroeconomic Variables: a Study of India and Indonesia. *Jurnal Ekonomi Dan Bisnis Islam (Journal of Islamic Economics and Business)*, *7*(1), 148. https://doi.org/10.20473/jebis.v7i1.25921

Jaroensathapornkul, J. (2013). Existence of J-Curve between Thailand and ASEAN: A Real Business Cycle Perspective. *International Proceedings of Economics Development & Research*, *76*, 26–33. https://doi.org/10.7763/IPEDR. 2014. V76. 6

Juanda, B., & Junaidi. (2012). *Ekonometrika Deret Waktu Teori dan Aplikasi*. IPB Press.

Karyatun, S., Waluyo, T., Muis, M., Munir, A. R., & Sumardi. (2021). The Islamic Stock Market and Macroeconomic Relationship. *Psychology and Education Journal*, *58*(1), 265–275. https://doi.org/10.17762/pae.v58i1.769

Kim, K., & Choi, Y.-Y. (1997). Business cycles in Korea: Is there any stylized feature? *Journal of Economic Studies*, *24*(5), 275–293. http://www.emeraldinsight.com/journals.htm?issn=0144-3585&volume=24&issue=5&articleid=846062&show=html

Kuehn, D. (2013). Hayek's Business-Cycle Theory: Half Right. *Critical Review*, *25*(3–4), 497–529. https://doi.org/10.1080/08913811.2013.853863

Kydland, F. E., & Prescott, E. C. (1982). Time to Build and Aggregate Fluctuations. *Econometrica*, *50*, 1345–1370.

Leamer, E. E. (2012). Gross Domestic Product. In *Macroeconomic Patterns and Stories* (pp. 19–38). Springer. https://doi.org/10.1007/978-3-540-46389-4_2

Liow, K. H. (2016). Linkages between cross-country business cycles, cross-country stock market cycles and cross-country real estate market cycles. *Journal of European Real Estate Research*, *9*(2), 123–146. https://doi.org/http://dx.doi.org/10.1108/JERER-05-2015-0024

Lucas, R. E. (1980). Methods and Problems in Business Cycle Theory. *Journal of Money, Credit and Banking*, *12*, 696–715.

Lucas, R., & Prescott, E. (1971). Investment Under Uncertainty. *Econometrica*, *39*(5), 659–681. http://links.jstor.org/sici?sici=0012-9682%28197109%2939%3A5%3C659%3AIUU%3E2.0.CO%3B2-0

Mankiw, N. G. (2000). *Macroeconomics*. WH Freeman.

Morley, J., & Piger, J. (2006). Chapter 3 The Importance of Nonlinearity in Reproducing Business Cycle Features. In *Contribution to Economic Analysis* (Vol. 276, Issue 05, pp. 75–95). Emerald Group Publishing Limited. https://doi.org/10.1016/s0573-8555(05)76003-x

Oppers, S. E. (2002). The Austrian Theory of Business Cycles: Old Lessons for Modern Economic Policy? *IMF Working Papers*, *02*(2), 1. https://doi.org/10.5089/9781451841770.001

Phillips, P. C. B., & Shi, Z. (2019). Boosting: Why you Can Use the HP Filter. *Cowles Foundation Discussion Papers*, *60*. https://doi.org/10.2139/ssrn.3499037

Plosser, C. I. (1989). Understanding Real Business Cycles. *Journal of Economic Perspective*, *3*(3), 51–77.

Podobnik, B., & Stanley, H. E. (2008). Detrended cross-correlation analysis: A new method for analyzing two nonstationary time series. *Physical Review Letters*, *100*(8). https://doi.org/10.1103/PhysRevLett.100.084102

Prasetyo, I., & Dwianto, R. D. (2018). Economic inclusion of un-bankable micro-scale traders in Indonesian traditional market: Learning from micro-scale traders in Islamic financial cooperative. *E3S Web of Conferences*, *74*(01008), 01–07.

Primartha, T. P., & Diana, N. (2021). Effects of Inflation, Interest, and Exchange Rate on Jakarta Islamic Index 2017-2020. *Jurnal Ekonomi Syariah Teori Dan Terapan*, *8*(2), 147. https://doi.org/10.20473/vol8iss20212pp147-158

Razzak, W. (1997). The Hodrick-Prescott technique: A smoother versus a filter: An application to New Zealand GDP. *Economics Letters*, *57*(2), 163–168. https://doi.org/10.1016/s0165-1765(97)00178-x

Rebelo, S. T. (2005). RBC Models: Past, Present, Future. *Scandinavian Journal of Economics*, *107*(2), 217–238. http://www.kellogg.northwestern.edu/faculty/rebelo/htm/rbc.pdf

Rizvi, S. A. R., & Arshad, S. (2014). Investigating the efficiency of East Asian stock markets through booms and busts. *Pacific Science Review*, *16*(4), 275–279. https://doi.org/10.1016/j.pscr.2015.03.003

Setianingsih, L., & Widyastuti, E. (2020). Does Sukuk, Domestic Investment, Foreign Investment, and Inflation Contribute To Economic Growth in Indonesia? *Jurnal Ekonomi Syariah Teori Dan Terapan*, *7*(12), 2375. https://doi.org/10.20473/vol7iss202012pp2375-2384

Sobarsyah, M., Soedarmono, W., Yudhi, W. S. A., Trinugroho, I., Warokka, A., & Pramono, S. E. (2020). Loan growth, capitalization, and credit risk in Islamic banking. *International Economics*, *163*, 155–162. https://doi.org/https://doi.org/10.1016/j.inteco.2020.02.001

Soelistyo, A. (2017). A Synthesis Keynes-Monetarist and Real Business Cycle Model To Inflation and Unemployment in Indonesia. *Journal of Innovation in Business and Economics*, *1*(01), 27. https://doi.org/10.22219/jibe.vol1.no01.27-40

Stadler, G. W. (1994). Real Business Cycles. *Journal of Economics Literatute*, *32*, 1750–1783.

Stockman, A. C. (1988). Real Business Cycle Theory : a Guide , an Evaluation , and New Directions.

Federal Reserve Bank of Cleveland Economic Review, *24*(4), 24–47. https://www.clevelandfed.org/en/newsroom-and-events/publications/discontinued-publications/economic-review/1988-economic-review/er-1988q4-real-business-cycle-theory.aspx

Sulistiana, I., Hidayati, & Sumar. (2017). Model Vector Auto Regression (Var) and Vector Error Correction Model (Vecm) Approach for Inflation Relations Analysis, Gross Regional Domestic Product (Gdp), World Tin Price, Bi Rate and Rupiah Exchange Rate. *Integrated Journal of Business and Economics*, *1*(2), 17–32. https://doi.org/https://doi.org/10.5281/zenodo.1147673

Suriani, S., Abd. Majid, M. S., Masbar, R., A. Wahid, N., & Ismail, A. G. (2021). Sukuk and monetary policy transmission in Indonesia: the role of asset price and exchange rate channels. *Journal of Islamic Accounting and Business Research*, *12*(7), 1015–1035. https://doi.org/10.1108/JIABR-09-2019-0177

Takahashi, S. (2020). J. R. Commons' Business Cycle Theory. *Journal of Economic Issues*, *54*(4), 907–917. https://doi.org/10.1080/00213624.2020.1816121

Vecchi, M. (1999). Real business cycle: A critical review. *Journal of Economic Studies*, *26*(2), 159–171. https://doi.org/10.1108/01443589910258489

Wahyuningsih, A., & Sumantyo, R. (2017). Analysis of Indonesia Business Cycle through Composite Leading Indicator Data Processing for Banking Industry. *Jurnal Keuangan Dan Perbankan*, *21*(4), 589–599. https://doi.org/10.26905/jkdp.v21i4.1553

Yamarone, R. (2012). Gross Domestic Product. In *The Trader's Guide to Key Economic Indicators* (3rd ed., pp. 11–46). Bloomberg.