The Stock Market and Economic Growth Nexus in Indonesia

Vector Autoregression (VAR) and Granger Causality Analysis on Primary Market and Secondary Market

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This piece is dedicated to Mama & Papa, Vania, Yunita, and Violeta,
the Aces of my life.

Contents

List of Tables

List of Figures

List of Appendices

List of Acronyms

ADF	Augmented Dickey-Fuller
AIC	Akaike's Information Criteria
ARDL	Autoregressive Distributed Lag
ASEAN	Association of Southeast Asian Nations
CAGR	Compound Annual Growth Rate
ECM	Error-Correction Model
ECT	Error-Correction Term
ETF	Exchange Traded Fund
FPE	Final Prediction Error
FSA	Financial Services Authority
GDP	Gross Domestic Product
GMM	Generalized Method of Moments
HQIC	Hannan and Quinn Information Criterion
IAPM	International Arbitrage Pricing Model
IDClear	Indonesia Clearing and Guarantee Corporation
IDX	Indonesia Stock Exchange
IFSA	Indonesia Financial Services Authority
IHSG	Indeks Harga Saham Gabungan/IDX Composite Index
IMF	International Monetary Fund
IPO	Initial Public Offering
IRF	Impulse Response Function
KSEI	Kustodian Sentral Efek Indonesia/Indonesia Central Securities Depository
LQ45	LQ45 Index
LR	Likelihood Ratio
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares
PCA	Principal Component Analysis
PP	Phillips-Perron
REIT	Real Estate Investment Trust
SBIC	Schwarz's Bayesian Information Criterion
SMD	Secondary Market Development
SME	Small and Medium-Sized Enterprise
SRO	Self-Regulatory Organization
UK	United Kingdom
USA	United States of America
VAR	Vector Autoregressive
VECM	Vector Error-Correction Model
WID	World Inequality Database

Abstract

This research investigates the stock market and economic growth relationship in Indonesia during the period of first quarter of 2003 to the second quarter of 2021. Rather than only test the secondary market variable, akin to a large body of similar research, this study tests both the primary and secondary market of the stock market to economic growth. By employing Vector Autoregressive (VAR) model and Granger causality, it is indicated that there is a one-way relationship running from growth to primary market, supporting the demand-following hypothesis. Meanwhile, the secondary market variable, constructed from three variables using principal component analysis, indicated to have a two-way bidirectional relationship with growth, supporting the feedback hypothesis. The results put the importance on growth, and the suggestion is for the policy makers in Indonesia to emphasize real economy activities rather than the stock market itself.

Relevance to Development Studies

The stock market is generally accepted as having the capability to boost economic growth by providing capital for listed companies in the primary market. However, abundant research on this topic utilized the secondary market as the proxy for the stock market. This study tries to determine the relationship of both variables primary and secondary market and their relationship to real economic growth and test the claim that the stock market is good for the economy. By realizing the relationship between the stock market and growth in Indonesia, we can hopefully formulate better policies and direction of the development.

Keywords

Indonesia stock market, primary market, secondary market, economic growth, time series, principal component analysis, vector autoregression, vector error-correction, Granger causality, impulse response function, variance decomposition

Chapter 1
Introduction

1.1 Background

The financial system is one kind of paradox from a development economics perspective. By theory, a well-developed financial system has the capability to boost economic growth through efficient intermediary function (Greenwood and Jovanovic, 1990; Bencivenga and Smith, 1991), connecting those who possess excessive funds to those who need funds. Hence, business activities, as well as consumption, could be amplified via this process. But on the other hand, the financial system is also often blamed as one of the culprits of worsened inequality all around the world as the richest ones utilize banking and capital market products to accumulate wealth. Meanwhile, the poorest of the poor often left behind with no access to the financial system at all, pull them down even more in their efforts to escape life in poverty. At best, there is mixed evidence that the development of the financial system might reduce inequality and poverty (Seven and Coskun, 2016; Zhang and Naceur, 2019; Kavya and Shijin, 2020). A large number of studies try to determine this Finance-Growth nexus and sometimes along with the relationship with inequality and poverty. Levine (1997, p. 721) even mentioned that we might not grasp a complete understanding of economic growth "until we understand the evolution and functioning of financial systems."

Notwithstanding its role for economic growth, the financial system holds a vital role as a route where monetary policy runs through. When the economy cycle faces a downward trend, policy makers would normally try to counter that by manipulating the central bank rate and reserve requirement to accommodate loan-friendly rate to boost economic activities. Liquidity boost through lending spree is the key takeaway here, a well-documented formula since long ago by Bagehot (1873). Another tool in monetary policy is open market operations where the central bank can buy government bonds – and in extreme cases even corporate bonds – in the market to pump liquidity into the system. The monetary policy offers quick responses in the face of crisis, much more so than a fiscal policy that usually needs more time (Agénor and Montiel, 2015). Here, both the banking system and capital market play critical parts.

The most common and biggest part of the financial system, especially in developing countries, is the banks (Mohanty, Schnabel, and Garcia-Luna, 2006; Mishra, Montiel, and Spilimbergo, 2012; Agénor and da Silva, 2013). The banking system's role in the modern world economy cannot be overstated as it is powering through every aspect of corporate and personal's life. Bank stores people's money and channels them to businesses who need credit to fund their activities. The bank then takes profit from the interest rate margin in-between. Bank also allows savers to send and receive money with other parties, smoothing the exchange of funds and the payment system. On the other end, the loans from banks could help businesses grow and earn profit, which can then be used to expand the business and improve the capital accumulation process. The banking system is so important to the economy that it makes policy makers in every country try their best to maintain the stability of the system. It sets the expression of 'too big to fail', indicating how some big banks simply cannot go into default. Managing the risk carried by the banking system is one of the most important jobs of the central bank or other financial authorities.

When we talk about risk, there is one more part of the financial system which poses at least similar - if not bigger - risks than the banking sector: the capital market. The capital market is the place for trading or exchanging long-term debt and equity-based assets. It is a market-driven place where asset prices move up and down following demand and supply interaction. Therefore, the capital market is an embodiment of a price mechanism that supposedly helps economies in developing countries, as opposed to direct control from the government or as what Deepak Lal called "*dirigiste dogma*" (1985, p. 10). Alas, as history unfolded, this mechanism could create a bubble that could impose a catastrophic impact on the whole financial and even real sector if it bursts. The global financial crisis of 2008 is a prime example of this case. But while it possesses risks, the capital market also provides an opportunity to raise funds for entrepreneurs as well as return on investment for investors. Thus, akin to the banking system, the capital market can also boost growth and capital accumulation process, at least in theory (Bekaert, Garcia, and Harvey, 1995; Cecchetti and Schoenholtz, 2017).

We can derive the capital market itself to the stock market, bond market, and derivative market. The three markets serve different purposes. The stock market allows companies to raise capital without inflicting debt but the owners must give up equity or shares in return. Although the initial business owners lost their ownership of the company, the company then possessed more capital without obligation to pay the debt interest. The bond market, on the other hand, provides corporations with a chance to issue debt on a huge amount of money for the investors. A derivative market is the market where financial derivatives products are traded such futures, options, or swaps. The products can be used as hedge facilities to protect investors' investment but are also widely popular as speculative trade. The more advance a derivatives market is, the deeper and complex the products will be.

Without proper oversight by the regulator, these complex products contain systematic risk. Prudential supervision and regulation and sound macroeconomic management needed to control such financial depth (Rodrik, 2007). Again, the global financial crisis of 2008 was an example of this case, when it was born from US financial market, arguably one of the deepest and most advanced financial markets in the world, with derivative products contributed as one of the triggers (Somanathan and Nageswaran, 2015). The global financial crisis of 2008, which started from the capital market, spread throughout the entire US financial system to the real economy of the almost entire world. Such massive the impact of the crisis, so many countries suffered from the shrinking economy, increasing inequality and poverty, even surging cases of mental illness, suicide, social conflict, and crime (Ötker-Robe and Podpiera, 2013). The crisis itself is often called the worst financial crisis since the Great Depression of the 1930s, which ironically also started at the stock market.

With roles, benefits, and risks contained within the financial system in general and the stock market in particular, it is important to determine the stock market's impact on the economic growth of one country. The common course taken by policy makers around the world is to push the stock market development as it is believed will boost growth. Unfortunately, it is not a one-formula-fits-all kind of policy. Each country has a different setup of systems that will influence the direction of the relationship of the stock market with real economic growth, which we will see in more detail in Chapter 3. The benefit must outweigh the risk if one decides to develop the stock market.

As one of the biggest countries by total area and by population, Indonesia is also trying to develop the financial system, stock market included. Improvement of financial literacy and inclusion is one of the programs pushed by policy makers to increase accessibility of

financial products for the people, in effort to develop financial system. But while the endeavour is ongoing, a question remains: what is the role of the stock market for the betterment of Indonesian people?

It has been more than 40 years since the Indonesia stock market was re-established in 1977. But after such a long period, only a tiny portion of Indonesian who is literate and exposed to the stock market product despite policy support given by the government, notably on the taxation front. The question of stock market's contribution to economic growth has to be revisited before policy makers put extra effort and incentives prescribed for stock market growth.

Muradoglu, Taskin, and Bigan (2000), Adam (2015), and Hismendi *et al.* (2021) have tried to find the relationship between the stock market and growth in the Indonesia case. But their focus remains on the stocks' price or stock index's price variable, which is only a fraction of the stock market. What sets this with similar research apart is that this research will try to examine the contribution of primary market and secondary market of the stock market instead of depending on a single variable of stocks' price. By doing this, we can obtain a more comprehensive insight into the stock market and growth nexus and minimize bias from only taking one side of the stock market and leaving the rest. We will discuss more on this in later chapters.

The focus of this research paper is the stock market and growth relationship. The reason why we have to focus on one market instead of mushing all financial sectors – such as bank, insurance, pension fund, micro-credit, and others – together is that such complexity of the financial system, it is important that we dissect it into pieces and direct our focus on one part for further examination and in this case, the equity market.

We differentiate the primary and secondary market function to depict a clearer picture of this issue by utilizing time series analysis. The methodology employed in this research is time series Vector Autoregressive (VAR) regression, supported by Granger causality, Impulse Response Function (IRF), and variance decomposition. We will take a look into the amount of funds raised in stock market as the variable represents the primary market. Then, we will utilize Principal Component Analysis (PCA) to create a single secondary market variable from three variables: market capitalization, stock's volume traded, and stock's value traded. The period of observation is quarter 1 of 2003 to quarter 2 of 2021.

While the policy maker worldwide try to establish and develop a well-functioning stock market, a substantial number of studies indicate conflicting conclusions on the relationship of the stock market and economic growth. But before moving forward with this plan, we should ask ourselves if the stock market could really contribute to the economic growth.

1.2 Research Objective and Research Question

The objective of this research is to determine the relationship of the stock market in Indonesia with economic growth. By determining this relationship, the financial regulator in Indonesia will have additional input on how to direct the stock market development.

Based on the research objective, the research question is whether there is a relationship between the stock market and economic growth in Indonesia and which direction it runs. To answer the question, we can break it down into sub-questions as follows:

1. What is the relationship between the stock market's primary market and economic growth in Indonesia, and which direction of such a relationship is going?

2. What is the relationship between the stock market's secondary market and economic growth in Indonesia, and which direction of such a relationship is going?

1.3 Relevance for Development Studies

This study tries to determine the relationship of the stock market and economic growth in Indonesia. As the stock market grows, supported by policy and regulation, it carries risk. By realizing the relationship between the stock market and growth in Indonesia, we can hopefully formulate better policies and direction of the development.

The stock market is generally accepted as having the capability to boost economic growth by providing capital for listed companies in the primary market. But abundant of research on this topic utilized market capitalization or stock price index in the secondary market as the proxies for the stock market. Therefore, the main appeal of this research is to put forward both variables primary and secondary market and their relationship to real economy activity and test the claim made that stock market is good for the economy.

1.4 Limitations

This research comes with limitations. First, because we employ time series analysis and one of the variables is macroeconomy data GDP on a quarterly basis, the amount of observation available is limited. During the research period, only 74 observations were counted. We do hope we can process more data, but at this time, this is what we have in our model. Second, the more suitable variable for the model should have been GDP per capita, but the data is not available on a quarterly basis for the Indonesia case. Hence, we utilize total GDP in current price. We tackle both limitations by conducting a robustness check on another proxy of real economy activity: industrial production. Industrial production data is available on a monthly basis, providing us with more observation than, and an alternative variable to, GDP.

The third limitation is related to the nature of secondary market data. As we will discuss in Chapter 3 of Theoretical Framework and Literature Review and also in Chapter 5 of Results and Discussion, secondary market data such as stock index price and market capitalization are predictive of the real economy. Granger causality method is a method to determine *predictive causality* and not causality in the literal term. Hence, utilizing such variables could give us biased results that the secondary market *causes* economic growth while in truth, it is more apt to say that the secondary market *predicts* growth. Alas, other variables that could minimize such bias are not widely tested yet and their availability is also another challenge altogether. We can replicate this research with secondary market variables that are not predictive of real economy development when the variables and their data are readily available in the future.

1.5 Structure of the Paper

This research paper consists of six chapters. The first chapter provides the background narrative of the financial system and its dynamics with economic development. The objective of this research and breaking down of research questions are also presented in this chapter, along with the relevance to development studies and limitations which exist. The second chapter describes the stock market in Indonesia's context to serve as a foundation

of understanding for this research. The third chapter reviews the theoretical framework and existing literature. The fourth chapter dwells on data and methodology used in this research. The fifth chapter contains results and discussion. The last chapter discusses the conclusion.

Chapter 2
Context of Indonesia

2.1 History and Structure of Indonesia Capital Market

As mentioned in the last chapter, the financial system is a complex structure built upon various financial institutions providing abundant products. The banking industry is arguably the biggest financial component in Indonesia. However, capital market also shows promising development of late, especially the stock market where individual retail can involve with a low barrier to entry compared to the bond market. Hence, it is important to aim our focus to one specific industry and, in this research, it is the stock market. In this chapter, we discuss the financial system in Indonesia, with emphasize on the stock market.

Stock exchange, as the place where securities traded, first established in December 1912 in Batavia city (now Jakarta, the capital city of Indonesia), in the Dutch colonial era. But World War I and II brought a halt to its development until, on 10 August 1977, the stock exchange was reactivated again, inaugurated by the president himself. The day, then, was celebrated as the anniversary of Indonesia capital market.

Apart from the Jakarta Stock Exchange which focused on stocks, in June of 1989, another stock exchange was established in Surabaya city to provide platform for bonds trading. While Jakarta Stock Exchange was still operated under government authority at that time, Surabaya Stock Exchange had already run as a private company. In 1992, the Jakarta Stock Exchange followed and became a private company, a milestone marked as the anniversary of the Jakarta Stock Exchange. In November of 2007, Jakarta Stock Exchange and Surabaya Stock Exchange merged into one private body called Indonesia Stock Exchange (IDX) who remains today.

Even if the stock market is operating under a private organization, it does not mean that it is far from the government's reach as the policy maker. On the contrary, the stock market, and even the financial industry in general, are falling under heavy regulations and intense watch of the government. This is the common practice in most countries to prevent financial instability, which can lead to a financial crisis.

Indonesia Financial Services Authority (Otoritas Jasa Keuangan Indonesia) or the IFSA is the highest authority supervising all financial services in Indonesia from banks (co-supervise with the Indonesia Central Bank), insurance, micro-credit, investments, and the capital market, IDX included. IDX itself is not processing all the securities transactions all alone. There are also the Indonesia Central Securities Depository (KSEI) who is in charge for settlement and custody of the securities and Indonesia Clearing and Guarantee Corporation (IDClear) who is in charge to the clearing and guarantee the trades done at IDX. Together, the three institutions are called Self-Regulatory Organization (SRO,) capable of making rules and regulations for the capital market, under the supervision of IFSA, as shown by Figure 1.

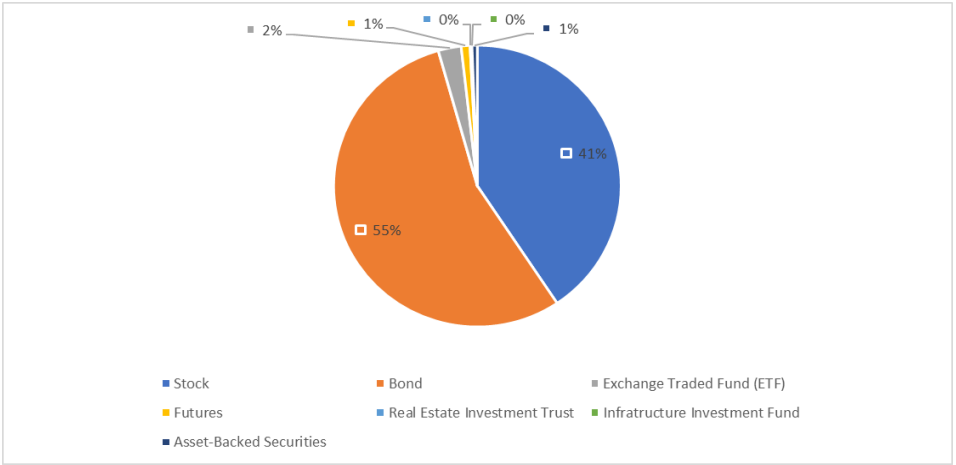
Figure 1. Indonesia Capital Market Structure.

Source: Indonesia Stock Exchange (2021a). Accessed on 18 September 2021.

Securities – or financial instruments – are "written obligation of one party to transfer something of value" (Cecchetti and Schoenholtz, 2006, p. 47). Securities can take any kind of forms, be it equity-based, debt-based, or other instruments like derivatives and asset-backed. IDX is not a seller nor buyer of securities. Instead, IDX is a place, a facility, or a market where securities traded.

Stocks and bonds are the most common securities listed at IDX by the number of products available. By the end of August 2021, there are 740 stocks and 1,001 bond series listed at IDX, representing 96% of the number of securities listed (Figure 2). The other products such as Exchange Traded Fund (ETF), Futures contracts, Real Estate Investment Trust (REIT), Infrastructure Investment Fund, and Asset-Backed Securities are still developing in comparison. Together, all products make the capital market.

Figure 2. Number of Listed Securities at IDX by the End of August 2021.



Source: Indonesia Stock Exchange (2021b). Accessed on 18 September 2021.

Nonetheless, there are several factors that distinguish stock and bond in Indonesia and, to some extent, all around the world. Stock, or share, is a proof of belonging of a

company. Owning certain percentages of stock, then, means entitlement to certain percentages of the company's value and dividend payment. A bond, on the other hand, represents a debt of the company to the bondholder. Because of the nature of stock and bond are valued and traded, the stock often seen as the riskier asset with higher volatility and higher chance of price bubble. Bubbling price is often defined as the condition where an asset's price goes up much higher than the fair value. Bond also usually traded at high price, makes it an asset that is out of individual retail's reach and mainly traded by institutions such as bank, insurance, or asset management. On the other hand, stock is usually traded at more affordable price and therefore reachable by retail. Consequently, the riskier asset is the one which exposed more to the public.

The focus of this research will be on the stock market rather than the capital market as a whole. It is important to distinguish the effect of equity-based market and debt-based market as the two are of different natures.

2.2 Policy Support for Stock Market

The common trajectory of policy makers around the world is to develop both banking sector and capital market, stock market included. One strategy to achieve that is by enlarging the basis of the user of financial institutions. Financial inclusion is one of the most popular strategies that supported by the World Bank itself. This particular issue prompted IFSA to release Regulation number 76/POJK.07/2016 regarding consumer's and public's financial literation and inclusion in financial services. This whole regulation pushes every financial institution in Indonesia to promote and educate the public on financial services so financial literation and inclusion will improve. The more educated the public, the bigger consumer there is for financial institutions.

Other than push for education, the government also provides incentive for companies to sell their shares to the public, or *go public*, and become public company. Through the Regulation of the Government of the Republic of Indonesia number 36/2008, the government imposed 28% - and later became 25% in 2010 - income tax for the company in Indonesia, but the tax rate was 5% lower for the public company whose at least 40% of paid-in shares are traded at the stock exchange. In response to the Covid-19 pandemic, the government released Regulation number 30/2020 to lower the tax rate to 22% in 2020 and 2021 and 20% in 2022. Here, public companies with at least 40% of paid-in shares traded at stock exchange are granted a 3% lower rate. Therefore, the tax rate is 19% in 2020-2021 and 17% in 2022.

Another boost from the government is also coming from a tax incentive. The Indonesia government does not impose a capital gain tax on transactions of public company's shares. Based on Law of the Republic of Indonesia, number 36, year 2008, article 4, section (2), the selling of public company's share is subjected only to 0.1% from the total selling value, regardless of profit or loss position when the shares sold. Under the normal income tax from the same law of article 17, section (1), income from such activities but of non-public company is subject to a normal income tax rate ranging from 5% to 30%. This kind of tax incentive is not only a welcome boost for stock investors and traders but also for the founders of public companies who want to sell their shares and take profit from it. Although the founders would be charged with an additional 0.5% of the transaction's value for such case, the number is still significantly lower than the normal tax rate.

Those are the incentives currently given by the Indonesia government to push the capital market more. By waiving potential income that might be received, the government is paving the way for more companies to go public and for investors to start investing in the stock market.

2.3 The Development of Indonesia Stock Market

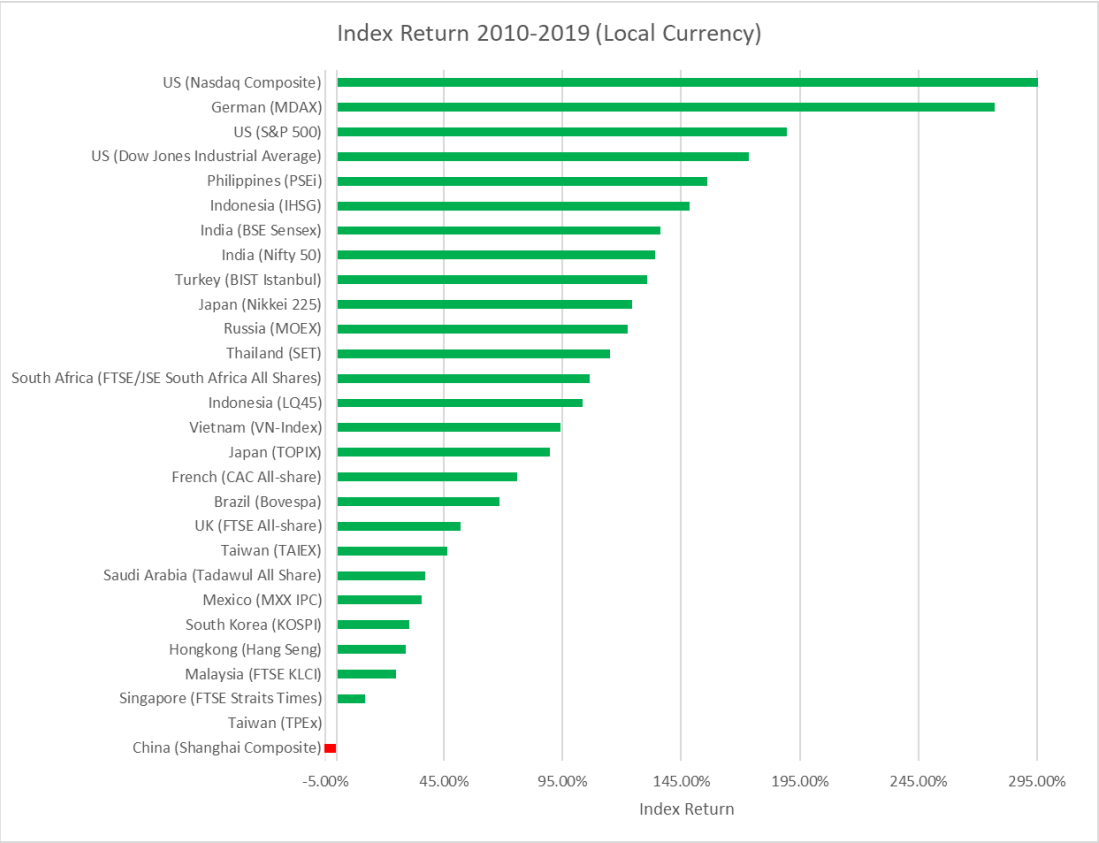
At a glance, the development of the stock market in Indonesia has been encouraging since the turn of the millennium. For 21 years of 2000-2020, the Composite Index – formerly known as Jakarta Composite Index – or IHSG (Indeks Harga Saham Gabungan), which captures the value of all listed companies at IDX, had risen by 783.28% from 676.92 on the last trading day of 1999 to 5,979.07 on last trading day of 2020. The compound annual growth rate (CAGR), which captures an investment's geometric return rate, stands at 10.93% annually for IHSG. The good news does not stop there.

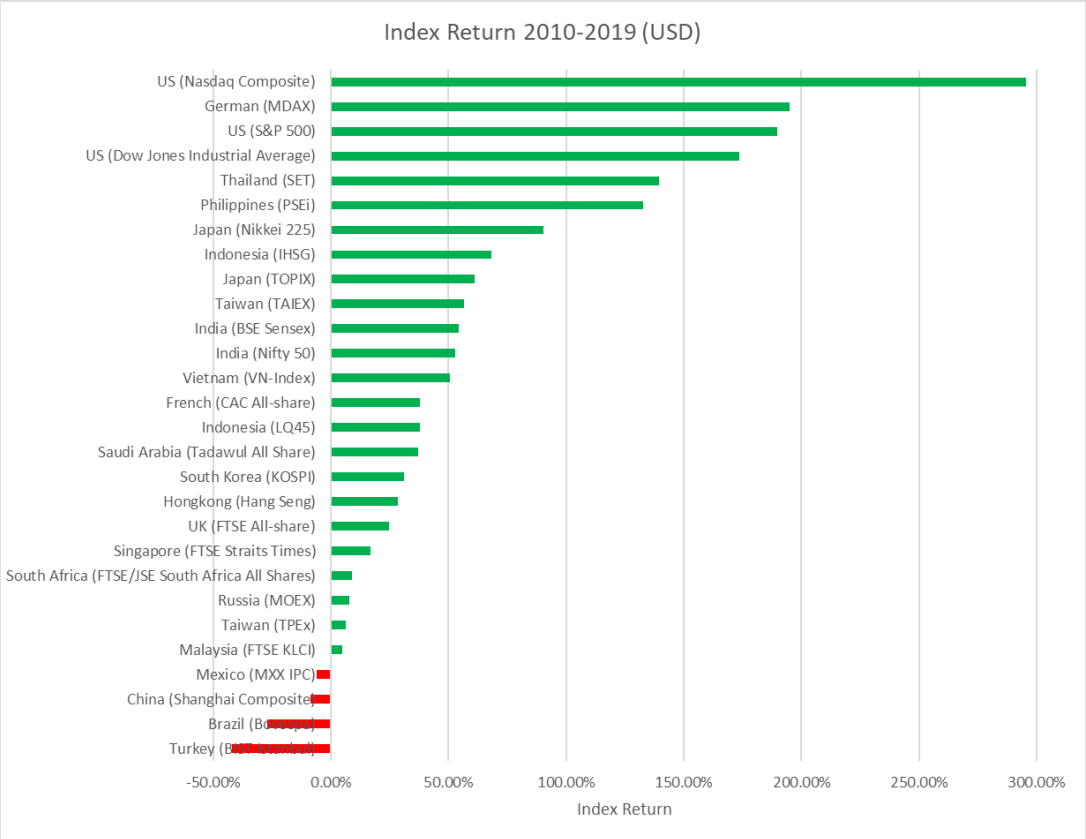
The number of companies listed at IDX grew from 278 by the end of January 2000 to 713 at the end of 2020 or a 156.47% increase. For the whole month of January 2000, only 628,455 times are the frequency of trade occurred for stocks at IDX. The same metric recorded a significant boast of 25,954,538 times a trade happened for December 2020. During the same period, IDX also recorded an increase in the value of stocks traded from 23.51 trillion IDR in January 2000 to 350.13 trillion IDR in December 2020. While the number is not inflation-adjusted, it is still an impressive surge. Appendix 1 provides the graphics of these developments.

Even when we compare the stocks' price performance, the Indonesia stock market has shown decent performance. In ten years from the end of 2009 to the end of 2019, IHSG as the price index of all shares at the stock exchange could deliver a total return of 148.57% in IDR term while the return in USD term was much less than that, stood at 68.40%. The LQ45 index, a flagship index that consists of 45 of the most liquidly traded stock (along with sound financial statement's performance), could deliver 103.59% in IDR term and 37.74% in USD term. Figure 3 shows the comparison of both indices to 26 other main and flagship indices from 22 other countries. The countries presented here as a comparison are emerging countries on similar level with Indonesia, such Malaysia, Thailand, the Philippines, and Brazil, as well as more developed countries such USA, UK, Germany, and China.

From the graphs, Indonesia stock indices stand well. IHSG beating the likes of India, Turkey, Russia, or Thailand stock indices with LQ45, although on lower rank, can stand above what Vietnam, Brazil, UK, South Korean, or Malaysia stock indices in term of return. However, in USD terms, the return rates were much lower in most countries, including Indonesia, as testament to stronger USD in the ten-year period.

Figure 3. Index Return of 26 Indices from 22 Countries.





Source: Bloomberg (2021). Accessed on 4 October 2021.

From the surface, the Indonesia stock market shows promising growth. But the stock market is considerably still in the incubation period, despite more than 40 years of its development, because of the slow growth from the industry. In 2017, there were only 1,122,668 investor account holders. The number grew to 1,619,372 in 2018 or up by 44.24%, to 2,484,354 (+53.41%) in 2019, and to 3,880,753 (+56.21%) in 2020 (Indonesia Central Securities Depository, 2021). Despite the astonishing growth in recent years, the numbers are paltry in comparison with the Indonesian population, which stands at around 270 million people. It means the investor numbers are stood at around 0.41%-1.42% of the population during the years mentioned.

The data confirm the result from the National Survey of IFSA in 2019. The survey revealed that in 2019, only 4.92% of Indonesian people are literate in capital market knowledge while 36.12% are literate in the banking sector. In terms of inclusion, which measures product usage, there are 1.55% of Indonesian who directly or indirectly use capital market products compared to 73.88% of Indonesian who use banking sector's product. In layman's terms, only a fraction of the Indonesian population uses capital market products compared to the supreme domination of the banking sector. There is a stark contrast of how capital market and banking sector accepted in Indonesia in terms of literation and even more so in inclusivity. But there is another part of the stock market that needs to be discussed, and that is the risk.

We have mentioned the risk of the stock market before. The Great Depression of the 1930s and the Global Financial Crisis of 2008 are started from the stock market in the USA before spreading through the real sector worldwide. The stock market contains a powerful tool to make or break wealth in such a short time that it needs to be kept under intense watch. Such nature of the stock market, malicious intent and unintentional mishap could lead to disaster.

In 2020, Indonesia was shaken by a huge corruption case that centralized at the stock market. Based on the court ruling number 29/Pid.Sus-TPK/2020/PN.Jkt.Pst, several names were convicted of bribing action and manipulating stock prices of more than 20 stocks in the stock market through various mutual funds that causing a state-owned insurance company went default. The state loss was judged at 16.81 trillion IDR or more than 1 billion USD. This case was deemed as one of the biggest corruption cases in Indonesia's history (Tamtomo, 2020; Diela, 2020). The ruling was then strengthened by the court of appeal ruling number 7/PID.TPK/2021/PT DKI. Another state-owned insurance company also allegedly ridden with a similar case, which might incur a state loss of more than 10 trillion IDR or more than 700 million USD (Rahman, 2020). Like the domino effect, more insurance companies – this time are privately owned – went default on their insurance payments after the aforementioned corruption cases were blown open.

In conclusion, the Indonesia stock market has established itself for more than 40 years. Its development was considerably slow before good strides were made in recent years. Despite the slow development, the government is supporting the stock market to grow through several policies. The capital market participation in Indonesia is much lower than participation in the banking sector. Even then, it was enough for the stock market to become the birthplace of huge corruption scandal in Indonesia history. We cannot forget the market risk inherent to the stock market which will always be there.

Chapter 3
Theoretical Framework and Literature Review

3.1 Financial Development and Growth

The relationship between Finance and Growth is a common theme among economics and finance researchers. Such a crucial and prevailing financial system is in the modern world, it is important to determine what their relationship might be so that policy makers can proceed with suitable approaches. Finance and growth relationship is the most widely studied since their relationship appears to be direct, or so it thought.

The nexus between financial activity and economic growth can be traced as far as the crucial work of Schumpeter (1911). In his book, *The Theory of Economic Development*, Schumpeter explains the importance of entrepreneurship as a fundamental aspect of economic development by emphasizing their ability to innovate. Initially, Schumpeter argues, the economic cycle is stationary with the same amount of productivity and the same amount of consumption. But innovation can break the stagnation, improve productivity, increase consumption, and set the economy on upward trajectory. The innovation brings the new economy and makes the old economy obsolete, prompting Schumpeter to coin the term *creative destruction* later. Bank credit plays an essential part in helping entrepreneur innovate by supplying capital, and since innovation is a risky venture, the entrepreneur has to pay interest for the credit given.

Schumpeter's following argument is that a growing economy will hit the ceiling at some point because the innovations push old economies to the side and make them scarce. In effect, unemployment rises, investment declines, and will make the demand in aggregate also fall. We usually call this recession. A continuous recession turns into depression before, again, innovation can help the economy revive with help from the financial sector. This is a cyclical process where banks act as important actors in the stages. It complimented Bagehot (1873) on the importance of the financial system during an economy downturn.

Greenwood and Jovanovic (1990) develop a model to explain the relationship between financial structure and economic growth. In the model, growth provides capital for enhancing financial structure and growing financial structure, in return, can boost real economic growth. An endogenous growth model developed by Bencivenga and Smith (1991) also emphasizes the importance of financial intermediaries to shift saving to capital and promote growth. Similarly, Greenwood and Smith (1997) also made a point of the banking sector and stock market's role in allocating capital in efficient way to the benefit of economic activities. Levine (1997) elaborates further, explaining that the financial system may help growth through two channels: capital accumulation and technological innovation. All models, then, may fall under the *Schumpeterian* frame of finance-growth nexus.

As capitalism and the financial system advance, studies are conducted to test the hypotheses of finance and growth. A large body of research has found that, surprisingly, it is not as simple as initially proposed. From the results of the empirical studies, four hypotheses have been developed to delineate the relationship between the financial system and economic growth:

1. The supply-leading hypothesis which stated that financial development leads to economic growth.

2. The demand-following hypothesis which stated that economic growth is the one who drives financial development.
3. The bidirectional-causality hypothesis which stated that both positively impacting each other.
4. The fourth hypothesis stated that both have no causality in any way.

3.1.1 Finance-Growth Nexus: Supply-Leading Hypothesis

The supply-leading hypothesis is one that is concurs with early theories. Evidence has piled up to support this proposition even since the 90's era. King and Levine (1993) conducted research on 80 developed and developing countries in the period of 1960-1989 and found that four financial development measurements tested are associated with per capita Gross Domestic Product (GDP) growth. Financial measurements used were lean heavily on the banking sector and they concluded that "Schumpeter might have been right" (p. 735) on financial system importance to the real economic growth. Berthelemy and Varoudakis (1996) also tested 85 countries for the 1960-1985 period and highlighted the importance of developing a sound financial system to avoid a halt on real growth. Rajan and Zingales (1998) pushed a step further and found that not only correlated, but financial sector causes growth in the economy by reducing the cost of external funding for companies, hence enabling them to be more efficient. An interesting finding from Gregorio and Guidotti (1995) shows that the financial system may positively influence growth, but the effect differs across countries and periods. Even the impact was evidently negative for Latin America as "unregulated financial liberalization and expectations of government bailouts" (p. 445) in the 1970s and 1980s allegedly reversed the effect. This finding is noteworthy and will be important later as our discussion moves forward.

Beck, Levine, and Loayza (2000) continued the works by testing 63 developed and developing countries during the 1960-1995 period and found that credit to the private sector strongly impacts total factor productivity growth and leads to GDP growth. Craigwell, Downes, and Howard (2001) tested the finance-growth nexus on a single country – in this case, Barbados – using multivariate Vector Auto-Regressive (VAR) for the 1974-1998 observation period and found a one-way causality from financial development to economic growth. Another research was conducted on nine South-East Asian developing countries by Fase and Abma (2003). With at least 25 years of observation and Granger causality method, they found that financial structure Granger causes economic development and no strong evidence for the other way around. Graff (2003) asked a critical question of the resources used up by financial system itself and under which condition does it actually in favour for economic growth. Using panel data from 93 countries in the 1970-1990 period, he found several noteworthy results. First, in general, the financial sector does matter for economic growth. Second, the impact is even more for developing countries. Third, adult literacy may also help the financial system to boost economic growth. Last, he suggests that the long-term manner of the banking sector is better than the market-based financial system to promote growth. Beck and Levine (2004) employed the Generalized Method of Moments (GMM) technique on panel data from 40 countries for 1976-1998 to determine banks and stock markets' impact on growth. Their finding is that both banks and stock markets positively influence growth, which is consistent with the supply-leading hypothesis. Christopoulos and Tsionas (2004) tested the financial depth – measured by total bank deposits liabilities – of 10 developing countries during the 1970-2000 period by using panel unit root test

and panel cointegration test. They find that there is indeed a causality running from financial depth to economic growth.

The evidence from 2010s publications is also numerous. Eng and Habibullah (2011) used GMM technique on 70 countries representing Africa, Asia, Europe, and Western Hemisphere area from 1990-1998 period to test causality on financial system and growth. Although there is evidence for the demand-following hypothesis, the results provide stronger support for the supply-leading hypothesis. Hassan, Sanchez, and Yu (2011) found that the hypothesis is particularly true for middle-to-low-income countries by conducting a test on 168 countries during the 1980-2007 period using VAR and Granger causality methods. Mukhopadhyay, Pradhan, and Feridun (2011) also support the supply-leading hypothesis in the case of Indonesia, Singapore, Philippines, China, and India for the period of 1979-2009 by employed Johansen cointegration tests and Vector Error Correction Model (VECM), reiterate by Pradhan *et al.* (2013) for India case of 1961-2011 using Granger causality method. Pradhan *et al.* (2014) add another evidence from South-East Asia countries for the 1961-2012 period by using the Granger causality method on panel VECM model and found that financial development helps economic growth in developing countries.

3.1.2 Finance-Growth Nexus: Demand-Following Hypothesis

Moving on to the second hypothesis, the demand-following hypothesis states that contrary to the supply-leading hypothesis, it is the economic growth that push the financial development forward. Patrick (1966) discussed the possibility of how the financial system and economic growth interact with each other. He argues that in an economy where the real sector is found wanting, the financial system may kickstart the growth engine to run and keep running until it achieves sustainable development, and at that time, the role reversed. The growing economy raises demand for financial products and helps in developing the financial system. Hence, it is *demand-following*.

Empirical evidence supports the hypothesis. Odhiambo (2004) investigated South Africa for the period of 1968-2000 and found that the economic growth causes the financial sector – measured by broad money or M2, narrower definition of money or M1, and bank credit to the private sector – and the result is consistent in both cointegration and error correction models. This finding on South Africa was then re-confirmed by further studies from Odhiambo (2009a; 2009b). Another study conducted on the case of China for the period of 1952-2001 using multivariate VAR method which found a similar conclusion of causality from growth to finance (Liang and Teng, 2006). Similarly, Ang and McKibbin (2007) found evidence of the demand-following hypothesis in Malaysia for 1960-2001. By utilizing Principal Component Analysis (PCA), they constructed a single index from three different variables to measure financial development which was later influenced by economic growth. Eng and Habibullah (2011), while finding stronger evidence on supply-leading hypothesis, also found evidence of demand-following hypothesis in West Hemisphere region. Hassan, Sanchez, and Yu (2011) found that the poorest regions have causality run from growth to finance, allegedly because an underdeveloped financial system does not have the capability yet to boost growth (p. 100).

3.1.3 Finance-Growth Nexus: Feedback Hypothesis

The third hypothesis, bidirectional causality or feedback hypothesis, stated that financial system and economic growth influence each other. Considering how the two previous hypotheses work, it is not a far-fetched assumption that financial system and economic growth can simultaneously impact one another. Blackburn and Hung (1998) argue that financial intermediaries can provide capital for real economy and at the same time, those

who reap the growth in wealth will demand more financial products even if they have to bear the cost of financial transactions (p. 107).

On empirical level, the feedback hypothesis has plenty of supports. Wood (1993) uses M2 as a proxy for financial development and he finds that finance and economic growth cause each other in Barbados for 1946-1990 period. Interestingly, Wood does not find evidence for Patrick's proposition (1966) that the finance-growth relationship changes from supply-leading to demand-following as the economy advances. Akinboade (1998) applies Granger causality on VECM to find two-way causality between financial system – represented by bank credit to the private sector and bank deposit and economic growth in Bostwana for 1972-1995 period. Dritsakis and Adamopoulos (2004) investigate Greece for 1960-2000 period and find that financial development and economic growth have a two-way causal relationship. Abu-Bader and Abu-Qarn (2008) examine Egypt in an almost identical period and found a similar result. They implement Granger causality on VECM to determine the relationship between growth and financial development where financial development approached by four variables: M2, M2 minus currency, bank credit to private sector, and credit to non-financial private sector. Fung (2009) tests the theory of convergence in economy through the angle of financial development and economic growth. Fung utilizes data of 57 countries which mainly consist of developing countries in 1967-2001 period and found that there is a "mutually reinforcing relationship between financial development and economic growth" (pp. 64-65). That relationship wanes along the way as the economy is getting more sustainable, similar to what Patrick (1966) proposes. Fung concludes that low-income countries with the good financial systems might catch up with higher-income countries. Although find that supply-leading hypothesis prevails in most countries in research, Mukhopadhyay, Pradhan, and Feridun (2011) do find evidence of the feedback hypothesis in Thailand's case.

3.1.4 Finance-Growth Nexus: Neutrality Hypothesis

If the first three hypotheses connect financial system and economic growth in a particular way, the last hypothesis states that both variables do not cause or influence each other. Hence, it is often called as neutrality hypothesis. Plenty of empirical studies show evidence of this. Thornton (1994) examines nine countries in Asia in period of 1950s to around 1990 to determine the relationship between financial deepening and growth. He also uses M2 as one of the proxies of financial deepening and total deposits as another variable. Using cointegration analysis, he does not find a long-run relationship between finance and growth. Granger causality test finds that at least in the short-run, financial deepening is not too impacting real economic growth. The variable choice might be one of the reasons why these findings take place (p. 46). Gries, Kraft, and Meierrieks (2009) employed PCA to create a single index of financial depth from three variables: bank assets, liquid liabilities (M3), and credit to the private sector. Then, they test the index to economic development and trade openness in 16 sub-Saharan African countries by utilizing Granger causality on VECM. They find that neither financial deepening nor trade openness significantly contribute to economic growth. This finding on the Africa region is also consistent with Eng and Habibullah (2011). A more recent study of Africa region countries was conducted by Menyah, Nazlioglu, and Wolde-Rufael (2014) which also try to test the hypothesis using data from 21 African countries for 1965-2008 observations. Implementing Granger causality on panel bootstrapped model, they also find that financial development and trade openness does not matter much for the economic growth, consistent with the previous study. Another conclusion from Mukhopadhyay, Pradhan, and Feridun (2011) is that there is evidence in support for no causality hypothesis in Malaysia.

Interestingly, there is a possibility for the relationship between finance and growth to be non-linear. What seems to have a positive – or negative – impact of finance could be reversed after certain limit passed through. Arcand, Berkes, and Panizza (2015) find that there is an indication that if credit to the private sector is going beyond 80%-120% of GDP, finance may have a detrimental effect on economic growth. They are indicating that finance and growth can have an inverted U-shaped relationship. This finding is important to put caution of the possibility to keep financial system in check, even if it initially supports growth.

Table 1 provides a summary of 27 previous studies on finance and growth relationship. We can observe the variety of variables and methodologies utilized in each of the different hypotheses.

Table 1. Summary of Previous Studies on Finance-Growth Nexus.

Author	Region	Period	Growth Var.	Financial System Var.	Methodology
Supply-Leading Hypothesis					
King and Levine (1993)	80 developed and developing countries	1960-1989	Real per capita GDP	- Liquid liabilities (M3) to GDP - Deposit bank domestic assets to deposit bank domestic assets plus central bank domestic assets - Credit to nonfinancial private sector to total domestic credit - Credit to nonfinancial private sector to GDP	Correlation analysis, cross-country regression, and sensitivity analysis
Gregorio and Guidotti (1995)	100 countries	1960-1985	Real per capita GDP	Domestic credit to private sector to GDP	Panel data regression with random effect
Berthelemy and Varoudakis (1996)	85 countries	1960-1985	Real per capita GDP	Broad money (M2) to GDP	OLS regression
Rajan and Zingales (1998)	43 developed and developing countries	1980-1990	Real per capita GDP	Domestic credit and market capitalization to the GDP	OLS regression
Beck, Levine, and Loayza (2000)	63 developed and developing countries	1960-1995	Real per capita GDP	Credit to private sector to GDP	Cross-sectional regression and GMM
Craigwell, Downes, and Howard (2001)	Barbados	1974-1998	Real per capita GDP	Commercial bank deposits to nominal GDP	Cointegration test and multivariate VAR
Fase and Abma (2003)	9 South-East Asian developing countries	Various periods at least for 25 years observations	GDP growth	Financial assets	Granger causality test on ECM

Author	Region	Period	Growth Var.	Financial System Var.	Methodology
Graff (2003)	93 countries	1970-1990	Real per capita GDP	- Number of banks and branches per capita - Financial system's worker - Financial system to GDP	Panel data regression
Beck and Levine (2004)	40 countries	1976-1998	Real per capita GDP	- Value traded to listed shares' total value - Credit to private sector to GDP	GMM
Christopoulos and Tsionas (2004)	10 developing countries	1970-2000	Countries' real output	Bank deposits liabilities	Panel unit root test, panel cointegration test, and OLS
Eng and Habibullah (2011)	30 countries representing Asia and Europe area	1990-1998	Real GDP	Domestic credit to GDP	GMM
Mukhopadhyay, Pradhan, and Feridun (2011)	Indonesia, Singapore, Philippines, China, and India	1979-2009	Real per capita GDP	- Credit to private sector to GDP - Deposit liabilities to GDP	Johansen cointegration test and VECM
Pradhan *et al.* (2013)	India	1961-2011	Per capita GDP	- Broad money (M2) - Credit to private sector - Domestic credit to GDP - Private credit to GDP - Total reserves - Liquid liabilities (M3) - Market capitalization	Granger causality test
Pradhan *et al.* (2014)	26 ASEAN Regional Forum countries	1961-2012	Real per capita GDP	- Broad money (M2) - Credit to private sector to GDP - Domestic credit to GDP - Domestic credit to credit to private sector - Market capitalization - Value traded - Turnover ratio - Number of listed companies	Panel Granger-causality test on VECM
Demand-Following Hypothesis					
Odhiambo (2004)	South Africa	1968-2000	Real per capita income	- Broad money (M2) to GDP - Currency to narrower definition of money (M1) - Bank credit to private sector to GDP	Cointegration test and VECM
Liang and	China	1952-2001	Real per	Domestic credit to	Multivariate

Author	Region	Period	Growth Var.	Financial System Var.	Methodology
Teng (2006)			capita GDP	GDP	VAR
Ang and McKibbin (2007)	Malaysia	1960-2001	Real per capita GDP	- Liquid liabilities (M3) to GDP - Commercial bank assets to commercial plus central bank assets - Domestic credit to private sector to GDP	Granger causality test on VECM
Odhiambo (2009a)	South Africa	1960-2006	Real per capita GDP	Broad money (M2) to GDP	Granger causality test on VECM
Odhiambo (2009b)	South Africa	1950-2005	Real per capita GDP	Gross domestic savings to GDP	Granger causality test on VECM
Eng and Habibullah (2011)	25 countries representing Western Hemisphere area	1990-1998	Real GDP	Domestic credit to GDP	GMM
Pradhan *et al.* (2013)	Bangladesh, Bhutan, Pakistan, China, Hong Kong, Japan, Indonesia, and Malaysia	1961-2011	Per capita GDP	- Broad money (M2) - Credit to private sector - Domestic credit to GDP - Private credit to GDP - Total reserves - Liquid liabilities (M3) - Market capitalization	Granger causality test
Feedback Hypothesis					
Wood (1993)	Barbados	1946-1990	Real GDP	Broad money (M2) to GDP	Granger causality test on Hsiao testing procedure
Akinboade (1998)	Bostwana	1972-1995	Real non-mineral per capita GDP	- Bank credit to private sector to GDP - Bank deposit to GDP	Granger causality test on VECM
Dritsakis and Adamopoulos (2004)	Greece	1960-2000	GDP	Broad money (M2) to GDP	Granger causality test on VECM
Abu-Bader and Abu-Qarn (2008)	Egypt	1960-2001	Real per capita GDP	- Broad money (M2) to GDP - M2 minus currency to GDP - Bank credit to private sector to GDP - Credit to non-financial private sector to total domestic credit	Granger causality test on VECM
Fung (2009)	57 countries	1967-2001	Real per capita GDP	- Credit to private sector - Quasi-money (M2-	GMM

Author	Region	Period	Growth Var.	Financial System Var.	Methodology
				M1)	
Mukhopadhyay, Pradhan, and Feridun (2011)	Thailand	1979-2009	Real per capita GDP	- Credit to private sector to GDP - Deposit liabilities to GDP	Johansen cointegration test and VECM
Neutrality Hypothesis					
Thornton (1994)	9 Asian countries	1950s-1990s	Real GDP	- Broad money (M2) to GDP - Total bank deposits to GDP	Granger causality test on VAR
Gries, Kraft, and Meierrieks (2009)	16 sub-Saharan African countries	1960s-2003/04	Real per capita GDP	- Commercial bank assets to commercial plus central bank assets - Liquid liabilities (M3) to GDP - Credit to private sector to GDP	Granger causality test on VECM
Eng and Habibullah (2011)	25 countries representing Africa area	1990-1998	Real GDP	Domestic credit to GDP	GMM
Mukhopadhyay, Pradhan, and Feridun (2011)	Malaysia	1979-2009	Real per capita GDP	- Credit to private sector to GDP - Deposit liabilities to GDP	Johansen cointegration test and VECM
Menyah, Nazlioglu, and Wolde-Rufael (2014)	21 African countries	1965-2008	Real per capita GDP	- Broad money (M2) to GDP - Liquid liabilities (M3) to GDP - Domestic credit to GDP - Domestic credit to private sector to GDP	Panel Granger causality test on bootstrapped model

3.2 Stock Market Development and Growth

Mixed evidence of finance and growth relationship also extends to specific parts of the financial system. Both theoretical and empirical research provides diverging and sometimes contrasting conclusions.

Kyle (1984) argues that in commodity futures market, a high liquidity market where everyone can buy and sell easily in large volume, can bring the market closer to the idea of perfect competition. In perfect competition, information is transparent and pricing mechanism is efficient. Kyle's argument then also supported by Holmström and Tirole (1993) which add that the concept of market monitoring may improve managerial quality. But such value is less likely to be extracted if the company's stock is not liquidly traded.

Levine (1991) also provides a strong argument on how the stock market helps growth through the lens of investors. First, the stock market allows investors to acquire and sell companies share easily without interrupting production, hence improving efficiency. Second, with investors able to diversify their wealth through the stock market, investors can increase their risk preference, take more risk, and invest in many companies. So again, it has ability to improve efficiency in the flow of capital.

Obstfeld (1994) pushes further by proposing a model where integrated stock markets enable investors to diversify more through international exposure and allowing for more efficient capital allocation. But the notion of integrated stock market of different countries or regions challenged by Devereux and Smith (1994) who say that full risk sharing may reduce saving of one country which leads to a lower growth rate.

Stiglitz (1985) puts forth the idea of capital market and "control of capital" (p. 133). He questions the capital market function that can liberate a company to be owned by several shareholders but consequently, may risk the authority on who controls the company's capital. In a condition where a controlling shareholder is not existing, it could be the managerial level or banks who lend the money which directly or indirectly control the capital. It could lead to inefficiency in capital allocation and reduce profitability. Stiglitz (1994) reiterates that control of capital, along with imperfect information and imperfect competition as market failures that need to be addressed with government intervention.

Bencivenga, Smith, and Starr (1996) discuss on the possibility that the stock market might need to be supported or curbed depending on how the internal rate of return is compared with real economic growth. If the stock market cannot shift capital to support growth, it is recommended to impose high transactions fee for the stock market. They show that the stock market is not in every way will positively impact economic growth, rather hang on the balance of conditions.

3.2.1 Stock Market-Growth Nexus: Supply-Leading Hypothesis

From empirical evidence, just like in the previous section, mixed results are also observed. From the supply-leading hypothesis, one piece of evidence comes from Levine and Zervos (1996) who implement time series regression to test long-run growth and stock market development by pooling data from 41 countries in 1976-1993 period. They define stock market development with three components consisting of four proxies. First, they use market size which approached with the ratio of market capitalization to GDP. Second, they try to approach market liquidity through two variables: ratio of total value traded at stock market divided by GDP and ratio of total value traded to market capitalization. The third component is the ability to diversify risk, which is proxied through the multifactor International Arbitrage Pricing Model (IAPM), which estimates how integrated the stock markets are. More integrated the stock market, more opportunity to diversify an investment portfolio. Then, they control them with financial depth variable with a proxy of the ratio of liquid liabilities of the financial system to GDP. The result is that stock market development positively correlated with growth rate measured by GDP per capita, although they did not test the direction of correlation the other way around.

Nieuwerburgh, Buelens, and Cuyvers (2006) use market capitalization as proxy of stock market development. They find that it promotes economic growth in Belgium especially for period of 1873-1935 through cointegration and Granger causality analysis. Another evidence comes from Colombage (2009) who investigates the relationship between the financial system and growth in five developed countries: Japan, Canada, USA, UK, and Switzerland. He employs VECM to determine long-run relationship and short-run Granger causality of stock market development, with market capitalization to GDP ratio as the vari-

able, along with bond market and banking system. The finding is that the financial system influences economic growth in all countries except for Canada, at least for the period of 1995 to first quarter of 2007. Similarly, Enisan and Olufisayo (2009) also find that the stock market positively influences growth in Egypt and South Africa, both long-run and short-run.

Kolapo and Adaramola (2012) explore the relationship of Nigerian capital market and growth in the period of 1990-2010. Their finding supports supply-leading hypothesis from market capitalization to GDP by running Granger-causality on VECM. Marques, Fuinhas, and Marques (2013) tested the relationship on the stock market and economic growth in Portugal for 76 observations from 1993-2011 by using the Granger causality method on VAR model. They utilize GDP as a proxy for growth and the ratio of stock market capitalization to GDP as proxy for stock market development. The findings are that the stock market Granger causes economic growth and weak evidence for the vice versa. Pradhan *et al.* (2014) employ Principal Component Analysis (PCA) to create a single variable of stock market development of ASEAN countries from four different variables: market capitalization, total value traded, turnover ratio, and number of listed companies. Then, by using panel Granger-causality on VECM, they find a long-run positive relationship between the stock market and economic growth. Nyasha and Odhiambo (2015) conduct similar research for the South Africa case in 1980-2012 period by utilizing multivariate Granger-causality within Autoregressive Distributed Lag (ARDL) bounds testing and find that stock market development causes economic growth in the short-run and long-run. With similar methods, Coşkun *et al.* (2017) employ PCA on variables mutual funds, pension funds, corporate and government bonds, and stocks and find that the supply-leading hypothesis holds in Turkey's 2006 to 2016 observations. Nordin and Nordin (2016) find a similar result by using Granger-causality on VECM and variance decomposition in Malaysia.

3.2.2 Stock Market-Growth Nexus: Demand-Following Hypothesis

From the demand-following hypothesis, evidence comes from one research by Dritsaki and Dritsaki-Bargiota (2005) from observation on Greece for 1988-2002 period. They use market capitalization to represent stock market development and find that economic growth is the one that influences stock market. The methodology used is Granger-causality on VECM. Similar method was also employed by Liu and Sinclair (2008), and they find that economic growth is more likely the one that drives stock market development, in this case proxied with stock price indices of China mainland, Hong Kong, and Taiwan. Although, in the short run, the reverse occurs when stock price drives growth.

3.2.3 Stock Market-Growth Nexus: Feedback Hypothesis

There are also documentation supporting the feedback hypothesis. Nishat and Saghir (1991) investigate Pakistan for period of 1964-1987, and by using the Granger causality test, they find a bidirectional relationship between stock prices as stock market indicator and industrial production as the real economic indicator. This finding on Pakistan's case was later strengthened by Rashid (2008), who observed the period of June 1994 to March 2005 by using the cointegration test and Granger-causality test on VECM. Hou and Cheng (2010) find that the bidirectional hypothesis of stock market and economic growth also holds in Taiwan for 1971-2007 period.

Another interesting examination from Muradoglu, Taskin, and Bigan (2000) is worth to discuss here. They investigate 19 emerging countries, Indonesia included, during the 1976-1997 period and employ Granger causality on each country instead of putting everything into a panel data model to determine the relationship between stock market and mac-

roeconomic variables. They use the stock market index as the proxy for the stock market and four macroeconomic variables: inflation, interest rate, industry production (as a proxy of the GDP), and exchange rates. There is evidence of bidirectional causality in Argentina between the stock market and inflation and between the stock market and interest rate. A similar case in Mexico with the stock market and exchange rates. Mixed relationships appear in other countries, and they argue that the size of stock market and international integration as key factors for feedback relationship between the stock market and macroeconomic variables. Consequently, it is advised for government to formulate policy that may draw more foreign investment.

3.2.4 Stock Market-Growth Nexus: Neutrality Hypothesis

There are also evidences that show indication of no relationship between stock market and real economic growth. For instance, Rousseau and Xiao (2007) find that unlike its banking system which take important part, China's stock market does not contribute significantly to the economic growth, at least for the 1995-2005 observation period.

Table 2. Summary of Previous Studies on Stock Market-Growth Nexus.

Author	Region	Period	Growth Var.	Stock Market Var.	Methodology
Supply-Leading Hypothesis					
Levine and Zervos (1996)	41 countries	1976-1993	GDP per capita	- Market capitalization to GDP - Value traded to GDP - Value traded to market capitalization - Multifactor International Arbitrage Pricing Model (IAPM) - Liquid liabilities (M3) to GDP	Time series regression
Nieuwerburgh, Buelens, and Cuyvers (2006)	Belgium	1830-2000	Real per capita GDP	- Market capitalization - Number of listed shares - Number of IPO	Granger causality test on VECM
Colombage (2009)	Japan, Canada, USA, UK, and Switzerland	1995-2007Q1	Real GDP	Market capitalization to GDP	Granger causality test on VECM
Enisan and Olufisayo (2009)	Egypt and South Africa	1980-2004	Real per capita GDP	- Market capitalization to GDP - Value traded to GDP	Granger causality test on VECM within ARDL
Kolapo and Adaramola (2012)	Nigeria	1990-2010	Real GDP	- Market capitalization - New Shares issued - Value traded - Number of listed equities and government stock	Granger causality test on VECM
Marques, Fuinhas, and Marques (2013)	Portugal	1993-2011	Real GDP	Market capitalization to GDP	Granger causality test on VAR

Author	Region	Period	Growth Var.	Stock Market Var.	Methodology
Pradhan *et al.* (2014)	26 ASEAN Regional Forum countries	1961-2012	Real per capita GDP	- Market capitalization - Value traded - Turnover ratio - Number of listed companies	Panel Granger-causality test on VECM
Nyasha and Odhiambo (2015)	South Africa	1980-2012	Real GDP	Means-removed average of: - Market capitalization - Value traded - Market turnover	Multivariate Granger-causality test on VECM within ARDL
Nordin and Nordin (2016)	Malaysia	1981-2014	Real per capita GDP	Market capitalization	Granger-causality test on VECM and variance decomposition analysis
Coşkun *et al.* (2017)	Turkey	2006-2016	GDP	- Market capitalization - Value traded - Corporate bond market capitalization - Market value of mutual funds and pension funds	Granger-causality test on VECM
Demand-Following Hypothesis					
Dritsaki and Dritsaki-Bargiota (2005)	Greece	1988-2002	Economic growth	Market capitalization	Granger-causality test on VECM
Liu and Sinclair (2008)	China mainland, Hong Kong, and Taiwan	1992-2003, 1973-2003, and 1967-2003	Real GDP	Stock market indices	Granger-causality test on VECM
Feedback Hypothesis					
Nishat and Saghir (1991)	Pakistan	1964-1987	Industrial production	Stock market index	Granger-causality test on VAR
Muradoglu, Taskin, and Bigan (2000)	19 emerging countries	1976-1997	Industrial production	Stock market index	Granger-causality test on VAR
Rashid (2008)	Pakistan	June 1994-March 2005	Industrial production	Stock market index	Cointegration and Granger-causality tests on VECM
Enisan and Olufisayo (2009)	Cote D'Ivoire, Kenya, Morocco, and Zimbabwe	1980-2004	Real per capita GDP	- Market capitalization to GDP - Value traded to GDP	Granger causality test on VAR within ARDL
Hou and Cheng (2010)	Taiwan	1971-2007	Real GDP	Market capitalization to GDP	Granger-causality test on VECM
Neutrality Hypothesis					

Author	Region	Period	Growth Var.	Stock Market Var.	Methodology
Rousseau and Xiao (2007)	China	1995-2005	Real per capita GDP	- Market capitalization - Value traded - Number of listed securities	Granger-causality test on VAR

3.3 Empirical Studies: Indonesia

As this study focuses on Indonesia's case, it is important to investigate existing literature studying Indonesia in the relationship between financial system and economic growth.

From the research of Muradoglu, Taskin, and Bigan (2000) previously mentioned, we can also take a look of Indonesia case. The research indicates that from January 1990 to May 1997, stock prices have no causality to the economic growth and also none for the other way around. The finding contradicted by Adam (2015), who finds the stock prices have predictive power to economic growth. This time, Adam uses quarterly data for 2004-2013 period, which may be suspected to have too few observations.

Another study comes from Majid (2007), who investigates the relationship among financial depth, economic growth, investment, and inflation. For financial depth, he uses total bank deposit liabilities and, after employing ARDL and VECM methods, find that financial depth independently stands from economic growth. Unlike financial depth, inflation and investment – which are proxied by gross fixed capital formation – are indicated to influence growth.

Mukhopadhyay and Pradhan (2011) examine Indonesia for the period of 1990-2009 and find structural break in 1997 which indicates the impact of the Asian crisis of 1997-1998. They utilize credit to the private sector and the banking system's deposit liabilities as financial development. From running the VECM, they find that finance is disconnected from economic growth, supporting the neutrality hypothesis. Although, it is worth noting that it could suffer from too few observations because they employ annual data. Interestingly, the same variables and the similar method employed in Mukhopadhyay, Pradhan, and Feridun (2011), with the difference in a longer annual period of 1979-2009, and they find that for Indonesia case "financial development significantly causes economic growth only when the lag length is increased from 1 to 2" (p. 1529).

Non-linear relationship of finance and growth is also observed for the Indonesia case. Soedarmono, Hasan, and Arsyad (2017) break down credit channelled by banks into three kinds of credit: investment credit, consumption credit, and working capital credit. They implement GMM panel data analysis on 33 province-level data in 2000-2009 period. Other than credit data, they utilize regional GDP as a proxy for growth. The results are interesting since they conclude that investment credit and consumption credit have an inverted U-shaped non-linear relationship with growth. Both credits positively influence growth until a certain level when they will have the opposite effect and harmful to the economy. Only working capital loans are indicated to have a positive linear relationship with growth. Working capital, they argue, is mostly channelled into day-to-day operation – instead of long-term investment of the investment credit – of small and medium-sized enterprises (SMEs), in effect supporting the economy itself in a positive manner.

The change in variables and period may also change the conclusion. Sohag *et al.* (2019) utilize PCA to make a single index from three variables: liquid liabilities, credit to the private sector, and market capitalization. By employing ARDL and VECM, they find that the financial index created has a U-shaped relationship with economic growth. It means that

even if initially detrimental, the financial system needs to be pushed even more to support growth. Another support for bank credit comes from Soedarmono, Trinugroho, and Sergi (2019) when they find that bank credit in general has a positive impact on regional companies' performances on province level.

Hismendi *et al.* (2021) cut up the stock market into sectoral price movement and connect them to growth of different industry to find the predictive power. They find that different sectors may have different relationships with growth. By utilizing Granger causality on VECM, they find indication that agricultural and finance sector growth have unidirectional causality for the agriculture and finance sector stock price. In reverse, it is the industrial stock price that cause industrial growth while no evidence for a relationship between mining sectoral growth and stock price.

Table 3. Summary of Previous Studies on Finance-Growth Nexus in Indonesia.

Author	Period	Growth Var.	Financial System Var.	Methodology	Hypothesis Supported
Muradoglu, Taskin, and Bigan (2000)	January 1990-May 1997	Industrial production	Stock market index	Granger-causality test on VAR	NH
Majid (2007)	1998-2006	Real GDP	- Deposits liabilities to GDP - Gross fixed capital formation to GDP	VECM within ARDL	NH
Mukhopadhyay and Pradhan (2011)	1990-2009	Real per capita GDP	- Credit to private sector - Deposit liabilities	VECM	NH
Mukhopadhyay, Pradhan, and Feridun (2011)	1979-2009	Real per capita GDP	- Credit to private sector to GDP - Deposit liabilities to GDP	Johansen cointegration test and VECM	SLH
Pradhan *et al.* (2013)	1961-2011	Per capita GDP	- Broad money (M2) - Credit to private sector - Domestic credit to GDP - Private credit to GDP - Total reserves - Liquid liabilities - Market capitalization	Granger causality test	DFH
Adam (2015)	2004-2013	GDP	Stock market index	Lag VAR	SLH

Author	Period	Growth Var.	Financial System Var.	Methodology	Hypothesis Supported
Soedarmono, Hasan, and Arsyad (2017)	2000-2009	Regional GDP	- Investment credit - Consumption credit - Working capital credit	GMM	SLH
Sohag *et al.* (2019)	1984-2017	GDP per capita	- Liquid liabilities to GDP - Credit to private sector to GDP - Market capitalization	VECM within ARDL	SLH
Soedarmono, Trinugroho, and Sergi (2019)	2004-2013	- Total income to total cost of raw materials - Total revenues to total input for production - Value added to total revenues	Bank credit to regional GDP	Panel data regression	SLH
Hismendi *et al.* (2021)	2009-2019	Sectoral growth	Price of sectoral indices	Granger-causality test on VECM	SLH DFH NH

SLH=Supply-Leading Hypothesis; DFH=Demand-Following Hypothesis; NH=Neutrality Hypothesis

Table 3 summarizes 10 of the previous studies on the finance-growth nexus in Indonesia. Five of them focus on the banking sector, and three studies are on the stock market, while the rest are a combination of the banking industry and the stock market. While the banking sector has been approached from several different variables, the stock market has been mostly approached through stock price or market capitalization. Hence, this research tries to fill the gaps in two different ways. First, it tries to reconfirm previous studies in Indonesia which focused on secondary market variables but here, it is enhanced by combining three secondary market variables into one index. Second, it dwells into the primary market impact, which is rarely touched in previous studies both outside and inside Indonesia.

The nature of the primary market and secondary market of the stock market is different. Therefore, by examining just one aspect of the stock market and drawing a conclusion from there, it could be misleading and contribute to ineffective or inefficient policy.

One last interesting observation is worth raising here regarding the secondary market. From Table 1 to 3, four common metrics which are part of secondary market utilized in finance-growth nexus studies: stock market index price, market capitalization, volume of shares traded, and value of shares traded. The stock price is commonly moves before real economic growth could be captured on a quarterly basis. For example, a rising coal price

could send coal producer stock's price soar even before the company themselves book higher profit than before. A prospect of a better pandemic situation in a country could send a stock market index raise even when GDP growth is still suffering. Market capitalization will also be moved by stock price's movement. Moreover, the rising (or spiralling down) of the stock price is usually create waves of bullish (bearish) investors that can increase the trading activities in term of volume and value as investors rush to buy (sell) stocks before it raises (downs) even more. With this kind of movement, it is not a far-fetched diagnosis to say the secondary market is *predictive* of real economy activities. Hence, we can also question other research's conclusion that the stock market *causes* growth based on Granger causality method because Granger causality is *predictive causality*.

Chapter 4
Data and Methodology

This chapter explains the data and methodology used in this research. The nature of this research is time series analysis which was done by statistical software Stata version 16.1. The first part of this chapter explains the data sources and variables choice and the second part breaks down the time series analysis step-by-step.

4.1 Data and Variables

As mentioned before, this research is conducting a time series analysis. The period of observation is 2003 quarter 1 to 2021 quarter 2, which gives us 74 observations on a quarterly basis. The GDP data used is obtained from the official website of Statistics Indonesia (Badan Pusat Statistik). Statistics Indonesia is the national centre for statistics in Indonesia. For the GDP period of 2003 to 2009, we retrieved data from the year 2000 series, and the rest comes from the 2010 series. The stock market data we utilize are funds raised, market capitalization, shares value traded, shares volume traded, and outstanding shares, which all are obtained from IDX as the only stock exchange in Indonesia. Appendix 2 lays out the data sources, series, and date of access.

The main appeal of this research is how the stock market variables are divided into two markets, just as discussed in previous chapters. One of the leading arguments of why the stock market is good for the economy is the ability to channel funds efficiently from public or investor to company in a non-debt method. Supposedly, the equity market can provide an alternative of funding that does not incur interest rate payment which usually hurts the bottom line of company's finance. Despite this argument, previous research dominantly uses the secondary market variables as proxies for capital market development. The variables for the secondary market, such as market capitalization, are connected but not precisely measuring the funds received by the listed company. Hence, the primary market, or the IPO market, is a suitable variable. Nieuwerburgh, Buelens, and Cuyvers (2006) is one of the few who utilize IPO as a stock market variable, but they focus on the number of IPOs done. While this is close, but still, does not capture the total amount of money channelled. For this reason, the amount of funds raised (FUND) through the stock market is used as a proxy for the primary market variable. In this research, we use the natural logarithm form of funds raised (L.FUND).

Other than the primary market, this research also tries to determine the relationship between economic growth and secondary market development just like in previous empirical evidence. The first secondary market variable used here is market capitalization (CAP) which is one of the most common variables utilized. Market capitalization is the market value of all shares listed in the equity market. While funds raised in the primary market go directly to the company, market capitalization captures the market price when the shares are traded in the secondary market, between investors. The value of market capitalization does not precisely represent the amount received by the company as it can be much higher – and lower – than the stocks sold by the company in the very first place. Again, we use the natural logarithm form of market capitalization (L.CAP). The second variable is trade turnover (VOLUME), the ratio of the shares' volume traded to total outstanding shares. This variable can measure the liquidity of the stock market as a whole. A similar proxy is also used by Pradhan *et al.* (2014) and Nyasha and Odhiambo (2015). The last variable is the ratio of shares' value traded to total market capitalization (VALUE), which, according to

the International Monetary Fund (IMF), can measure the efficiency of the stock market. This variable is observed in Levine and Zervos (1996) and Beck and Levine (2004). Another form of value traded, either in full amount or in ratio to GDP, also used as a stock market variable by Rousseau and Xiao (2007), Enisan and Olufisayo (2009), Kolapo and Adaramola (2012), Pradhan *et al.* (2014), Nyasha and Odhiambo (2015), and Coşkun *et al.* (2017).

We try to create a single index of secondary market from the three variables by employing Principal Component Analysis (PCA). PCA makes "a linear transformation of the variables so that they are orthogonal to each other" (Pradhan *et al.*, 2014, p. 169). By creating a single index, we can direct our focus to only two variables: the primary market and the secondary market. Working with fewer variables is also an advantage if we have an arguably low number of observations. PCA technique is also employed by Ang and McKibbin (2007), Gries, Kraft, and Meierrieks (2009), Pradhan *et al.* (2014), Coşkun *et al.* (2017), and Sohag *et al.* (2019), among others. The index will represent secondary market development (SMD).

The economic growth is approached through variable Gross Domestic Product (GDP). While GDP per capita is one that commonly used in previous research, the lack of availability of the data on a quarterly basis prompt us to utilize GDP overall. It is important to be noted that we use GDP in the current price of Indonesian Rupiah (IDR). The reason why GDP (instead of GDP per capita) in current price (instead of constant price) in IDR (instead of USD) is chosen here is because the stock market variables employed are also denominated in IDR and impacted by population change as well as inflation. By keeping all variables unadjusted, hopefully the econometrics model can perform better analysis of the variation within the data. We use the natural logarithm form of GDP (L.GDP).

4.2 Methodology

4.2.1 Principal Component Analysis (PCA)

The first step in this analysis is to implement PCA on the three variables of the secondary market: L.CAP, VOLUME, and VALUE. PCA allows us to reduce the dimension from three variables into a single variable. Basically, PCA tries to preserve as much as variance it can hold from separate variables so that this single index contains most of information (Abdi and Williams, 2010) even after reducing the variables from three to one, in expense of as little as possible loss in accuracy. Another advantage of PCA is that we can tackle the multicollinearity issue among the variables.

The first step of PCA is to standardize the range of data. All the data transformed into the scale so that no variable dominates because it has a much bigger range compared to others. We can do this by subtract the original value with the average value and then divide with the standard deviation.

The second step is to form a covariance matrix of the three variables. The matrix takes 3×3 symmetric matrix that can be observed from this form:

$$\begin{pmatrix} Cov(L.CAP, L.CAP) & Cov(L.CAP, VOLUME) & Cov(L.CAP, VALUE) \\ Cov(VOLUME, L.CAP) & Cov(VOLUME, VOLUME) & Cov(VOLUME, VALUE) \\ Cov(VALUE, L.CAP) & Cov(VALUE, VOLUME) & Cov(VALUE, VALUE) \end{pmatrix}$$

where we can obtain the correlation from each possible combination of variables. In short, this matrix contains information on how variables correlated to each other.

The third step is to extract eigenvectors and eigenvalues from the covariance matrix. The eigenvectors and eigenvalues make eigen-decomposition that constructs the *principal component*. From three variables, we will obtain three principal components with different eigenvalues. The eigenvalue constitutes how much variance each principal component takes. Then, we can pick the principal component with large variance, usually indicated by eigenvalues bigger than 1 (Abdi and Williams, 2010), and leave one that only carries low variance. The principal component equation can be written as:

$$P = \sum_{i=1}^{3} a_{it} X_i$$

where P is the principal component, a is the variance contained by the principal component, and X is the original variables.

From the PCA calculation, we can obtain the single index of secondary market development that is SMD.

4.2.2 Unit Root Test

As with all the time series analysis conducted, we conduct tests to check for stationarity of the time series. Stationarity is one of the properties of time series, which refer to the long-term movement. A time series is stationary if the value, in the long-term, goes back to the average. It means that the mean and variance will eventually revert to some value (Enders, 2015; Shrestha and Bhatta, 2018). Conversely, a time series is non-stationary if the value does not return to the average value. Hence, there could be a *trend* there. If a time series is non-stationary, it is called to have a unit root, so the unit root test is another name of stationarity test.

The importance of determining stationarity of the data is because the different statistical properties they carry need to be approached with different econometrics techniques. We conducted two popular unit root tests, Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests, to check the stationarity of all variables in play L.GDP, L.FUND, and SMD. The ADF test is basically checks whether a time series can be explained with the past values of itself. It can be written as:

$$\Delta y_t = \mu + \delta y_{t-1} + \sum_{i=1}^{k} \beta_i \Delta y_{t-i} + u_t$$

where Δy_t is the first difference of y_t, and the null hypothesis is for $\delta = 0$ meaning that if we fail to reject the null hypothesis, the time series has the unit root and therefore can be said as non-stationary. The explanation behind this is that if past values cannot explain a direction of time series, then it is possible to not move back to the average value so it is non-stationary. While ADF test utilizes lagged of first difference to deal with serial correlation in error terms, PP test utilizes "nonparametric statistical methods" regarding the same issue (Gujarati and Porter, 2009, p. 758). The PP test can be written as:

$$\Delta y_t = \delta y_{t-1} + \beta_i D_{t-i} + u_t$$

with similar hypothesis testing with ADF test. Both tests are done with no lag, lag 1, and lags 4 and also on level and on first difference.

4.2.3 Vector Autoregressive (VAR) Model

The unit root test conducted on sub-section 4.2.2 presents us with the stationarity of each variable at hand. If the variables are all stationary, we can proceed to Vector Autoregressive (VAR) model. If non-stationarity is found, we can utilize Vector Error Correction Model (VECM) to identify the long-term relationships among variables. The unit root test results, which describe in section 5.2 later, indicate that the three variables are stationary. We then act on that to move to the VAR model.

VAR model is a model that allows us to estimate a variable based on its own past values and on other variables past values (Gujarati and Porter, 2009; Shrestha and Bhatta, 2018). In a model where we test three variables at the same time, we can call this trivariate VAR model written as:

$$L.GDP_t = \alpha_1 + \sum_{j=1}^{k} \beta_{1j}\, L.GDP_{t-j} + \sum_{j=1}^{k} \beta_{2j}\, L.FUND_{t-j} + \sum_{j=1}^{k} \beta_{3j}\, SMD_{t-j} + u_{1t}$$
$$L.FUND_t = \alpha_2 + \sum_{j=1}^{k} \beta_{4j}\, L.GDP_{t-j} + \sum_{j=1}^{k} \beta_{5j}\, L.FUND_{t-j} + \sum_{j=1}^{k} \beta_{6j}\, SMD_{t-j} + u_{2t}$$
$$SMD_t = \alpha_3 + \sum_{j=1}^{k} \beta_{7j}\, L.GDP_{t-j} + \sum_{j=1}^{k} \beta_{8j}\, L.FUND_{t-j} + \sum_{j=1}^{k} \beta_{9j}\, SMD_{t-j} + u_{3t}$$

where u_{1t}, u_{2t}, and u_{3t} are assumed to be white-noise and uncorrelated to each other. All variables are endogenous to the model.

That being said, the results from VAR model should have not interpreted directly as it could be misleading (Gujarati and Porter, 2009, p. 789). There is no particular *independent variable* in VAR model as all variables are endogenous to another. Interpreting coefficient directly is not recommended as we can only spot the general long-run relationship among variables. Hence, after the VAR model, we might have to proceed to post-estimation. Granger causality, impulse response function, and variance decomposition are the common methodologies employed for better interpretation, which we discuss in the next sub-sections.

4.2.4 Granger Causality

After running the VAR model shown in sub-section 4.2.5, we will have the long-run relationship among the variables and their significance to each other. But the VAR model does not indicate the direction in which causality runs from one variable to another. Here, we can perform a Granger causality test.

Granger causality is a test that can help us to determine whether there is a 'causality' running from one variable to another. In theoretical concept, Granger causality can find whether past values of variable *A* might help improve prediction of variable *B*. If it does, then variable *A* Granger causes *B*. In general, we avoid using the word '*cause*' and go with '*Granger cause*' because this test will only give us *predictive causality* instead of the definitive causality as in the common definition. Therefore, the interpretation of Granger causality should always be dealt with caution (Wooldridge, 2015, p. 590).

Granger causality test is done through *F-test* of VAR model in sub-section 4.2.5 with the null hypothesis is that the variable tested does not Granger cause other variables. If we reject the null hypothesis, it indicates a Granger causality between the two variables tested.

4.2.5 Impulse Response Function and Variance Decomposition

Granger causality can provide the direction of *predictive causality* of the variables, but then it still does not provide how much impact one variable has on another variable or how much

the change in one variable spread to other variables. Impulse response function and variance decomposition are two useful tools that can help us to analyse the VAR results further.

The error term u_{it} from the VAR equations in sub-section 4.2.3 has other names in innovations, shocks, or impulses. These other names are attributes of the time series model as the changes in error might bring information for the future time series value. Impulse Response Function (IRF) tries to see if a change in the impulse can impact other variables in the model. From the VAR model, we can see that a change in one of the u_{it} can have impact on the left-hand side of the equation. But since the left-hand side variable is used on other model, it could also change the dynamics on that variable. What IRF tries to determine here is also sometimes called "impact multipliers" (Enders, 2015, p. 295).

On the other hand, variance decomposition is a method that can help us to see the contribution of all variables in one variable movement. We *decompose*, for example, the contribution of the lag of L.GDP, L.FUND, and SMD to the L.GDP. A similar process is also done to L.FUND and SMD variables. Just like IRF, variance decomposition can be explained better with graphs which will be presented in the next chapter and through table of values presented in Appendix 4. The variance decomposition is estimated based on Cholesky ordering.

Both IRF and variance decomposition will be presented for the forecast of 20 periods of observation, and since we are dealing with quarterly data, it means that we can see the effects until 5 years forward. A timestamp of 5 years may translate into a mid to long-term relationship.

Chapter 5
Results and Discussion

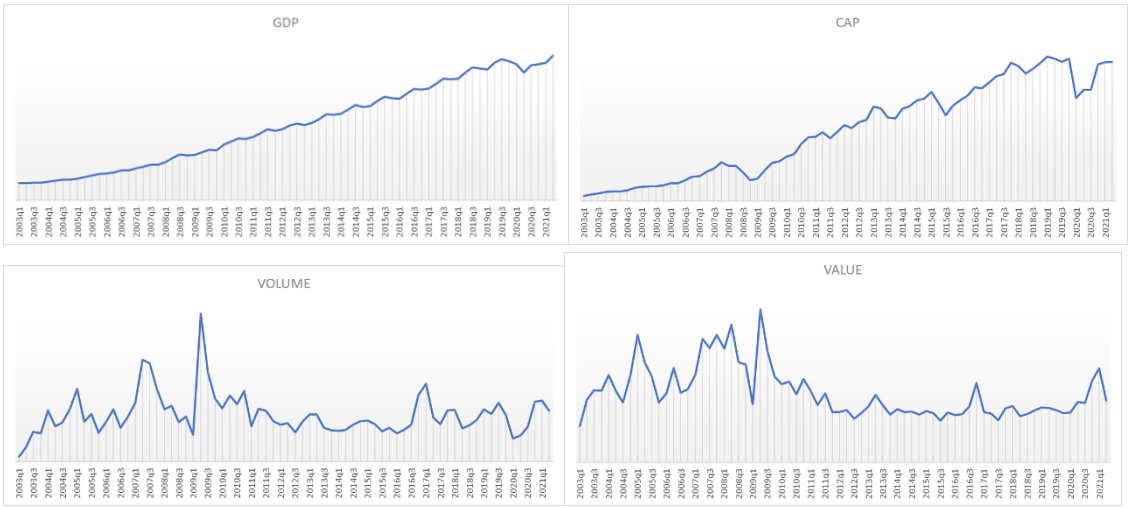
This chapter provides results for the econometrics analysis, which structures are laid out in previous chapters.

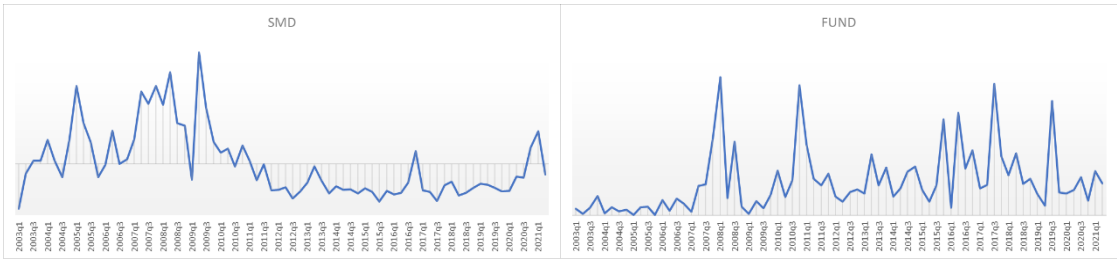
5.1 Stock Market and Growth Variables Statistics

As we are trying to determine the growth and stock market relationship, we utilize several variables. The current price of GDP is used as the proxy for growth while there are four stock market variables used: FUND represents primary market while CAP, VOLUME, VALUE, which later all three variables reduced to one variable SMD, represent the secondary market.

Figure 4 shows the trend of the variables in our hands. Within the space of almost 19 years, Indonesia GDP rose 741% in current price from 496.25 trillion IDR in early 2003 to 4,175.84 trillion IDR. The market capitalization of the stock market grew more impressively. In the same period, market capitalization had grown 2,725% from 251.58 trillion IDR to 7,107.01 trillion IDR, effectively outgrowing the GDP itself. Interestingly, the other two secondary market variables do not show similar trajectories. Both VOLUME and VALUE moved in a volatile manner and within the same period, only grown 984% and 70% respectively from the base value that are still considerably small. Thus, we can see a kind of stagnation in the stock market in which the value might keep growing but other parts are not catching up. Nevertheless, it supports our decision to create a single index of secondary market instead of relying solely on market capitalization as representative of stock market development, like done by Rajan and Zingales (1998), Dritsaki and Dritsaki-Bargiota (2005), Colombage (2009), Hou and Cheng (2010), Pradhan *et al.* (2013), Marques, Fuinhas, and Marques (2013), and Nordin and Nordin (2016), as it can create bias.

Figure 4. Trends of Variables 2003Q1-2021Q2.





Source: Indonesia Stock Exchange.

Table 4 presents the descriptive statistics of four variables. There are 74 observations across quarter 1 of 2003 until quarter 2 of 2021. Our sole variable representing the primary market, FUND, is observed to a have huge range of data points from 58.71 billion IDR to 48.27 trillion IDR, confirming the impression from Figure 4 that there is little trend that can be seen from such volatility. Another interesting point is from VOLUME and VALUE variables in which their average stand at 15.04% and 10.22% respectively. It means that in a period of 3 months, on average, only 15.04% of total outstanding shares are traded. From that vast market capitalization that can overtake national GDP, only 10.22% of the market capitalization is traded.

Table 4. Descriptive Statistics of Variables FUND, VOLUME, VALUE, and SMD.

Statistics	FUND	VOLUME	VALUE	SMD
Number of Observation	74	74	74	74
Min	58,706,951,250	1.5005%	5.3145%	-1.3178
Max	48,273,653,061,180	47.2606%	22.3693%	3.2650
Mean	11,671,763,079,444	15.0428%	10.2186%	0.0000
Median	8,825,783,361,841	13.2277%	8.7635%	-0.3910
Standard Deviation	11,038,141,099,462	6.6417%	3.6963%	0.9932

The figure from Appendix 3 shows the comparison of market capitalization growth and the ratio of value traded to market capitalization (VALUE) in 2015-2020 period from IDX and other five neighbouring stock exchanges: Bursa Malaysia, Singapore Exchange, Hochiminh Stock Exchange, The Stock Exchange of Thailand, and Philippine Stock Exchange. IDX, as already discussed, was indeed could record impressive market capitalization growth by consistently beating other neighbour stock exchanges, bar maybe Hochiminh Stock Exchange. But the VALUE number, on the other hand, was consistently beaten by other stock exchanges, bar the Philippine Stock Exchange. At this point, we can assume one kind of stagnation occurred within how the Indonesia stock market develops.

The simple correlation analysis shown in Table 5 indicates the relationship among the variables observed, including the SMD and three variables that constructed it. The dark grey shows a correlation more than 0.50 and light grey shows a correlation above 0.30, regardless of the signs, either positive or negative. We can suspect that there are some kinds of relationship among the variables with market capitalization and GDP are almost go arm in arm. This can be an indication that market capitalization reacts according to the real economy, with the general belief that the stock market moves first even before the economy. We can also check that the index SMD has an arguably strong relationship with the three variables it is made of.

Table 5. Correlation Coefficients among Variables.

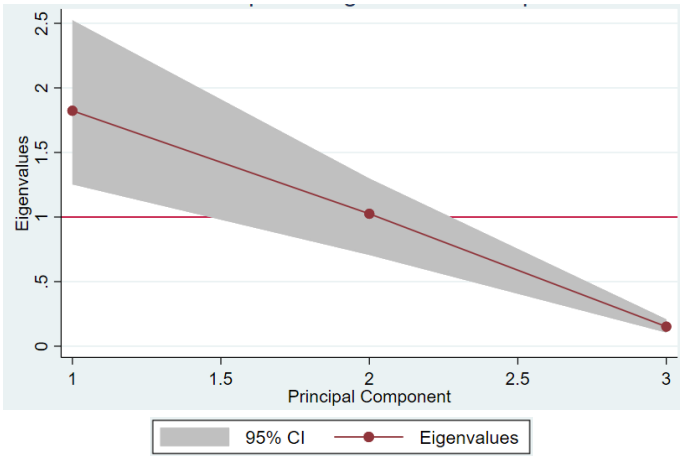
Variable	L.GDP	L.FUND	L.CAP	VOLUME	VALUE	SMD
L.GDP	1					
L.FUND	0.5913	1				
L.CAP	0.9805	0.6317	1			
VOLUME	-0.0402	0.0591	0.0287	1		
VALUE	-0.4843	-0.1964	-0.4308	0.7158	1	
SMD	-0.4843	-0.1965	-0.4308	0.7158	1	1

Moderate correlation>0.3, marked with light grey colour; Strong correlation>0.5, marked with dark grey colour.

5.2 Stock Market-Economic Growth Nexus

From the previous chapter, we understand that the variables needed for analysis are incomplete. Through PCA implementation, we can get out hands on the single index for representation of the secondary market of the stock market, SMD. As Figure 5 shows, the first principal component has an eigenvalue of 1.82302 and is able to capture more than 60% of information from three variables. Therefore, the variable of SMD is ready to utilized in the model along with L.GDP and L.FUND.

Figure 5. Scree Plot of Eigenvalues after PCA.



The next step is to test the possible existence of structural break within the time series. Structural break, sometimes called structural change, is when the nature of a time series changes significantly, be it rise or fall, that the relationship with other variables might be inconsistent anymore. Hence, it *breaks* the direction of the time series may it "in intercept, trend or both" (Shrestha and Bhatta, 2018, p. 75).

A structural break can occur exogenous or endogenously (Enders, 2015). An exogenous break is a break that is identified and known before any test is conducted. Usually, this kind of break is visible on the graph and result of events such as policy change, war, or other shocks. Covid-19 pandemic is one good example of it. On the other hand, the unknown structural break is usually called endogenous break.

After conducting supremum Wald, average Wald, and average Likelihood Ratio (LR) tests on L.GDP, we could find that we should reject the null hypothesis of no structural break in the model. The supremum Wald test points out that the estimated break point is

on quarter 4 of 2008. There was indeed a drop in economic growth at that time when the current price GDP fell by 2.78%. The last drop of GDP before that was occur in quarter 4 of 2003 or five years before. The Global Financial Crisis of 2008 was the prime suspect for the reason behind the drop.

Although the financial crisis of 2008 seems like obvious cause of structural break, through visual observation we can only see a slight drop – instead of a big break – that occur in 2008Q4 from Figure 4, which shows the movement of Indonesia's GDP. After that, Indonesia's GDP went back on the growth track by showing a *V-shaped* recovery. Sangsubhan and Basri (2012) state that the Global Financial Crisis of 2008 was hit ASEAN countries but not as hard as it hit developed countries. Hence, it explains the limited damage to Indonesia's economy. Accordingly, we can take the risk of ignoring small breaks that might occur and not incorporating them into the model (Pesaran and Timmermann, 2004; Boot and Pick, 2020), proceeding with expanding window of full period time series.

We start the analysis of the econometrics model by deciding on the lag used in the model. Although Likelihood Ratio (LR) test, Final Prediction Error (FPE) test, and Akaike's Information Criteria (AIC) test suggest higher degree of lags, we will use lag 1 as suggested by Hannan and Quinn Information Criterion (HQIC) and Schwarz's Bayesian Information Criterion (SBIC) tests (when tested for maximum lag of 4). It is a sensible choice since we have limited observation and there is a need to preserving the degree of freedom. Although lag 1 is employed in our main model, the lag 4 model will also be presented in some of the processes as an additional robustness check.

After that, we can run the unit root test on L.GDP, L.FUND, and SMD both on levels and first differences. We conduct ADF and PP tests to check for the stationarity of the variables. Although we will focus on lag 1, we put the results of running both tests without lag and lag 4. Table 6 shows from the test statistic that all variables are stationary both on levels and first differences. This result allows us to utilize the VAR model.

Table 6. Unit Root Tests on log of GDP, log of FUND, and SMD.

Variable	Level/Δ	ADF	ADF (1)	ADF (4)	PP	PP (1)	PP (4)
log GDP	Level	-2.827*	-3.035**	-3.417**	-3.592***	-2.864*	-3.395**
	Δ	-7.769***	-6.745***	-2.549	-7.740 ***	-7.775***	-7.763***
log FUND	Level	-5.609***	-3.585***	-2.290	-5.738***	-5.452***	-5.863***
	Δ	-15.340***	-11.456***	-4.123***	-18.705***	-16.498***	-19.298***
SMD Index	Level	-3.769***	-2.699*	-1.529	-3.589***	-3.619***	-3.717***
	Δ	-11.635***	-8.076***	-4.993***	-13.361***	-11.776***	-13.698***

Δ=First Difference.

(1)=lag 1; (4)=lag 4.

*Test statistic>10% critical value; **test statistic>5% critical value; ***test statistic>1% critical value.

After we accept that all variables are stationary, we can proceed to the VAR model, which is already specified in Chapter 4. The VAR model has capacity to provide us with long-run relationship that might exist among variables during observation period. Table 7 presents the result from the VAR model. Again, the model is executed on lag 1 and lag 4.

Table 7. Results from VAR Model on Lag 1 and Lag 4.

VAR Model with Lag 1 (N=73)			
	L.GDP	**L.FUND**	**SMD**
L.GDP(1)	0.9933***	1.1999***	-0.4004**
	(0.0072)	(0.2430)	(0.1667)
L.FUND(1)	-0.0007	0.0456	-0.0123
	(0.0034)	(0.1158)	(0.0795)
SMD(1)	0.0111***	0.2232*	0.5460***
	(0.0039)	(0.1331)	(0.0914)
VAR Model with Lag 4 (N=70)			
	L.GDP	**L.FUND**	**SMD**
L.GDP(1)	0.7809***	12.2312***	-4.2613
	(0.1079)	(4.1225)	(2.9542)
L.GDP(2)	-0.3249**	-9.9593*	-2.2872
	(0.1343)	(5.1321)	(3.6778)
L.GDP(3)	0.2270*	0.3852	4.7658
	(0.1365)	(5.2150)	(3.7371)
L.GDP(4)	0.2855***	-1.5231	1.2654
	(0.1100)	(4.2023)	(3.0115)
L.FUND(1)	0.0032	0.0252	0.0642
	(0.0030)	(0.1147)	(0.0822)
L.FUND(2)	0.0033	0.1786	-0.0720
	(0.0028)	(0.1088)	(0.0780)
L.FUND(3)	0.0018	0.2327**	0.0750
	(0.0028)	(0.1056)	(0.0757)
L.FUND(4)	-0.0010	-0.1675	-0.0288
	(0.0028)	(0.1084)	(0.0777)
SMD(1)	0.0067	0.2222	0.4152***
	(0.0042)	(0.1598)	(0.1145)
SMD(2)	-0.0043	0.1602	0.1107
	(0.0046)	(0.1773)	(0.1271)
SMD(3)	0.0147***	-0.1124	-0.0867
	(0.0047)	(0.1783)	(0.1278)
SMD(4)	-0.0015	-0.2046	0.3341***
	(0.0045)	(0.1715)	(0.1229)

*p<0.1; **p<0.05; ***p<0.01.

Standard error in parentheses.

There are several points that are interesting to be raised from the VAR model results. First, there is an indication that L.GDP has a long-term relationship with its own and SMD past values, but not with L.FUND. It can be translated as no relationship between GDP and funds raised in the stock market, which is consistent on both lag 1 and lag 4. Second, SMD is indicated to have a long-term relationship with the past values of SMD itself and L.GDP. Following the previous point, it means that GDP and secondary market development are related to each other, although it does not be replicated fully on lag 4 model, which shows no significant value between SMD and past values of L.GDP. The last point and arguably most interesting is that the past value of L.FUND does not seem to have a relationship with both L.GDP and SMD, even if L.FUND is indicated to develop a long-term relationship with past values of the other two. We can suspect, then, that funds raised in the stock market will not influence the economy and the secondary stock market in the long run. The eigenvalues stability test also shows that the VAR model is stable and all variables are stationary on lag 1 and lag 4.

Nevertheless, as mentioned in the previous chapter, VAR model should not be interpreted directly. Our conclusions from the model are not done yet. From the VAR model, we can utilize post-estimation analyses to obtain more coherence and clear explanation.

The first post-estimation methodology we discuss is Granger causality. Granger causality provides us with an opportunity to investigate the direction of *predictive causality* from one variable to another. It helps us to identify further the type of relationship as additional to VAR model results. Table 8 presents the result from the Granger causality method, which is also presented in lag 1 and lag 4. Chi-squared results appear in the table.

Table 8. Results from Granger Causality on Lag 1 and Lag 4.

Granger causality with Lag 1			
	from L.GDP	**from L.FUND**	**from SMD**
to L.GDP	-	0.043	7.868***
to L.FUND	24.378***	-	2.813*
to SMD	5.763**	0.024	-
Granger causality with Lag 4			
	from L.GDP	**from L.FUND**	**from SMD**
to L.GDP	-	3.316	19.238***
to L.FUND	17.993***	-	5.619
to SMD	9.174*	2.659	-

*p<0.1; **p<0.05; ***p<0.01.

The Granger causality results are almost consistent with lag 1 and lag 4 estimations. Thus, there is evidence for two-way causality between real economy and secondary market development when L.GDP Granger causes SMD and vice versa. Both also indicated to Granger causes L.FUND. But L.FUND does not Granger cause any other variable, which supports previous suspicion from VAR model result. We can take it with a pinch of salt, of course, but so far, the number suggests that funds raised in the stock market does not matter for economic growth as well as the secondary market of the stock market itself. Further discussion on the results will be talked about in section 5.4 later.

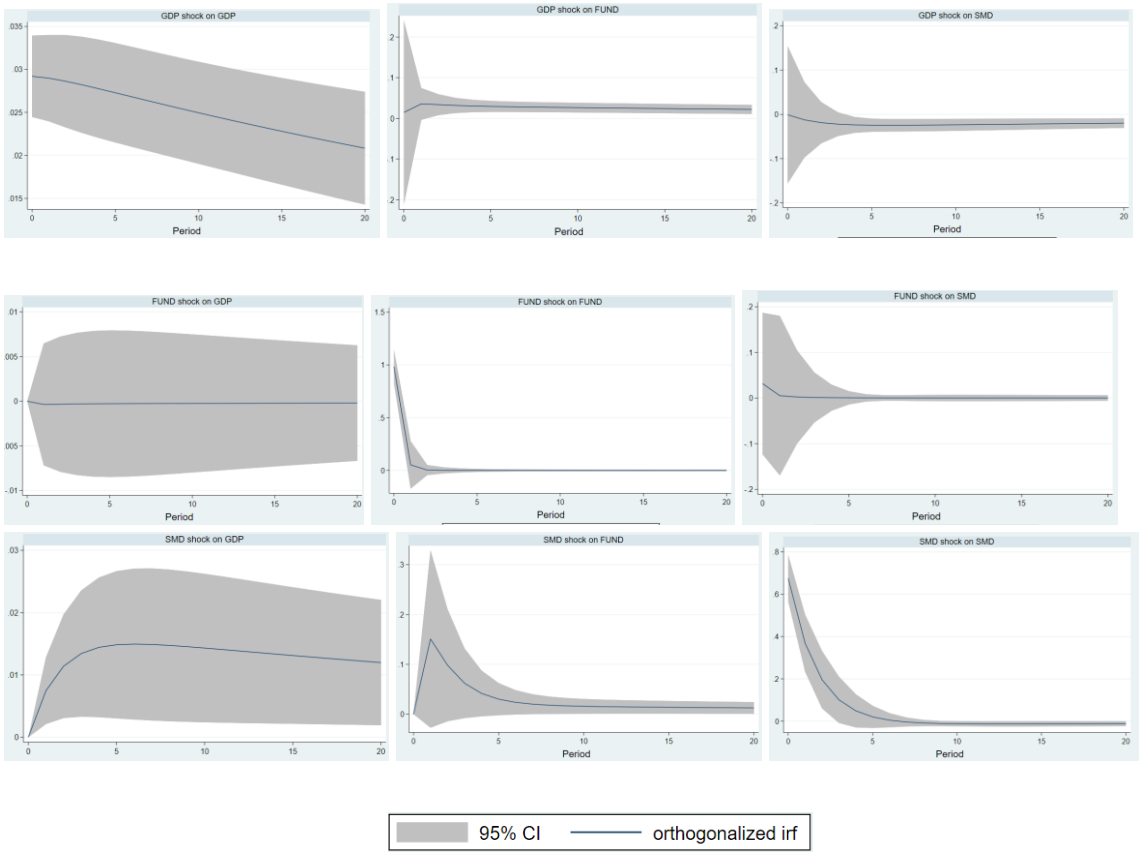
The next analysis is on impulse response and variance decomposition. Figure 6 presents the orthogonalized IRF graphs for nine possible relationships of the three variables in discussion. IRF will picture the impact of *one standard deviation shock* from one variable could give to another variable. The horizontal axis of the IRF graph shows the period and the vertical axis shows the unit value of the impacted variable. First, we can see that shock occurs to GDP has a positive impact on future values of GDP itself, but the effect decreases consistently further into later period. It is in one way supports the *theory of economic business cycle* explaining the boom and bust of the economy. Economic growth will hit the peak at one time and go into recession before going up again. GDP shock also has a small positive impact on funds raised in the stock market, meaning that the growing economy may have push companies to raise funds in stock market. But the impact is only appearing early and fading out quickly after few quarters. Meanwhile, shock in GDP has a negative effect on SMD. This may be related, at least theoretically, to the boom and bust of the economic cycle. As SMD is indicated to have predictive causality – also an accepted common knowledge in the financial market – the market has ability to move first before the economy. If the economy is forecasted to suffer, market would fall and if the economy is forecasted to rise, market would go up.

The second finding here is on funds raised in the stock market. FUND has almost no effect on both GDP and SMD. Small positive impact observed from FUND shock to

SMD and it makes sense since raise in FUND can raise market capitalization, one of the variables in the SMD index. Meanwhile, shock on FUND will have a high impact on FUND itself but significantly decrease in the early period, showing that funds raised is not following consistent trend as it is hard to obtain big fund-raising time after time.

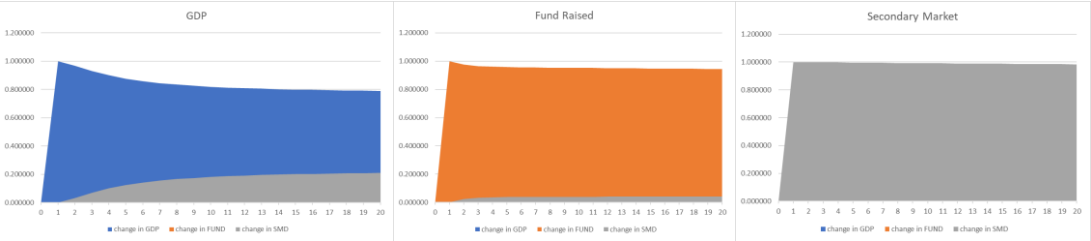
The last finding from graphs on SMD shock confirm several points that we just encountered. Shock on SMD can have positive impact on GDP as SMD can predict economy, with the impact waning later on. On the contrary, boom and bust – often we call it *volatility* – in the stock market is well known and it moves even faster than the real economy cycle. Hence, positive shock on SMD can indicate that later on, the market will go down. The value of orthogonalized IRF is available in Appendix 4.

Figure 6. Orthogonalized IRF Graphs.



The variance decomposition can be observed in Figure 7. From variance decomposition graphs, we can spot how much the contribution of the three variables in each of one variable's movements and just like in IRF analysis, we optimized the period of observation until 20 periods. One similarity among the three variables is that most of their movement is contributed by their own values. The relationship between GDP and SMD is again highlighted by GDP movement that can be *predicted*, partially, by SMD development. Regardless, variance decomposition gives us a glance at the possibility that the stock market plays a little part in real economic growth. The variance decomposition detail table is available in Appendix 4 and from the value in the table, we can confirm the graphs' observation. Indeed, each variable's movement is mostly explained by the movement of its own past value.

Figure 7. Variance Decomposition Graphs.



5.3 Robustness Check: Industrial Proxy and Gini Ratio

The previous section has already provided us with indications of growth and the stock market relationship. GDP is utilized as the main proxy for real economic growth, just like commonly used in previous research (with several differences). Yet, there is one more proxy that can be used as a proxy for economic activities: industrial production. The variable itself is not a new variable to approach real economy activity. Nishat and Saghir (1991), Muradoglu, Taskin, and Bigan (2000), and Rashid (2008) already employed it for similar research on finance-growth nexus. There is also a possibility for us to check on how stock market in relation to inequality. The financial sector, theoretically, allows people to tap into a capital in an effort for their life's betterment. This is one of the reasons why microfinance, which targets poor people and small businesses, is tried and tested in developing countries. Alas, just like the finance-growth nexus, the finance-inequality relationship is also mixed. If anything, financial products such as stock are also the culprit for widening the wealth inequality gap.

Sub-section 5.3.1 and 5.3.2 provide robustness checks on our previous model by running time series analysis on two variables: industrial production and income inequality.

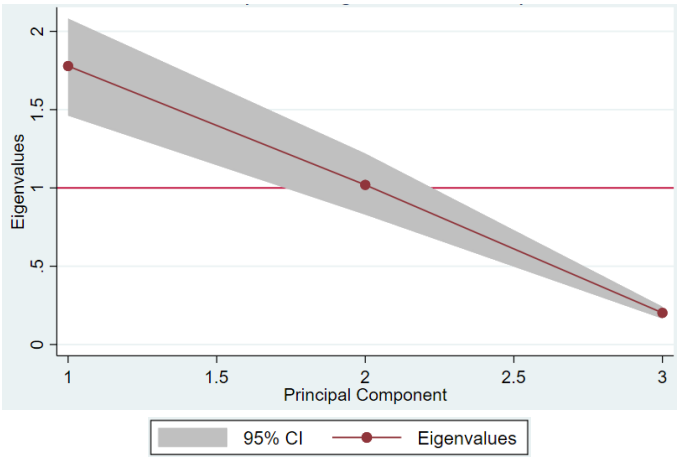
5.3.1 Stock Market-Economic Growth Nexus: Industrial Production Proxy

Industrial production is the measurement of industrial activity's output. Industrial activities may include, but are not limited to, mining and manufacturing. It is easy to see why industrial production is seen as one of the tools to gauge economic activity. Alas, industrial production is only counted for some parts of the whole GDP. But industrial production is a good measurement for demands on real goods. Higher real economic growth will transpire to consumer demands which later reflected on industrial products. Vice versa, if the economy is in a downturn trend, demands and the industrial production will get weaker. Additionally, industrial production data is available on monthly basis, allowing us to run econometric models with more observations within same period.

This sub-section provides a robustness check on our results before. Utilizing monthly data of industrial production (IPROD) from the Organisation for Economic Co-operation and Development (OECD) and exact same data for FUND and SMD – albeit in monthly terms instead of quarterly basis – we acquired 223 observations from January 2003 to July of 2021. The same VAR processes are also followed here.

We started with the PCA technique to acquire an SMD index just like before. Figure 8 shows the principal component, which is almost identical with the one we have in previous sub-section. The SMD index, then, has a degree of consistency on both a quarterly and monthly basis.

Figure 8. Scree Plot of Eigenvalues after PCA.



Simple correlation analysis is also provided here. Table 9 reveals the difference of IPROD with GDP as the variable. The key takeaway here is that while GDP is almost correlated with any other variables in play here, IPROD only correlated with market capitalization. Our early suspicion is that IPROD does not have a strong relationship with the stock market variables.

Table 9. Correlation Coefficients among Variables, IPROD Proxy.

Variable	IPROD	L.FUND	L.CAP	VOLUME	VALUE	SMD
IPROD	1					
L.FUND	0.2694	1				
L.CAP	0.4365	0.4228	1			
VOLUME	0.0691	0.0229	0.0231	1		
VALUE	-0.0249	-0.0934	-0.3737	0.6936	1	
SMD	0.0691	0.0229	0.0231	1	0.6937	1

Moderate correlation>0.3, marked with light grey colour; Strong correlation>0.5, marked with dark grey colour.

If in the main VAR model we used lag 1 and 4, here we will employ lag 1 and 12. Monthly frequency and more observations allow us to run the model with more lags. The 12 lags is also recommended by the LR test, while 1 lag is recommended by HQIC and SBIC tests (all tests conducted with maximum lags of 12). Table 10 shows the test statistic results, and just like in main model, the variables here are also all stationary, allowing us to proceed with the VAR model.

Table 10. Unit Root Tests on IPROD, log of FUND, and SMD.

Variable	**Level/Δ**	**ADF**	**ADF (1)**	**ADF (12)**	**PP**	**PP (1)**	**PP (12)**
Industrial Production	Level	-2.725*	-3.275**	-2.736*	-2.786*	-2.959**	-2.845*
	Δ	-12.553***	-12.293***	-4.156***	-12.372***	-12.597***	-12.399***
log FUND	Level	-12.265***	-8.884***	-3.045**	-12.486***	-12.250***	-6.617***
	Δ	-24.898***	-16.703***	-13.943***	-36.902***	-25.613***	-51.442***

Variable	Level/Δ	ADF	ADF (1)	ADF (12)	PP	PP (1)	PP (12)
SMD Index	Level	-6.073***	-5.720***	-3.227**	-6.003***	-6.068***	-5.909***
	Δ	-16.960***	-13.425***	-6.047***	-17.681***	-16.990***	-21.162***

Δ=First Difference.

(1)=lag 1; (12)=lag 12.

*Test statistic>10% critical value; **test statistic>5% critical value; ***test statistic>1% critical value.

Replacing L.GDP with IPROD from equations in section 4.2.3 and replicating the same VAR model, we have results presented in Table 11 in the number of coefficients. The difference here is that we execute the model with more observations, from quarterly to monthly data, and employ lag 1 and 12 instead of 4. Once more, no variable indicated to have a long-term relationship with the lag value of FUND, except for the FUND itself. It indicates that on a monthly basis, funds raised in the stock market may be more related to its past values than on a quarterly basis. FUND is also indicated to have a long-term relationship with IPROD, just like GDP. When we look into the results from model with lag 12, there are some long-term relationships spotted but clearer directions can be seen from Granger causality results.

Table 11. Results from VAR Model on Lag 1 and Lag 12.

VAR Model with Lag 1 (N=222)			
	IPROD	**L.FUND**	**SMD**
IPROD(1)	0.9275***	0.1337***	-0.0080
	(0.0248)	(0.0341)	(0.0088)
L.FUND(1)	0.0319	0.1148*	0.0225
	(0.0480)	(0.0661)	(0.0171)
SMD(1)	0.1964	0.1979	0.722***
	(0.1286)	(0.1770)	(0.0457)
VAR Model with Lag 12 (N=211)			
	IPROD	**L.FUND**	**SMD**
IPROD(1)	1.1760***	0.1259	-0.0055
	(0.0690)	(0.0808)	(0.0244)
IPROD(2)	-0.4757***	0.0124	0.0010
	(0.1061)	(0.1242)	(0.0375)
IPROD(3)	0.2307**	-0.0606	-0.0049
	(0.1100)	(0.1288)	(0.0389)
IPROD(4)	0.0185	-0.0708	-0.0156
	(0.1107)	(0.1297)	(0.0391)
IPROD(5)	0.0315	0.1306	0.0094
	(0.1107)	(0.1296)	(0.0391)
IPROD(6)	-0.0258	-0.0827	0.0269
	(0.1106)	(0.1296)	(0.0391)
IPROD(7)	-0.0610	0.1133	-0.0451
	(0.1101)	(0.1290)	(0.0389)
IPROD(8)	0.1089	-0.0921	0.0215
	(0.1105)	(0.1294)	(0.0390)
IPROD(9)	-0.1152	0.0325	-0.0269
	(0.1110)	(0.1301)	(0.0392)
IPROD(10)	0.1371	0.0283	0.0581
	(0.1098)	(0.1287)	(0.0388)
IPROD(11)	-0.1765*	-0.1209	-0.0449
	(0.1059)	(0.1240)	(0.0374)

IPROD(12)	0.0728	0.0171	0.0312
	(0.0696)	(0.0815)	(0.0246)
L.FUND(1)	0.0857	-0.0037	0.0260
	(0.0570)	(0.0668)	(0.0201)
L.FUND(2)	0.0209	-0.0486	-0.0497**
	(0.0567)	(0.0665)	(0.0200)
L.FUND(3)	0.0239	-0.0729*	0.0258
	(0.0568)	(0.0666)	(0.0201)
L.FUND(4)	0.0058	0.1148	0.0003
	(0.0562)	(0.0659)	(0.0199)
L.FUND(5)	0.0389	-0.0007	-0.0221
	(0.0560)	(0.0656)	(0.0198)
L.FUND(6)	-0.0458	0.1666***	0.0003
	(0.0554)	(0.0649)	(0.0196)
L.FUND(7)	0.0016	0.1022	-0.0233
	(0.0538)	(0.0630)	(0.0190)
L.FUND(8)	-0.0713	-0.0083	0.0173
	(0.0540)	(0.0633)	(0.0191)
L.FUND(9)	-0.0623	-0.0169	0.0186
	(0.0529)	(0.0619)	(0.0187)
L.FUND(10)	0.0420	0.0963	-0.0162
	(0.0533)	(0.0624)	(0.0188)
L.FUND(11)	-0.0229	0.1233**	-0.0086
	(0.0530)	(0.0620)	(0.0187)
L.FUND(12)	0.0097	0.1430**	-0.0221
	(0.0528)	(0.0618)	(0.0186)
SMD(1)	0.2409	-0.1892	0.7492***
	(0.1938)	(0.2270)	(0.0685)
SMD(2)	-0.1424	0.5329*	-0.0896
	(0.2413)	(0.2826)	(0.0852)
SMD(3)	0.2131	-0.4111	0.1308
	(0.2433)	(0.2850)	(0.0860)
SMD(4)	-0.2527	0.2406	-0.1454*
	(0.2430)	(0.2846)	(0.0858)
SMD(5)	0.2487	-0.2482	0.0445
	(0.2441)	(0.2859)	(0.0862)
SMD(6)	-0.3375	0.4243	0.0544
	(0.2426)	(0.2841)	(0.0857)
SMD(7)	0.1775	-0.0400	-0.0418
	(0.2450)	(0.2870)	(0.0865)
SMD(8)	-0.2187	0.1497	0.0171
	(0.2450)	(0.2869)	(0.0865)
SMD(9)	0.0023	0.1138	-0.0199
	(0.2448)	(0.2867)	(0.0865)
SMD(10)	0.3128	-0.0542	-0.0694
	(0.2443)	(0.2862)	(0.0863)
SMD(11)	-0.3333	0.3969	0.0546
	(0.2408)	(0.2821)	(0.0851)
SMD(12)	0.1110	-0.5072**	0.0672
	(0.1929)	(0.2259)	(0.0681)

*p<0.1; **p<0.05; ***p<0.01.

Standard error in parentheses.

Table 12 provides the Chi-squared numbers from the Granger causality test, and we can notice one statistically significant relationship, on the lag 1 model, running from IPROD to FUND. No other relationship was found from the rest of lag 1 Granger causality and none from the lag 12 model. Thus, there is a fraction of evidence that similar to the main model. It is the real economic activity that push companies to raise funds in stock market.

Table 12. Results from Granger Causality on Lag 1 and Lag 12.

Granger causality with Lag 1			
	from IPROD	**from L.FUND**	**from SMD**
to IPROD	-	0.440	2.331
to L.FUND	15.373***	-	1.251
to SMD	0.832	1.743	-
Granger causality with Lag 12			
	from L.GDP	**from L.FUND**	**from SMD**
to IPROD	-	6.571	8.553
to L.FUND	15.621	-	17.319
to SMD	8.521	16.444	-

*p<0.1; **p<0.05; ***p<0.01.

5.3.2 Stock Market-Inequality Nexus

Section 5.2 and sub-section 5.3.1 have provided us with indications of the relationship between the stock market, both primary and secondary market, and real economic growth. In this sub-section, we will explore the relationship between the stock market and inequality.

Das and Mohapatra (2003) find evidence from 11 cross-country examination that stock market liberalization hits income shares of the lower, middle, and upper classes differently. They find that stock market liberalization might increase income shares of the upper-level income earner but decrease income shares of the middle-class. Surprisingly, the income shares of the lower-level earners are not significantly changed. It means the stock market may worsen income inequality by facilitating high earners to speed up ahead, at the expenses of the middle-income earners. This statement is also supported with a similar conclusion from Favilukis (2013).

From Indonesia's case, there are evidence that banking sector development may improve the inequality problem by providing access to capital, especially to lower-income people and small businesses (Pamungkas *et al.*, 2015; Ridzuan *et al.*, 2021). However, another research by Rachmawati, Wulandari, and Narmaditya (2018) find that stock market, proxied by market capitalization, worsening inequality at least in short-run.

We can utilize the same stock market variables that we employed earlier to test the relationship between the stock market and inequality in Indonesia. We can replace L.GDP with Gini ratio (GINI) and replicate the processes. Gini ratio data could be obtained from World Inequality Database (WID) in the form of income inequality. The data is available annually and together with stock market data in hand, we can conduct a time series analysis for the period of 1989-2019. Admittedly, it will only yield us 31 observations which are not as high as we would like to, but it is enough to run the econometrics model. Alas, the interpretation should be done with caution and cannot be taken as a definite conclusion.

We follow similar processes done before in section 5.2 and sub-section 5.3.1, although this time in annual form, and start with creating single index SMD using PCA. After that, we can see in Appendix 5 that GINI has a moderate correlation with FUND but none with other variables, either SMD or the variables that make it. According to FPE, AIC, HQIC, and SBIC tests, the lag used in this model is 1. Again, it is also a sensible choice as we deal with a low number of observations. Now the setup is ready for further tests.

The first step is for us to do a unit root test. We conduct the ADF and PP tests for three variables without lag and on lag 1. The test statistic results shown in Table 13 indicate that either the variables are non-stationary, or they are stationary but only statistically significant at 10% level. We can assume that all variables have unit root or they are non-stationary.

Table 13. Unit Root Tests on GINI, log of FUND, and SMD.

Variable	Level/Δ	ADF	ADF (1)	PP	PP (1)
GINI	Level	-1.764	-2.243	-1.925	-1.959
	Δ	-4.623***	-4.448***	-4.572***	-4.634***
log FUND	Level	-2.495	-1.59	-2.416	-2.377
	Δ	-7.739***	-6.290***	-8.554***	-7.894***
SMD Index	Level	-2.801*	-1.844	-2.833*	-2.704*
	Δ	-7.802***	-4.229***	-7.890***	-7.798***

Δ=First Difference.

(1)=lag 1

*Test statistic>10% critical value; **test statistic>5% critical value; ***test statistic>1% critical value.

Non-stationary variables do not allow us to proceed with the VAR model. Therefore, we run a Johansen cointegration test to determine the existence of cointegration among the variables. Cointegration means that the variables move together forming an equilibrium as they are going in non-stationary way. The Johansen test reveals that there is at least one cointegration among three variables in which we can test through Vector Error-Correction Model (VECM).

VECM is a model that can be utilized if the first difference of all variables in the model is stationary, which can be observed in Table 13, and if at least there is one cointegration relationship which also exists based on the Johansen test. In basic term, our VECM model is adapted from the VAR model from section 4.2.3 but in addition, we use the first difference of the variables, and we add Error-Correction Term (ECT), which capture the long-run relationship.

Table 14. Results from VEC Model on Lag 1.

VECM Model with Lag 1 (N=30)		
	Coefficient	**P>|z|**
GINI	1	-
L.FUND	-0.082780 (0.0125)	0.000***
SMD	0.036254 (0.0121)	0.003***
trend	0.005509 (0.0017)	0.001***
constant	1.768903	-

*p<0.1; **p<0.05; ***p<0.01.

Standard error in parentheses.

After a likelihood-ratio test to compare models, it shows that VECM that includes a restricted trend is better. Hence, we adopted it. Table 14 shows the results from VECM, with the coefficients and P-values. It shows that FUND has a positive long-run relationship with GINI, with the impact is in the region of 8.28%. On the other hand, SMD has a negative long-run relationship with GINI with an arguably small impact of 3.63%. More importantly, the rising GINI means that inequality is rising and vice versa. It means that the more companies raise funds through the stock market, based on this model, the worse ine-

quality becomes. The more SMD develops, then, the better off the income inequality condition, albeit in small significance. The eigenvalue stability check shows that the VEC model is stable and the Lagrange-multiplier test shows no autocorrelation detected.

5.4 Discussion

Previous sections have shown us the results from time series analyses to determine the relationship of economic growth – and inequality – to the stock market development, both primary and secondary markets. This section will discuss our findings.

What distinguishes this research is how the stock market development approached with two different proxies: the primary market and secondary market. The research using this approach is scarce since most of them focus on the secondary market. The econometric models are built around how we can see the impact those two variables bring for economic growth and, to some extent, income inequality.

From the VAR model, we can identify a long-term relationship between the primary market and the past values of GDP. Granger causality supports this notion and we found that the (Granger) causality run from real economy to the primary market, established the demand-following hypothesis. The robustness check using industrial production also found a similar result. Orthogonal IRF analysis also found that the positive shock from GDP has a positive impact on the primary market, albeit it is just short-lived. The demand-following hypothesis itself has been supported by Odhiambo (2004; 2009a; 2009b), Dritsaki and Dritsaki-Bargiota (2005), Eng and Habibullah (2011), Pradhan *et al.* (2013), among others. It means that in Indonesia's case, it is real economy activities that pull the development of primary market development. We can translate that as the more growing economy is, the more companies raise funds in the stock market.

On the other hand, secondary market development is the more common variables tested in effort to determine stock market and growth relationship. VAR model shows that GDP has a long-term relationship with past values of secondary market as well as secondary market which is also related with past values of GDP. Granger causality test shows that indeed, there is two-way causality run both way between economy growth and secondary market development. This result is also confirmed by orthogonal IRF, which shows that shock from GDP impacts the secondary market and vice versa. This finding supports the feedback hypothesis, which was also found by Wood (1993), Akinboade (1998), Abu-Bader and Abu-Qarn (2008), Fung (2009), Mukhopadhyay, Pradhan, and Feridun (2011) who utilized banking sector variables and also by Nishat and Saghir (1991), Muradoglu, Taskin, and Bigan (2000), Rashid (2008), and Hou and Cheng (2010) who utilized stock market variables. Just like this research on Indonesia case, the previous researches mentioned before are also conducted mostly on developing countries such Barbados, Bostwana, Thailand, Pakistan, among others.

Through our findings, we can indicate that secondary market Granger causes growth as also confirmed in other research in other countries and this time, we also find the other way of causality runs from growth to the secondary market. Interestingly, the secondary market is a peculiar variable with unique movement. As we have already discussed in Chapter 3 about the *predictive* property of secondary market, we can take the conclusion of secondary market *causality relationship* to the economic growth with a pinch of salt.

Notwithstanding the relationship between the variables, we can see from variance decomposition analysis that the stock market – both primary and secondary – may only hold little importance to the overall Indonesia economy. It is true that in terms of market capitalization, market index, and listed companies, all have shown promising growth. Neverthe-

less, the signs of stalled development that hold the stock market back from contributing more to the economy are there. From section 2.3, we learned that less than 3% of the Indonesian population are investing in the stock market. In comparison, less than 5% are literate on capital market knowledge, a far cry from literacy and inclusion in the banking sector. From section 5.1, we noticed that the primary market (FUND) itself was not growing as consistent and massive as the market capitalization, even though this metric is labelled as the direct way of the stock market to help economic activities. In terms of transaction value and volume as variables from the secondary market, both move volatilely and not grow as steady as market capitalization and index price. Therefore, we can suspect that the stock market as a whole is stalled in development, and it is pale in comparison to the banking sector. The banking sector has been diagnosed to be a positive influence on economic growth by Mukhopadhyay, Pradhan, and Feridun (2011), Soedarmono, Hasan, and Arsyad (2017), and Soedarmono, Trinugroho, and Sergi (2019) through different econometrics techniques.

From income inequality ends, the model might suffer from a low number of observations. In effect, we should be cautious in interpreting the results. Nevertheless, there is an indication that the primary market is worsens income inequality while the secondary market might positively impact one, even though both are on small-scale impacts.

The stock market could and could not be worsening income inequality. Seven and Coskun (2016) do not find a statistically significant relationship between stock market development and inequality based on observations on 38 emerging countries in the 1987-2011 period. Since the financial sector in emerging countries is mostly dominated by the banking sector (p. 49), there is a possibility that stock market's impact is so limited it does not influence inequality on national level. On the other hand, it is very easy to see how the stock market might affect inequality. The stock market is the place for companies to raise funds and for investors to invest. From investors' side, only those with adequate knowledge can obtain consistent gain, and such knowledge is hardly found even on middle-income never mind lower-income level. According to a survey by Indonesia FSA of 2019, only 4.92% of Indonesia's population are literate on the capital market subject. Even if they can access the stock market through institutions such as insurance or pension fund, the concept of investing itself is like a tertiary need, after primary and secondary needs such as food, housing, and education. From companies' side, raising funds and listing their stock in the stock market will benefit the whole company, but the owner usually gains more than what the workers or employee obtain. Moreover, the owners of public companies are rarely wanting to relinquish their shares and may inherit them to the next generation and making wealth and income condensed into higher-level earners, worsening inequality along the way (Kavya and Shijin, 2020).

The development of the stock market carries its own risk. The stock market can be the place where the asset price bubble formed and burst, potentially spreading the crisis from the stock market to the real sector and even to the whole world. The Great Depression of the 1930s and the Global Financial Crisis of 2008 are prime examples of that kind of market risk. Other than market risk, stock market is also the place where fraud and money laundering could materialize. Pemberton (2000) points out that the easiness of moving money around in the capital market makes it a suitable place for money laundering, even for drug traffickers. Even worse, law enforcement is having a hard time dealing with capital market money laundering because it is hard to prove and police investigators usually do not have enough knowledge of financial transactions. We can see that the same can be applied to market price manipulation. These illicit activities in the capital market could – and had – led to crises in some countries (Fabre, 2005). The corruption cases in Indonesia raised in

Chapter 2 fall into this category when money laundering and market manipulation led to bigger setbacks.

Chapter 6
Conclusion

As part of financial system, the stock market is widely accepted as a good influence for the economy even it carries a huge risk with Great Depression of 1930s and Global Financial Crisis of 2008 as prime examples of such risk. However, various studies yield different results. This study is aimed to answer the question of the relationship among the primary market of the stock market, the secondary market of the stock market, and the economic growth in Indonesia. We also checked the direction of (Granger) causality among the three variables.

Indonesia is one of the biggest nations in terms of population and geographical area. The Indonesia stock market is also growing since its reactivation in 1977, albeit at a slow pace. The government has supported the stock market development with policy supports, namely from a taxation's point of view. Yet, the equity-based market is pale in comparison with the banking sector. Before the government tries to push it to pursue the banking sector, it is better to examine the stock market and economic growth relationship. Utilizing Vector Autoregression (VAR) regression, supported by Granger causality, Impulse Response Function (IRF), and variance decomposition analysis, we checked the relationship between stock market and growth.

The main appeal of this research is how the stock market is broken down into two markets. The first market is primary market where companies raise funds by selling securities to the investors. The second market is secondary market, where such securities are traded among investors. The stock market is considered a useful tool for the economy because it helps businesses raise funds without held back by debt's interest rate, hence it is the primary market. Alas, the research focusing on the primary market and growth nexus is scarce and it is the secondary market that is more often used as a proxy of the stock market. For the primary market, the funds raised in the stock market is used. For the secondary market, we construct a single index from three variables by utilizing principal component analysis: market capitalization, ratio of share's traded volume to total outstanding shares, and ratio of share's traded value to market capitalization. We can address both markets by putting them together with GDP – as a proxy of growth – into the VAR model.

The Granger causality on the VAR model finds a one-way (Granger) causality running from real economic growth to the primary market, while there is a two-way (Granger) causality between secondary market and growth. The orthogonal IRF analysis supports these findings. The first key takeaway here is that the real economy activity pulls the primary market forward and not vice versa. Second, the real economy and secondary market Granger causes each other. Third, variance decomposition analysis finds that despite the direction of the causality, stock market contributes little to the economy, confirming the small muscle of the stock market compared to the might of banking sector. Robustness check with industrial production supports the demand-following hypothesis between GDP and primary market. Another experiment with a small number of observations of income inequality – proxied through Gini ratio – and VECM shows that the primary market could be worsening inequality, while secondary market could improve inequality condition. Nevertheless, the impacts from both markets are small.

The results of this research lean towards the importance of real economic growth rather than the stock market itself. From the policy perspective, it is recommended that the government should focus more on the real economic activities, while put the stock market under acute observation to manage the risks it carries.

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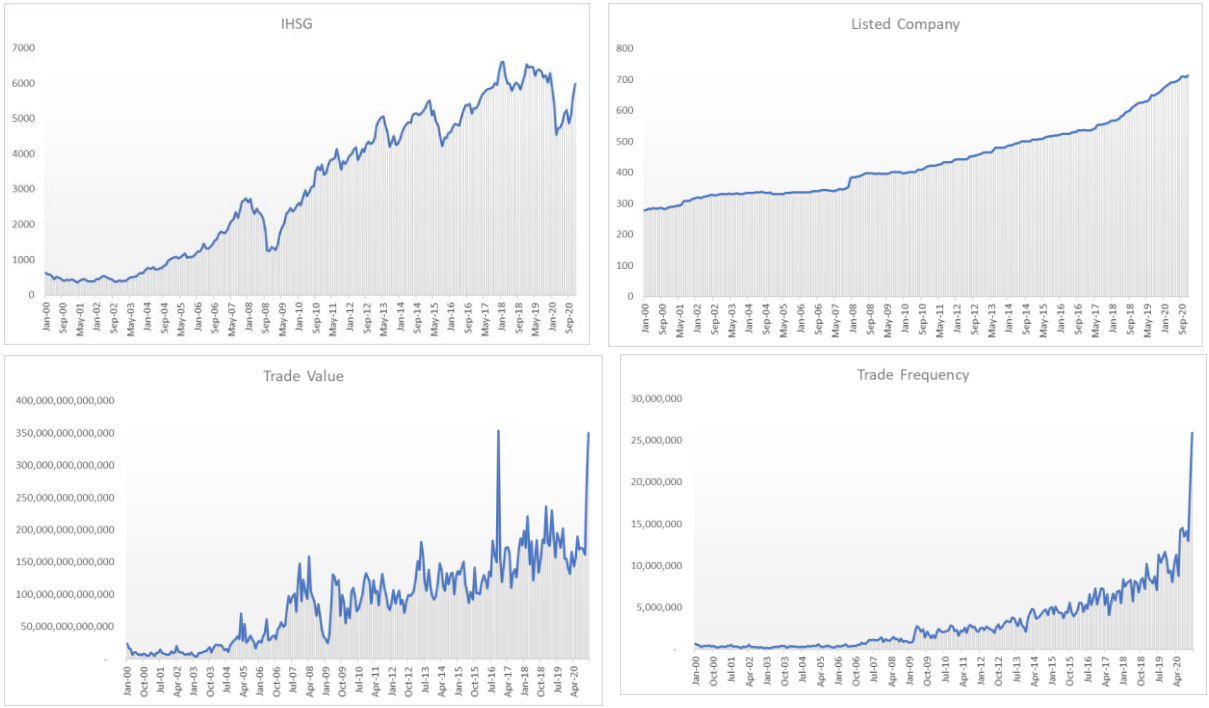
Appendices

Appendix 1. Indonesia Stock Market Development: Index, Number of Listed Company, Trade Value, and Trade Frequency



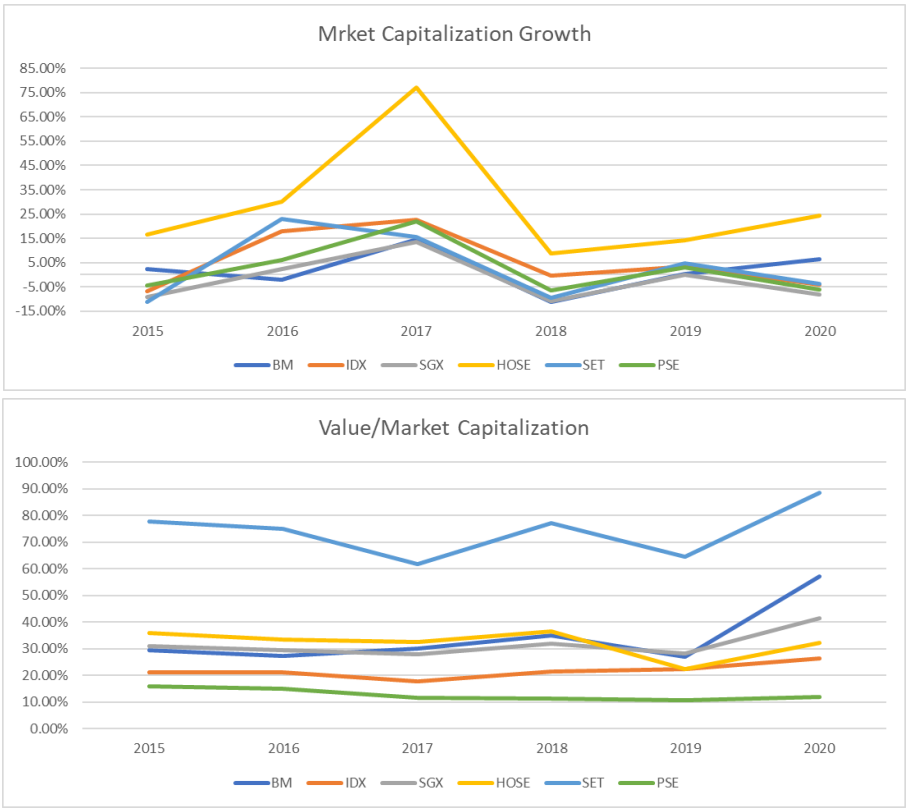
Source: Indonesia Stock Exchange.

Appendix 2. Data Sources

Data	Period	Source	Series	Accessed
GDP Current Price	2003Q1-2009Q4	Statistics Indonesia official website (https://www.bps.go.id/site/pilihdata)	2000 Series	28 July 2021
GDP Current Price	2010Q1-2021Q2		2010 Series	
Funds Raised in Stock Market	- 2003Q1-2021Q2 - 2003M1-2021M7 - 1989-2019	Indonesia Stock Exchange (IDX)	-	6 September 2021
Market Capitalization	- 2003Q1-2021Q2 - 2003M1-2021M7 - 1989-2019			
Shares Value Traded	- 2003Q1-2021Q2 - 2003M1-2021M7 - 1989-2019			
Shares Volume Traded	- 2003Q1-2021Q2 - 2003M1-2021M7 - 1989-2019			
Outstanding Shares	- 2003Q1-2021Q2 - 2003M1-2021M7 - 1989-2019			
Industrial Production	2003M1-2021M7	OECD official website (https://data.oecd.org/industry/industrial	-	20 October 2021

Data	Period	Source	Series	Accessed
		-production.htm)		
Income Gini Ratio	1989-2019	WID official website (https://wid.world/country/indonesia/)	-	22 October 2021

Appendix 3. Market Capitalization Growth and Ratio of Value Traded to Market Capitalization of Bursa Malaysia, Hochiminh Stock Exchange, Indonesia Stock Exchange, Philippine Stock Exchange, Singapore Exchange, and Stock Exchange of Thailand



Appendix 4.Orthogonalized IRF and Variance Decomposition Detail Values

Orthogonalized IRF

Period	GDP shock on			FUND shock on			SMD shock on		
	GDP	FUND	SMD	GDP	FUND	SMD	GDP	FUND	SMD
0	0.029197	0.014481	-0.000837	0.000000	0.985615	0.031889	0.000000	0.000000	0.675770
1	0.028983	0.035506	-0.012326	-0.000350	0.052063	0.005253	0.007473	0.150864	0.369002
2	0.028629	0.033643	-0.018774	-0.000327	0.003127	0.002366	0.011397	0.098225	0.196639
3	0.028207	0.031694	-0.022129	-0.000301	0.000279	0.001384	0.013425	0.062053	0.101599
4	0.027752	0.030349	-0.023769	-0.000283	-0.000039	0.000873	0.014415	0.041620	0.049337
5	0.027282	0.029376	-0.024465	-0.000272	-0.000147	0.000591	0.014835	0.030209	0.020655
6	0.026809	0.028613	-0.024645	-0.000263	-0.000201	0.000433	0.014944	0.023789	0.004966
7	0.026338	0.027970	-0.024545	-0.000257	-0.000229	0.000344	0.014882	0.020124	-0.003565
8	0.025871	0.027398	-0.024293	-0.000251	-0.000242	0.000294	0.014729	0.017978	-0.008154
9	0.025411	0.026868	-0.023962	-0.000246	-0.000247	0.000264	0.014528	0.016673	-0.010572
10	0.024958	0.026365	-0.023590	-0.000241	-0.000247	0.000246	0.014303	0.015832	-0.011795
11	0.024512	0.025882	-0.023200	-0.000237	-0.000246	0.000234	0.014066	0.015250	-0.012363
12	0.024074	0.025412	-0.022802	-0.000232	-0.000243	0.000225	0.013825	0.014813	-0.012571

Period	GDP shock on			FUND shock on			SMD shock on		
	GDP	FUND	SMD	GDP	FUND	SMD	GDP	FUND	SMD
13	0.023643	0.024954	-0.022404	-0.000228	-0.000240	0.000219	0.013583	0.014457	-0.012582
14	0.023220	0.024505	-0.022008	-0.000224	-0.000236	0.000214	0.013343	0.014148	-0.012488
15	0.022805	0.024066	-0.021617	-0.000220	-0.000232	0.000209	0.013106	0.013867	-0.012336
16	0.022397	0.023634	-0.021232	-0.000216	-0.000228	0.000205	0.012873	0.013604	-0.012155
17	0.021996	0.023211	-0.020853	-0.000212	-0.000224	0.000201	0.012643	0.013352	-0.011959
18	0.021603	0.022796	-0.020480	-0.000208	-0.000220	0.000198	0.012417	0.013109	-0.011757
19	0.021216	0.022388	-0.020114	-0.000205	-0.000216	0.000194	0.012195	0.012872	-0.011553
20	0.020837	0.021987	-0.019754	-0.000201	-0.000212	0.000191	0.011977	0.012640	-0.011350

Variance Decomposition

Period	GDP explained by			FUND explained by			SMD explained by		
	change in GDP	change in FUND	change in SMD	change in GDP	change in FUND	change in SMD	change in GDP	change in FUND	change in SMD
0	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
1	1.000000	0.000000	0.000000	0.000216	0.999784	0.000000	0.000002	0.002222	0.997777
2	0.967988	0.000070	0.031942	0.001473	0.975730	0.022797	0.000257	0.001758	0.997985
3	0.931075	0.000085	0.068840	0.002579	0.965308	0.032114	0.000798	0.001659	0.997543
4	0.900301	0.000087	0.099612	0.003557	0.960686	0.035757	0.001545	0.001634	0.996821
5	0.876574	0.000086	0.123340	0.004454	0.958179	0.037368	0.002411	0.001628	0.995961
6	0.858570	0.000084	0.141345	0.005293	0.956508	0.038199	0.003331	0.001626	0.995043
7	0.844827	0.000083	0.155090	0.006089	0.955210	0.038702	0.004265	0.001624	0.994111
8	0.834187	0.000081	0.165732	0.006848	0.954099	0.039053	0.005189	0.001623	0.993189
9	0.825808	0.000080	0.174111	0.007575	0.953096	0.039328	0.006092	0.001621	0.992287
10	0.819095	0.000079	0.180825	0.008273	0.952165	0.039562	0.006968	0.001620	0.991412
11	0.813627	0.000079	0.186294	0.008944	0.951286	0.039770	0.007815	0.001618	0.990567
12	0.809104	0.000078	0.190818	0.009590	0.950448	0.039962	0.008632	0.001616	0.989751
13	0.805312	0.000078	0.194611	0.010212	0.949646	0.040142	0.009420	0.001615	0.988965
14	0.802092	0.000077	0.197831	0.010810	0.948877	0.040313	0.010179	0.001613	0.988208
15	0.799328	0.000077	0.200596	0.011386	0.948138	0.040476	0.010910	0.001612	0.987478
16	0.796932	0.000076	0.202991	0.011941	0.947426	0.040633	0.011614	0.001610	0.986776
17	0.794838	0.000076	0.205086	0.012475	0.946742	0.040784	0.012291	0.001609	0.986100
18	0.792993	0.000076	0.206931	0.012989	0.946082	0.040928	0.012944	0.001608	0.985449
19	0.791356	0.000076	0.208568	0.013485	0.945447	0.041068	0.013572	0.001606	0.984822
20	0.789895	0.000075	0.210029	0.013962	0.944836	0.041202	0.014177	0.001605	0.984218

Appendix 5. Correlation Coefficients among Variables, GINI Proxy

Variable	GINI	L.FUND	L.CAP	VOLUME	VALUE	SMD
GINI	1					
L.FUND	0.3370	1				
L.CAP	-0.0254	0.6846	1			
VOLUME	0.2355	0.5188	0.5403	1		
VALUE	-0.0721	0.0696	-0.0458	0.3145	1	
SMD	0.2355	0.5188	0.5403	1	0.3145	1

Moderate correlation>0.3, marked with light grey colour; Strong correlation>0.5, marked with dark grey colour.