# RELATIONSHIP BETWEEN INITIAL PUBLIC OFFERING AND MACROECONOMIC FACTORS IN THE U.S.

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# RELATIONSHIP BETWEEN INITIAL PUBLIC OFFERING AND MACROECONOMIC FACTORS IN THE U.S.

# BY

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A final year project submitted in partial fulfillment of the requirement for the degree of

**BACHELOR OF FINANCE (HONS)** 

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Relationship between	Initial Public	Offering and	d Macroecond	mic Factors	in tl	he U.S

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- (3) Equal contribution has been made by each group member in completing the FYP.
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#### LIST OF ABBREVIATIONS

ADF Augmented Dickey Fuller Test

ARCH Autoregressive Conditional Heteroscedasticity

BLUE Best Linear Unbiased Estimator

CPI Consumer Price Index

GCC Gulf Cooperation Countries

GDP Gross Domestic Product

GLS Generalized Least Square

IPI Industrial Production Index

IPO Initial Public Offering

JB Jarque-Bera Test

LIR Lending Interest Rate

NASDAQ National Association of Securities Dealers Automated Quotations

NYSE New York Stock Exchange

OLS Ordinary Least Square

R&D Research and Development

SEC Securities and Exchange Commission

TOL Tolerance

VEC Vector Error Correction

VIF Variance Inflation Factor

WLS Weighted Least Square

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#### **PREFACE**

This final year project is being conducted by the student and submitted in partial fulfilment of the requirement for the degree of Bachelor of Finance (Hons). This research conducted entitled "Relationship between Initial Public Offering and Macroeconomic Factors in the U.S." is being supervised by Mr. Adam Arif Lee Aik Keang. This research paper was done by the students solely by referring to other research and those researches reviewed are quoted as the reference. This helps students enhance their understanding of the relationship between macroeconomic variables and the number of IPO. There are many researches that have been conducted on a similar topic. However, most of the research is conducted from the corporate financial perspective. Therefore, the idea of this topic came from those limited research that focused on the number of IPOs and macroeconomic factors. Three macroeconomic variables which been selected for this research are inflation, GDP growth rate, and lending interest rate. Lastly, this research will contribute to the parties related to IPO by providing them with a better understanding of the relationship between the number of IPO and macroeconomic variables.

#### **ABSTRACT**

This study is being conducted for the purpose of measuring the relationships between macroeconomic variables and the number of IPO in the United States from period year 2001 Quarter 1 until year 2020 Quarter 4, which total up to 80 observations. The macroeconomic variables those used in this study were inflation, GDP growth rate and lending interest rate. The quarterly data of each variable was adopted from the secondary sources such as IPOScoop & PWC data base, Bloomberg data base and the Federal Reserve Economic Data. This study able to implicate the policymakers, education field, retail investors and the company those want to issue IPO as they will know how the macroeconomic variables can affect the number of IPO. In order to study the relationships between the independent variables and the number of IPO in the U.S., we have carried out some statistical tests by using the E-Views 12. The result showed inflation and lending interest rate are in a positive relationship with the number of IPO in the U.S. while GDP growth rate is in a negative relationship with number of IPO in the U.S. These results showed are different with result observed in the past studies reviewed. This is in light of the fact that there are other elements and factors such as the country size of all the researches are different and so on contributed to this issue. Since there are some limitations in our study, therefore some recommendations are provided for the future researchers in order to make the improvement in the research which topic related.

#### **CHAPTER 1: RESEARCH OVERVIEW**

#### 1.0 Introduction

The beginning of the chapter will provide a broad together with complete view of our final year project which is the relationship between initial public offering and macroeconomic factors in the U.S. Our study comprises of 20 years.

# 1.1 Research Background

# 1.1.1 Introduction of Initial Public Offering

Initial Public Offering (IPO) is a process of a private corporation first selling the company shares to the public, such as institutional and retail investors in the stock exchange, with the help of an investment bank (Ernst & Young, 2018). This process is so-called 'going public,' the privately held company transforming into a public company. It allows companies to raise capital to build their business by creating a new stock issue and selling existing shares.

An IPO is a stage in a company's growth process when they believe their business is mature enough to accept the rigours of Securities and Exchange Commission (SEC) regulations, benefits, and responsibilities to public shareholders, so they will begin to advertise their interest in going public. The company's primary advantage in going public is the financial benefit of

raising capital as it has many investment opportunities, especially for a growing company, as the funds can use in research and development (R&D), mergers and acquisitions (M&A), fund capital expenditures, and repay debt (Hunsaker, 2017). An IPO is an important event for a company seeking long-term growth because it provides the opportunity for the company to raise a large amount of capital to gain greater capacity to grow and expand its business.

The process of IPO is considered complicated and time consuming. For a company to go public, it is a must to fulfil the requirement set by SEC. The timeline for an IPO is six months to nine months. The first step is to build a team consist of lead investment bank, auditors and law firms ("U.S.IPO Guide", 2021). A trustable underwriter will guide the company for coordinating, preparing relevant documents, offering initial draft, dealing with the due diligence and help the company to meet the requirement of SEC. The following month will be the company need to prepare the document to submit to the authorities. Another process is to organize an IPO roadshow. The purpose of the roadshow is to present to the interested parties and draw the attention of future owners of the company. After the approval of SEC, the IPO team then can set the initial offer price based on the industry and company's financial status. The last step is the underwriters will make an analyzation of the IPO share and the company is successful listed on the market. The company then will need to strive their best to maximize shareholder's wealth.

#### 1.1.2 Benefits and Challenges to Become a Listed Company

The financial benefit that a company undergo the IPO process is to source for additional capital to expand and get publicity in the market. A successful listing can enable a firm to obtain capital to complete a strategic acquisition, generate opportunities to increase customer's base, or provide exit opportunities for private equity or other investors. Another advantage of the company going public is an increased company reputation because the new potential customers will know the company's product and services by the generate publicity from IPOs. As IPOs often generate publicity by exposing their products to a new potential customer base. The increased transparency and the credibility of the stock listing can also help them obtain better terms when seeking to borrow funds. As a result, this may help the company to increase its market share. Many venture capitalists use IPOs to cash in on successful companies. Founders can also use IPOs as an exit strategy by selling the share after the company IPO.

However, the initial public offerings (IPOs) market is complex and challenging. While IPOs offer many benefits, they also involve significant costs, primarily associated with the process, such as banking and legal fees and ongoing requests for disclosing important and even sensitive information. They are required to file their financial statements to the SEC annually. These financial statements must be prepared under the United States Generally Accepted Accounting Principles and audited by a certified public audit firm. In addition, it might need to meet additional requirements and continuing obligations set by the stock exchange and SEC as a public company. The requirements are different in each country and stock exchange.

#### 1.1.3 Reasons for the Company to be Listed in the U.S.

The stock exchange is where investors can trade different financial instruments, including equities, bonds, and commodities. They bring the companies and investors together to help them raise capital by issuing shares to investors. Exchanges provide liquidity to the market, which means that the market has enough buyers and sellers to process transactions more efficiently without delay. The exchange also ensures that trading is conducted orderly and fair to deliver important financial information to investors and financial professionals. The buyers and sellers' consummate transactions via open outcry at a central exchange or electronic trading platform.

United States is the largest equity market globally that consists of two stock exchanges: New York Stock Exchange (NYSE) and National Association of Securities Dealers Automated Quotations (NASDAQ). The New York Stock Exchange is the world's largest stock exchange, and it is an auction-based exchange that allows investors to physically and verbally communicate to buy and sell orders. While NASDAQ is the second-largest stock exchange in the United States, it is an electronic exchange that only allows buyers and sellers to be connected by computers over a telecommunications network.

According to Doidge et al. (2004), since the United States is the largest equity market globally, the foreign companies listed on United States markets are widely perceived to have advantages, such as cheaper cost of capital and an increased shareholder base, greater liquidity, enhanced prestige. Apart from that, reputation is also one of the factors in being a listed company in the United States for foreign companies. This is because the United States has a well-established supervisory authority such as SEC to regulate companies listed and publicly traded in the United States. While this often means that foreign companies require to learn new procedures and

more paperwork, it pays off in the long run. The increased scrutiny and transparency provided by SEC oversight is seen as an advantage by investors. It helps the company improve its reputation in the market and benefit from it as the U.S stock exchange has the large market capitalisation in the world. Therefore, the investor will tend to trust the company when they read its financials and make investments (Schacht, 2017).

## 1.1.4 Trend of Initial Public Offering in U.S.



Figure 1.1: Number of IPOs in the United States from the year 2001 to 2020.

Source: IPOScoop & PWC

The window of opportunity is very useful for the companies because it allows them to determine when the window of opportunity is open, and then they will take action to go public. When the window of opportunity is open, the market will show strong growth, and when the market succumbs to maturity, the window of opportunity will close. Therefore, the company requires to use the right insights to make the right moves at the right time. When a company is properly planned for going public, IPOs prices will

provide an optimal valuation because it provides IPO investors with the greatest upside to their investment in the months and years following the IPO (Ernst & Young, 2018).

IPOs are dynamic as macroeconomic factors, world events, political changes, and new regulations drive them to different peaks and valleys. Therefore, the companies might not have a perfect time to go public. The window of opportunity for IPOs is difficult to predict because the external shocks happen suddenly without any advance announcement or warning. The theory and the empirical evidence suggest that IPO activities are driven by internal factors—firm-specific determinants and external factors—macroeconomic determinants. However, people believe that sound macroeconomic fundamentals are considered one of the inducements to expand the IPO base in the market.

Based on figure 1.1, the number of IPOs illustrates the extreme fluctuations in IPO volume over 20 years. From 2001 to 2020, the lowest number of listed companies was in 2008, with only 47 companies going public due to the economic crisis in that particular year. The legacy of the 2007 and 2008 financial crises and the economic volatility that continues to affect the market have made investors more diligent in reviewing IPOs. Therefore, the number of IPOs only increased by 14 to 61 in 2009. All financial markets throughout the world were affected by the global financial crisis of 2007 and 2008. Although the world suffered from the Covid-19 pandemic in 2020, U.S. obtained the highest number of IPOs, 421. The phenomena of IPO trends are observed in developed countries, including the United States. Recently, many companies which showed interest in entering the stock market during the Covid-19 pandemic since 2020 had hit the highest number of IPOs between 20 years. These phenomena are due to the change in market conditions and the change in United States' economic performance. The

changes in an economic condition, also known as macroeconomics factors, have led to active participation in the IPO, thus impacting the number of IPOs. Therefore, macroeconomic factors may affect the number of IPOs, representing good and bad news in the market.

#### 1.2 Research Problem

Every company that wants to go public must be aware of the timing and if any variables are important to consider. Macroeconomic variables are the key indicators to acknowledge the situation of the country's economy. Unfavourable macroeconomic factors can influence the industry-level and firm-level business performance along with the company's decision to go public (Laohakosol et al., 2018). Therefore, the company will become distress in the event of collecting additional fund from IPOs due to the unfavourable performance of macroeconomic factors. Subsequently, the company may consider it is not the perfect time to go public and the company will hold up their decision of going public (Mehmood et al., 2020). Hence, the overall business environment conditions may deteriorate during high uncertainty in the IPO market and adverse macroeconomic factors.

Previous studies investigated the relationship between Initial Public Offering and macroeconomics factors such as Poland (Kovandova & Zinecker, 2015) (Meluzín et al., 2014), United Kingdom (Angelini & Foglia, 2018), Sri Lanka (Dai & AWGCN, 2015), Malaysia (Ameer, 2012), Nepal (Laohakosol et al., 2018), Pakistan (Mehmood et al., 2020), and China (Lim et al., 2012). These studies suggest that macroeconomic variables are the most suitable indicator for examining the factors that affect IPOs because macroeconomic changes simultaneously affect the cash flow of many companies and affect the risk-adjusted discount rate.

There is very limited literature on number of IPOs and macroeconomic variables in the developed country in the previous literature. Most studies have focused on IPOs from a corporate finance perspective. The volatility of IPOs is because of an opposing macroeconomic outlook, which has not been substantially and broadly studied. For that reason, the macroeconomic factors are being applied to the study. In addition, United States chosen to be our research project is due to the economy of U.S economy being considered as a highly developed mixed economy, and New York Stock Exchange and NASDAQ are the world's largest stock exchanges in view of their trade volume and market capitalization. U.S. is also equipped with the most advanced technology and innovative economy which the company in the U.S. are at or near forefront in many industries. As a result, we take the initiative to conduct a research project on the relationship between the number of IPOs and the macroeconomic factors including inflation, Gross Domestic Product growth rate, and lending interest rate in the U.S. Along with the study, the relationship between initial public offering and macroeconomics factors can be identified.

# 1.3 Research Question

#### General Research Question

1. Is there significant relationship between macroeconomic factors and number of IPOs in the United States?

### Specific Research Question

- 1. Does inflation affect the number of IPO in the United States?
- 2. Does Gross Domestic Product growth rate affect the number of IPO in the United States?
- 3. Does lending interest rate affect the number of IPO in the United States?

# 1.4 Research Objectives

#### General Objective

1. To investigate the relationships between macroeconomic factors and the number of IPOs in the United States.

#### Specific Objective

- 1. To investigate the relationship between inflation and the number of IPOs in the United States.
- 2. To investigate the relationship between GDP growth rate and the number IPOs in the United States.
- 3. To investigate the relationship between lending interest rate and the number of IPOs in the United States.

# 1.5 Research Significance

This research is being conducted for the purpose of investigating the relationships between the number of IPO and macroeconomic factors in the United States. Therefore, it is important as this research helps to identify the effect of the macroeconomic factors on the IPOs in the United States. This study contributed significance of the study to the policymakers, retail investors, educational field and the company which wants to issue IPO in the United States.

First, the policymaker can get the benefit from the research because our research provides an understanding of how macroeconomic factors affect the volume of IPOs. IPO is important for a country since the company can raise the fund from the public and this helps on improving the economy of a country. According to Quaadman

(2020), this is because the employment opportunity increases when there is an increasing volume of IPO and the capital gain will also flow to the country. Therefore, the findings of the research are valuable for the policymaker as policymaker can impose suitable policy in order to make sure the economic condition of the country will not be affected heavily by referring to the research.

On the other hand, the outcome of this research is important to the retail investors and able to bring benefit to them. The research helps retail investors to have a better understanding of the impact of macroeconomic variables on the IPOs' volume. A better understanding helps retail investors to enhance their decision-making and prevent the risk of losses. This is because when the retail investors buy the IPO stock in a good condition, there is a high potential for the retail investors to receive a large number of capital gains after a long period. During a good economic condition, there are many IPOs in the market and the retail investors can make a wise decision on choosing an IPO that is expected to have strong growth.

As mentioned in the problem statement part before, there is only a limited amount of reference focused on the number of IPOs and macroeconomic factors in the developed country. Most of the literature found are mainly discussed the IPO from the perspective of corporate finance. Therefore, this research is beneficial to the education field. This is because there are only a few researchers who discussed the relationships between number of IPO and the macroeconomic elements. So, this study can act as a new reference for future researchers and students to discuss the topic related to our study for the educational purposes.

The research also brings benefits to the companies that would like to go public through IPO in the United States. Since this research provides information on the effect of the macroeconomic factors on the IPOs in the United States, the company can consider the study as a reference to decide the best timing for the company to go public. Normally, going public is for the purpose of raising capital for the

company's development. So, good timing is important for the company to go public because the company is unable to raise the expected amount of capital if it goes public at the wrong timing. For example, the company has difficulty in raising capital during a period of low GDP growth rate because this shows a poor economic condition, and the investor is not willing to invest to prevent the loss. Therefore, it is important for the company to make a wisely decision by referring to the research.

# **CHAPTER 2: LITERATURE REVIEW**

#### 2.0 Introduction

Capital demand hypothesis, theory of IPO wave and business cycle theory are selected as our underlying theories. Furthermore, we also formed hypothesis for the three independent variables which include inflation (consumer price index), GDP growth rate and lending interest rate.

# 2.1 Underlying Theories

The decisions of choosing to go public for a firm is a huge decision. It shows that the firm need to give up their private benefits such as need not to disclose the information. But going public indeed brings significant benefits to the firm as well. According to Zingales (2005), the researcher argue that the bargaining power of a firm will reduce if the firm goes public and which will lead to decrease of profit. On the contrary, go public will increase the firm cash flow as well as their liquidity (Benninga et al., 2005). Holmstrom and Tirole (1993) also argue that going public will help the company itself to observe and monitoring the outsiders such as investment bank, analysts and others' activities.

### 2.1.1 Capital Demand Hypothesis

According to Lowry (2021), the criteria of a company demand for capital will bring significant effect on volume of IPO. Capital demand hypothesis express that fluctuation on number of IPO is caused by the company's aggregate demand for capital. Indeed, beyond the fact that when a company growth faster, the company will expand their business as well and eventually the company will acquire capital from the public. In view of the capital demand increase, the number of IPO will also increase. Another key fact to highlight is that business cycle and economic situation also contribute to this theory. Du (2014) summarizes that if is in economic expansion, company will seize the opportunity to go public as the economic perform well. This statement has been proven by Dittmar and Dittmar (2008) that varies in economic situation has direct impact to the aggregate capital demand. In another word, economic expansion makes company to take the initiative to go public hence the volume of IPO increase.

# 2.1.2 Theory of IPO Wave

Maug (2000) declare that when a firm first issue to a relatively new industry and solve the obstacles by themselves it creates a learning process for the following firm. Consequently, the next issuer will benefit from the process as it lower down the hurdle for public offering in future. Thus, a hot IPO market will exist in the relevant industry. It will then provoke the IPO wave. IPO wave can be defined as IPO clustering of a company's free-riding on the information production based on the former IPOs. The wave that created by the hot issue market is due to some of the company might not expertise either in their management or the control of the company, they will take the

advantage of the former IPO as earlier IPO had created useful information for these companies (Ameer, 2012). As a result, these companies will place in a higher position in the market. IPO wave follows by a high level of asymmetry information (Batnini, 2015). High volume of IPO is then explained by He (2007) that investment bank plays a vital role to produce information to the investor. In view of the new IPO, the investor will evaluate the IPO price based on the past performance IPO and the information generate from the investment bank. The information improves the quality of the company and end up that low quality company go public thus facilitate to high volume of IPO.

### 2.1.3 Business Cycle Theory

From a theoretical and general perspective, business stage divided into four stages which include expansion, peak, contraction and through. It is necessary to mentioned that business cycle possess conceptual and intellectual history in U.S. The cycle will be repeated and cannot be breakable (Stock &Watson, 1998). Economic activities are mainly the factors that contribute to the business cycle such as GDP, inflation and so forth. Observation of Canova (1998) stated that business cycle serves as a benchmark to study the soundness and rationality of those theoretical models. According to Stock and Watson (2002), there is a long expansion period in 1990 following by recession in 2001. The paper also examined that the little moderation in volatility of U.S. economy is also caused by monetary policy. A complete business cycle in U.S. is located from year 2001 until year 2007. Bivens and Irons (2008) made an assumption that the expansion ended at the beginning of year 2008. It is undeniable that business cycle plays an important role for a company. This is in light of the fact that business cycle able a company to make informed business decisions and to benefit the company when it comes to expansion period (Smyth, 2020).

# 2.2 Hypothesis Development

# 2.2.1 Number of Initial Public Offering

Number of Initial Public Offering can be defined as the figure of the company going public in U.S. Initial public offering is a vital instrument for a company to raise capital by offering new stock issuance to public investors. A privately-owned company who wishes to listed on New York Stock Exchange (NYSE) need to fulfil the requirement of SEC. New York Stock Exchange is the one of the largest equities-based change's platforms. Ameer (2012) claimed that the increase of the regulatory requirement shortens the time-to-market and the capital market able to enlarged.

There are many papers had studied the fluctuation of IPOs and macroeconomic factors. According to Lowry (2003), other than macroeconomic that cause the fluctuation of number of IPO, high level of uncertainty also will create a lemon problem which lead to the decrease number of IPO. The added determinants that move the number of IPO is also because of the asymmetric information in the market (Ritter & Welch,2002). In addition, as mentioned in the previous part, the complicated process of going public is also the cause and mechanism to discourage the company to go public. As a result, volume of IPO has downturn trend.

It is needful to highlight that number of IPO in this study refers to the number of companies that have gone public from 2001 to 2020 quarterly

without considering whether it has succeeded at market capitalisation and market pricing during the Initial public offering period. It also includes all companies listed on the United States stock exchange from 2001 to 2020 quarterly and does not classify them into various categories such as company industry.

# 2.2.2 Inflation (Consumer Price Index)

Inflation is also a vital determinant on the volume of IPOs. This can be proven by the findings from Mehmood et al. (2020), the researchers found out that consumer price index is positive significantly in expressing the number of IPOs. A paper that published by Loughran et al. (2020) had examined the influences of inflation towards IPOs. There are 15 countries that shows inflation had bring great impact towards stock price level. In fact, according to fisher effect hypothesis, it predicts the stock return and inflation. Fisher effect hypothesis claim that high inflation is due to high interest rate which will led to losses of competitive advantage. Wei (2007) found out that the equity return will not perform well if the country is suffering from inflation. A clear manifestation of the unexpected inflation will cause the company reluctant to go public, further reducing the number of IPOs. According to Geetha et al. (2011), since World War II, in the United States the average inflation rate is between 2% and 5% and it led to a natural bias condition in the stock market. The company acknowledge that the inflation and economic condition will affect the decision of the investor, so company will tend to avoid go public in the period of inflation. Inflation indeed is which will reserve their investment decision during inflation period. Omran and Pointon (2001) stated that high inflation does not motivate company to go public since higher inflation, investor will demand higher return which the company need to bear increases in cost of capital for equity offering. Due to the evidence below, the hypothesis is proposed as follows:

H1: There is negative relationship between inflation and the number of IPOs.

#### 2.2.3 GDP Growth Rate

GDP growth rate also serve as a major determinant that able to affect the number of IPOs issued. Normally, the GDP growth rate refer to the percentage change in the GDP. It depends on the consumption demand level of a country (Mehmood et al., 2020). Refer to the capital demand hypothesis, when there is an increase in the economic growth, there will be an increasing capital demand. This is because an increasing economic growth provide more opportunities for the new investments arise in the market. Therefore, the demand of capital of the firms increases and they will raise the capital from the public to expand the business (Langlet & Lilliehöök, 2017). Refer to the previous research related to this topic, common proxy which been used for the capital demand is GDP growth (Lowry, 2003). According to Langlet and Lilliehöök (2017), there is a positive relationship between the GDP per capita growth and the number of IPOs in Europe. This means the IPO volume in Europe increase when the GDP growth rate of Europe increase. On the other hand, the researchers have conducted research for Gulf Cooperation Countries (GCC) and global simultaneously. But the result gained are different within these 2 regions. Aidrous and Glavina (2020) declared the GDP growth bring a positive impact to the global IPO market but GDP growth also negatively affected the GCC IPO market at the same time. This result obtained because the size of these 2 markets is different. Therefore, GCC IPO market which smaller than global IPO market can respond more sharply than global IPO market. Mehmood et al. (2020) also claimed the GDP growth rate move in a same direction with the IPO volume

in Pakistan. The higher GDP growth rate act as a sign for the people and the firms to make an investment in the market. Business cycle theory also emphasize that when economy enter expansion period, the market will also mirror the stages. This means a strong health of the economy increase the number of IPOs issued. Besides, Meluzín et al. (2014) have declared the GDP growth rate bring a crucial impact to the number of IPOs in the Poland from the period of 1992 until 2012. However, research which conducted in Nepal from the period of 1993 until 2015 shows the study did not discover significant relationship between the GDP growth rate and the number of IPO (Laohakosol et al., 2018). This result is quite different with others research which been conducted. Due to the evidence showed, the hypothesis is as follows:

H2: There is a positive relationship between GDP growth rate and the number of IPOs.

# 2.2.4 Lending Interest Rate

Interest rate affect the decision of the firms on issuing the IPO. When refer to the neoclassical economic theory, the interest rate, investment and financing action able to interact dynamically. Firms able to raise more capital to acquire the target or issued the IPO with the lower level of lending interest rate. Normally, the firm unwilling to go public during the period with a higher lending interest rate. This is because the borrower or the firms need to pay for a higher cost in the future when there is a higher lending interest rate. Thus, the expected return and reward of the firms will be affected since they need to pay a higher cost to the lender or the bank. So, the firms are discouraged to issue IPO when the lending interest rate increasing (Laohakosol et al., 2018). According to Mehmood et al. (2020), number of IPO in Pakistan has discovered had opposite relationship with

lending interest rate. This shows the firms unwilling to issued IPO during a high interest rate period because the firm will need to pay a higher cost of the bank loans. Laohakosol et al. (2018) declared the lending interest rate can negatively and significantly affect the number of IPOs in Nepal. This negative relationship represents the number of IPOs decrease when the lending interest rate increase. This is because the high lending interest rate let them not willing to issue the IPO since the firms' return will be discounted heavily compared to the low lending interest rate period. Due to the evidence showed above, the hypothesis is as follows:

H3: There is a negative relationship between the lending interest rate and the number of IPOs.

# 2.3 Proposed Theoretical Framework

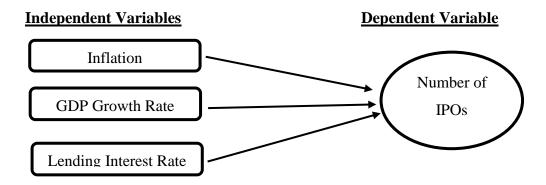


Figure 2.1: Proposed theoretical framework for the relationship between macroeconomic factors and the number of IPO in the United States from 2001 Q1-2020 Q4.

The framework above shows the relationships between the macroeconomic factors and the number of IPOs in the United States. When we review the previous literature, we have decided on using the inflation, GDP growth rate and lending interest rate

as our independent variables while using the IPO volume as the dependent variable in our research project.

**CHAPTER 3: METHODOLOGY** 

3.0 Introduction

As a mean to analyses time-series data, under this chapter will discuss about

mathematical model and techniques developed for our study.

3.1 Research Design

Quantitative research method will be put in this research project to identify the

patterns, forecasting causal relationship. In order to identify the effect of

macroeconomic variables such as inflation, GDP growth rate, and lending interest

rate towards the number of IPOs in the United States, 20 years from 2001 to 2020

has been studied. In pursuance of describing the cause and effect between number

of IPO and macroeconomic components, causal research is being conducted.

Furthermore, the consumer price index is the proxy for inflation, percentage of GDP

growth rate is an indicator for GDP and percentage of lending interest rate applied

to the study.

3.2 Data Collection Method

Secondary data are being developed in our study. These statistic and data are the

time-series data derived from the sources such as IPOScoop, PWC, Bloomberg and

Federal Reserve Economic Data. The data were collected quarterly from 2001 Q1 until 2020 Q4 which total up to 80 observations.

Table 3.1: Variables, unit measurement and sources of data.

Variables	<b>Unit Measurement</b>	Sources
Number of IPOs	Frequency	IPOScoop & PWC
Inflation	Index	Bloomberg
GDP Growth Rate	Percentage (%)	Bloomberg
Lending Interest Rate	Percentage (%)	Federal Reserve Economic
		Data

# 3.3 Proposed Data Analysis Tool

# 3.3.1 Augmented Dickey Fuller Test (ADF)

From a theoretical viewpoint, Augmented Dickey Fuller test examines the stationary of a given time series as economic time series commonly is non-stationary. In order to perform ADF test, all variables are transferred into natural logarithms to find out their first differences for every unit root at the level. ADF estimation equation is as follows:

$$\Delta y_t = \alpha + \beta_t + \gamma y_t + e_t$$

Where  $\Delta y_t$  is  $y_t - y_{t-1}$  and is tested for the number of IPOs.  $\alpha$  is the constant. If  $\gamma = 0$  random walk process present while  $-1 < 1 + \gamma < 1$  stationary process exists. Besides, Schwarz Bayesian Criterion is also selected to identify the number of the suitable lag length in the regression for ADF test (Prabhakaran, 2019).

## 3.3.2 Johansen Co-integration Test

Johansen Co-integration test is a test which been used to test for the longrun cointegration relationships between the multiple variables of the research. Normally, this test is used for larger sample sizes and time-series data. So, this Johansen Co-integration test is suitable for us to carry out in our research since we focus our research in the United States which has a large population or sample size and we use time-series data as our research data. Furthermore, the Johansen Co-integration test is more preferable than the Engle-Granger test because this test allowed for testing multiple cointegration relationships ("Cointegration", n.d.). According Hjalmarsson and Österholm (2007), Johansen Co-integration test begin with the vector autoregressive (VAR) model. When there is an error correction mechanism appears, the VAR converted into the vector error correction (VEC) model (Tran & Jeon, 2011). Under Johansen Co-integration test, there are two forms of test which are trace test and the maximum eigenvalue test. The hypothesis of the research is as follows:

H<sub>0</sub>: There is no long-run relationship between independent variables and dependent variables.

H<sub>1</sub>: There is long-run relationship between independent variables and dependent variables.

# 3.3.3 Granger-causality Test

Granger-Causality test was proposed by Granger in 1969 and modified by

Sims in 1972. It is used to test the causality relationship between

independent and dependent variables in the short-run (Gujarati & Porter,

2009). According to Rossi (2013), the Granger Causality Test identifies

whether a time series variable can predict another variable. However, we

can only know the direction of causality between the variables and cannot

estimate the effect on the dependent variable in the short run. There are two

approaches to establish the Granger-Causality test, which are the p-value

and F statistics test.

H<sub>0</sub>: Variable X does not granger causes the variable Y.

H<sub>1</sub>: Variable X does granger causes the variable Y.

When p-value is smaller than the significance level or F-test statistic is

larger than the critical value, the null hypothesis is rejected. Therefore, there

is sufficient evidence to conclude that variable X does granger causes the

variable Y.

3.3.4 Normality Test- Jarque-Bera Test

Jarque-Bera test uses for examine the normality of the econometric model.

It can be used to determine whether the sample data is normality distribution

by observing the skewness and kurtosis measurement. There are two

approaches to test the normality distribution, which are Jarque-Bera

formulation and p-value.

H<sub>0</sub>: Error terms are normally distributed.

H<sub>1</sub>: Error terms are not normally distributed.

Null hypothesis is rejected, if the p-value is lower than the significance level or JB statistic is larger than the critical value, reject null hypothesis. Therefore, there is adequate evidence to conclude that error terms are not normally distributed.

## 3.3.5 Multicollinearity

Multicollinearity is the econometrics problem arises when independent variables had a relationship accompanied by one another in the regression model (Gujarati & Porter, 2009). There are several ways to detect multicollinearity in the model. We can look at a high R² but few significant t-value; thus, we can assume it has multicollinearity problems in the model. Other than that, we can look at the high pair wide of two or more variables whether they correlate. The model will consider a multicollinearity problem when the pair-wide correlation between two variables is more than 0.8. We can use Variance Inflation Factor (VIF) and Tolerance (TOL) method to identify the problem of multicollinearity in our economic model. The model has a high collinearity problem when the VIF≥10 or TOL is close to 0. The model has perfect collinearity when VIF is infinite or TOL is 0. The model has no collinearity when the VIF is 1 or TOL is 1.

Table 3.2: Formula of VIF and TOL.

VIF	$VIF = \frac{1}{(1-r)}$
TOL	$TOL = \frac{1}{VIF}$

3.3.6 Heteroscedasticity

Heteroscedasticity refers to the unequal scatter of the error term in the

regression analysis (Frost, n.d.). This is a problem that normally happens

when all the error terms do not have constant variance over the range of the

measured values ("What is Heteroskedasticity?", n.d.). Thus, this is

considered a problem because Ordinary Least Squares (OLS) regression

considered all error terms to have a constant variance. In this situation which

all the residuals have a constant variance is known as homoscedasticity

(Frost, n.d.).

In order to detect the presence of heteroscedasticity in the research, an

autoregressive conditional heteroscedasticity (ARCH) test can be applied

when doing the data analysis. Gujarati and Porter (2009) stated that the

ARCH test is test which been used to evaluate the volatility of the time series

data. This is suitable for our research as the ARCH test is suitable to test for

time series data. When there is the presence of a heteroscedasticity problem

in the regression model, this problem can be solved with the help of the

Generalized Least Squares (GLS) and Weighted Least Squares (WLS). The

hypothesis of our research is as follows:

H<sub>0</sub>: There is no presence of heteroscedasticity.

H<sub>1</sub>: There is a presence of heteroscedasticity.

3.3.7 Autocorrelation

Autocorrelation uses to identify the relationship between the variable's past

value and current value. Positive correlation describes that an increase in the

time series tend to increase in other time series, while negative correlation

describes an increase in the time series tends to decrease in other time series.

In order to identify whether there is an autocorrelation problem, tests such

as Durbin-Watson test need to be carried out. Values range below 2 is

considered as positive autocorrelation while value range above 2 is

considered as negative autocorrelation in Durbin Watson test. On the other

hand. It can be taken into consideration that the consequence of

autocorrelation will make the OLS estimators assumed the framework are

still unbiased which lead to OLS estimators will be no longer BLUE. In

addition, R<sup>2</sup> will also be overestimated.

When the autocorrelation problem has been detected, Cochrane-Orcutt

Procedure can solve the problem. Cochrane-Orcutt procedure will require

to iterate the procedure when the autocorrelation problem exists. Other than

that, Newey-West estimator is also a remedy to solve the autocorrelation

problem. Newey-West estimator is commonly used to tackle autocorrelation

in time series data where it can enhance OLS regression.

H<sub>0</sub>: There is no autocorrelation problem.

H<sub>1</sub>: There is an autocorrelation problem.

We reject the  $H_0$  when the p-value of F-statistic is lower than 0.05, otherwise

do not reject the null hypothesis.

### **CHAPTER 4: DATA ANALYSIS**

# 4.0 Introduction

This segment will provide the result generated for our study. All the test generated is by using EViews. Moreover, this chapter will show the significant effect as well as the relationship between the number of IPO and inflation, GDP growth rate and lending interest rate for our study.

# 4.1 Descriptive Analysis

Table 4.1: Descriptive Data.

	IPO	CPI	LIR	GDP
Mean	44.8000	92.6895	4.5726	1.7100
Median	39.0000	93.1850	4.0250	2.1000
Maximum	193.0000	110.1100	8.6200	4.4000
Minimum	1.0000	74.2100	3.2500	-9.1000
Std. Dev.	29.3854	10.64052	1.6039	2.0714
Kurtosis	10.07944	1.872959	3.232836	11.97214

Table 4.1 included 80 observations quarterly from 2001 to 2020. The median of CPI is 93.185, the average CPI is 92.6895, the lowest CPI is 74.21, and the highest is 110.11. The standard deviation of CPI is 10.64052, which shows a large fluctuation compared with other variables. Moreover, the kurtosis is less than 3, which means that CPI data is quite stable.

Besides, the median of LIR is 4.025, the average LIR is 4.5726%, the lowest LIR is 3.25%, and the highest is 8.62%. The standard deviation of LIR is 1.6039. The data of LIR is quite volatile as kurtosis is more than 3, which is 3.232836.

Furthermore, the median of GDP is 2.1; the average GDP is 1.71% which, the lowest GDP is -9.1%, and the highest is 4.4%. The standard deviation of GDP is 2.0714. In addition, the data of GDP has a high kurtosis of 11.97214; it is more volatile than others.

# 4.2 Inferential Analysis

## 4.2.1 Multiple Linear Regression Model

The quantitative model is as below:

$$IPO_t = \beta_0 + \beta_1 CPI_t + \beta_2 LIR_t + \beta_3 GDP_t + \mu_t$$
 Model 4.1

The estimated quantitative model is as below:

$$\widehat{IPO_t} = \beta_0 + \beta_1 CPI_t + \beta_2 LIR_t + \beta_3 GDP_t$$
 Model 4.2

N = 80

 $R^2 = 0.158313$ 

Adjusted  $R^2 = 0.125088$ 

Where  $IPO_t$  = Number of Initial Public Offering

 $CPI_t$  = Consumer Price Index

 $LIR_t$  = Lending Interest Rate

 $GDP_t = Gross Domestic Product$ 

Multiple linear regression model is formed to identified the estimation of number of IPO in the Unites States and the three variables. Time series data is used to estimate the model (model 4.1 and model 4.2) which included 80 observations, the data is collected from quarter 1 year 2001 until quarter 4 year 2020. Number of IPO is the output variable whereas inflation, GDP growth rate and lending interest rate are the explanatory variables selected for this project.

#### **Quantitative Model Estimation and Interpretation**

$$\widehat{IPO_t} = \beta_0 + \beta_1 CPI_t + \beta_2 LIR_t + \beta_3 GDP_t$$
 Model 4.2

$$\widehat{IPO_t} = -87.1511 + 1.1795 + 4.9883 - 0.1089$$
 Model 4.3

EViews has generated quantitative estimated model (model 4.3).

#### Interpretation of Beta

$$\beta_0 = -87.1511$$

On average, when all the variables are constant, the number of Initial Public Offering will decrease by 87.1511.

$$\beta_1 = 1.1795$$

If consumer price index increases by 1 index, on average, the number of Initial Public Offering will increase by 1.1795, ceteris paribus.

$$\beta_2 = 4.9883$$

If lending interest rate increases by 1 percent, on average, the number of Initial Public Offering will increase by 4.9883, ceteris paribus.

$$\beta_3 = -0.1089$$

If growth domestic product increases by 1 percent, on average, the number of Initial Public Offering will decrease by 0.1089, ceteris paribus.

#### Interpretation of R- Squared and Standard Error

$$R^2 = 0.158313$$

 $R^2$  of the model is 0.158313. It means that 15.83% of the variation in number of IPO explained by the variation in consumer price index, lending interest rate and gross domestic product.

#### Standard Error = 27.48618

There are 80 observations of the sample size and the standard error of the model is 27.4861. The standard error to the mean ratio also known as coefficient of variation. The standard error to the mean ratio is 0.61353 or 61.35% (27.48618 / 44.8). The higher the ratio, the greater the level of dispersion around the mean.

## **4.2.2** Augmented Dickey Fuller Test (ADF Test)

Augmented Dickey Fuller test was carried out to identify time series data. Before performing unit root test, all the variables are transfer into natural logarithms and being tested for the first differences. The hypothesis is stated as below:

H<sub>0</sub>: The variables are not stationary, unit root exists.

 $H_1$ : The variables are stationary.

Table 4.2: ADF Test.

Variables	Log Level	Log Difference
N_IPO	-6.190291***	-13.35003***
<b>Consumer Price Index</b>	-1.504744	-7.510492***
<b>Lending Interest Rate</b>	-2.238608	-4.569084***
Real GDP	-5.242456***	-8.691855***

Note: All variables are transformed in to natural logarithms. The Augmented Dickey Fuller (ADF) tests are conducted with intercept. T-statistic is the reported number in the table. Number of lags is depended on the selection of Schwarz info criterion. \*\*\*, \*\*, \* denote statistical significance at the 1%, 5% and 10% accordingly.

Table 4.2 above is the result of Augmented Dickey Fuller test generated by EViews. The reported number is categorized into log level and log difference. Based on the hypothesis stated above, null hypothesis is rejected if the series is stationary.

## 4.2.3 Johansen Co-integration Test

Table 4.3: Johansen Co-Integration Test.

Hypothesised	Trace		Max-Eigen		
number of CE(s)	Test	Critical Value	Test	Critical Value	
	Statistic	(%)	Statistic	(%)	
r = 0	60.40977	47.85613	31.02806	27.58434	
$r \le 1$	29.38171	29.79707	14.74260	21.13162	
$r \le 2$	15.49471	15.49471	12.34334	14.26460	
$r \le 3$	2.295759	3.841465	2.295759	3.841465	

Johansen Co-integration test is been used for the purpose to test for the long run relationships between the dependent variable and independent variables.

#### Hypothesis:

 $H_0$  = There is no long-run relationship between dependent variables and independent variables.

 $H_1$  = There is long-run relationship between dependent variables and independent variables.

The table above showed the result of the Johansen Co-integration test which get from the EViews12. Based on the table above, the  $H_0$  is rejected because the test statistic of 60.40977 for the trace test is greater than the critical value of 47.85613 at the significance level of 5%. On the other hand, test statistic of 31.02806 under the max-eigenvalue test also greater than critical value (27.58434) at the significance level. The test statistic in both tests are greater than the critical value at significance level of 5%. This shows both tests reject the  $H_0$ . Therefore, there is long run relationship between dependent variable and independent variables.

# **4.2.4** Granger Causality Test

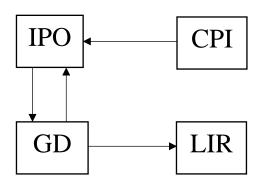
H<sub>0</sub>: No granger cause relationship between variable X and variable Y in short run.

 $H_1$ : Granger cause relationship between variable X and variable Y in short run.

Table 4.4: Granger Causality between variables' result.

Variable Y	Prob.	Result	Conclusion
IPO	0.0420	Reject	Granger cause
CPI	0.4115	Do not reject	No granger cause
IPO	0.7363	Do not reject	No granger cause
LIR	0.5969	Do not reject	No granger cause
IPO	0.0077	Reject	Granger cause
GDP	0.0111	Reject	Granger cause
CPI	0.3063	Do not reject	No granger cause
LIR	0.9883	Do not reject	No granger cause
CPI	0.7861	Do not reject	No granger cause
GDP	0.2442	Do not reject	No granger cause
LIR	0.0051	Reject	Granger cause
GDP	0.4215	Do not reject	No granger cause
	IPO CPI IPO LIR IPO GDP CPI LIR CPI GDP LIR	IPO 0.0420 CPI 0.4115  IPO 0.7363 LIR 0.5969  IPO 0.0077 GDP 0.0111  CPI 0.3063 LIR 0.9883  CPI 0.7861 GDP 0.2442  LIR 0.0051	IPO         0.0420         Reject           CPI         0.4115         Do not reject           IPO         0.7363         Do not reject           LIR         0.5969         Do not reject           IPO         0.0077         Reject           GDP         0.0111         Reject           CPI         0.3063         Do not reject           LIR         0.9883         Do not reject           CPI         0.7861         Do not reject           GDP         0.2442         Do not reject           LIR         0.0051         Reject

Figure 4.1: Relationship between each variable



#### CPI and IPO

The result shows that there is a unidirectional causal relationship from CPI to IPO.

#### LIR and IPO

The result shows that there is no causal relationship between these two variables.

#### GDP and IPO

The result shows that there is causal relationship between these two variables.

#### LIR and CPI

The result shows that there is no causal relationship between these two variables.

#### GDP and CPI

The result shows that there is no causal relationship between these two variables.

#### GDP and LIR

The result shows that there is a unidirectional causal relationship from GDP to LIR.

# 4.3 Diagnostic Checking

# **4.3.1 Jarque-Bera Test**

Table 4.5: Result of Jarque-Bera Test.

P-value	0.0000
$H_0$	: Error term is normally distribution
$H_1$	: Error term is not normally distribution
Decision Rule	: Reject $H_0$ , if P-value is less than significant level. Otherwise, do not reject $H_0$ .
Level of significant	: 5%
P-value	: 0.0000
Decision Making	: Reject H <sub>0</sub> since p-value is less than significant level.

# 4.3.2 Multicollinearity

Conclusion

Table 4.6: Result of Variable Inflation Factor (VIF).

	Centered VIF	Result
CPI	1.2371 < 10	Do not reject
LIR	1.2456 < 10	Do not reject
GDP	1.0616 < 10	Do not reject

: Error term is not normally distribution.

Based on table 4.6, the result shows the VIF of each variable are below 10, which means that model does not exist multicollinearity problem.

## 4.3.3 Heteroscedasticity

Table 4.7: Result of ARCH Test.

P-value	0.0074	

Heteroscedasticity is the unequal scatter of the error term in the regression analysis. Autoregressive Conditional Heteroscedasticity (ARCH) test is generated to test for the presence of the heteroskedasticity problem

#### Hypothesis:

 $H_0$  = There is no presence of heteroscedasticity.

 $H_1$  = There is a presence of heteroscedasticity.

The table above showed the result of the ARCH test which get from the EViews 12 to test for the heteroscedasticity. Based on the table above, the  $H_0$  is rejected because the p-value of 0.0074 is smaller than significance level of 5%. Therefore, heteroscedasticity problem exists in this research.

#### 4.3.4 Autocorrelation

Autocorrelation also named as serial correlation which is to identify the repeating pattern of the model.

Durbin-Watson Test is formed to distinguish autocorrelation problem. The test will generate value between 0 to 4, where:

Table 4.8: Identification of autocorrelation.

No Autocorrelation	Positive Autocorrelation	Negative correlation
2	0  to  < 2	>2 to 4

H<sub>0</sub>: There is no autocorrelation problem.

H<sub>1</sub>: There is autocorrelation problem.

Table 4.9: Result of Durbin-Watson Test.

1.543006	
	1.543006

Since the test statistic for Durbin Watson test falls between 0 to less than 2 which is 1.543006. Hence, we can conclude that there is a positive autocorrelation in this quantitative model.

#### **Breusch-Godfrey Serial Correlation LM Test**

For the purpose to solve autocorrelation in the model, Breusch-Godfrey test is generated by using EViews.

Table 4.10: Result of Breusch-Godfrey Serial Correlation LM Test.

Test Statistic	0.5704

Since the test statistic is greater than critical value. We cannot reject null hypothesis. Hence, we can conclude that there is no autocorrelation problem in this model.

## **CHAPTER 5: CONCLUSION**

### 5.0 Introduction

This chapter is a summary for this project. It comprises from Chapter 1 to Chapter 4. The project intends to study the relationship between macroeconomic factors and the number of Initial Public Offering in the United States. The data collected for this project is from 2001 Quarter 1 until 2020 Quarter 4 with a total number of 80 observations. The independent variables included inflation, GDP growth rate and lending interest rate while the dependent variable is the number of IPO. All the test in Chapter 4 is generated by using EViews.

# **5.1 Discuss of Findings**

*Table 5.1 Summary of outcome.* 

Dependent	Independent	Significance	Predicted	EViews
Variable	Variable	Level	Sign	Result
Number of	Inflation	5%	Negative	Positive
IPO				
Number of	Real GDP	5%	Positive	Negative
IPO	<b>Growth Rate</b>			
Number of	Lending	5%	Negative	Positive
IPO	Interest Rate			

Table 5.1 summarized the results from Chapter 4. Each variable is tested with 5% of significance level. Number of IPO which is the dependent variable has tested

positive with the independent variables inflation and lending interest rate. On the other hand, real gross domestic has a negative relationship with the number of IPO.

As mentioned above in the table, there is positive relationship between number of IPO and inflation. Consumer Price Index (CPI) is method to measure inflation. Omran and Pointon (2001) claimed that there is negative relationship and stated that company will be unmotivated when there is high inflation happening. This is due to the reason that investor will request higher return and lead to the increase of cost of capital. However, Mehmood et al. (2020) discover that inflation is positive significantly towards the number of IPO in Pakistan. Whenever the market is developing and trending, it cannot be denied that inflation will cause violation in the stock market, but some stock will tend to perform better in high inflation condition. Although the risk that might face under high inflation period, it is also an indicator for the investor that the company are likely to grow as well. Investor will gain confidence from the market.

GDP is a proxy for a country to represent their market condition and business operations. This paper used GDP growth rate as a measurement and the result obtained is negative sign which is not as expected. However, Laohakosol et al. (2018) has studied the relationship between the number of IPO in Nepal and GDP growth rate. The result at last indicated that GDP growth has no significant influence the number of IPO.

The table point out that lending interest rate possess positive relationship with the number of IPO in the United States which is opposed to the finding of Mehmood et al. (2018) and Ameer (2012). As a consequence of the finding of the researchers does not clearly mention the type of interest used for their study, it may have different result with our study. Besides, the cause and mechanism that the result is opposite may due to the different in terms of country size, type of interest used in every finding.

Furthermore, as mentioned in Chapter 2 our project consists of three underlying theories which are capital demand theory, theory of IPO wave and business cycle theory. Based on our research, we found out that the result of our project is consistent will all the theories stated. It is necessary to highlight that capital demand hypothesis also based on the condition of the market. Alternatively, theory of IPO wave is a theory of when there is hot IPO market when the former IPO established a learning process for the new IPO issuer. Lastly, the business cycle indeed act as an important tool for the company to determine the time to go public. Company will benefit from going public during the expansion period.

# 5.2 Summary on Statistical Analysis

Table 5.2: Summary of result.

Test	Result			
Normality	Error term is not normally distributed.			
Multicollinearity	Not existed multicollinearity problem.			
Heteroscedasticity	Existed heteroscedasticity problem.			
Autocorrelation	Autocorrelation detected and solved.			
Unit Root Test	Only CPI and LIR are non-stationary at log level, others			
	are stationary.			
Cointegration	The four variables have long run equilibrium			
	relationship.			
Granger Causality	There is a unidirectional causal relationship from CPI			
	to IPO, and GDP to LIR, others does not have causal			
	relationship between each other.			

## **5.3 Implication of Study**

## 5.3.1 Implication to Policymaker

The implication of our research to the policymakers is to provide them the understanding and discussion on how the macroeconomic variables affect the number of IPO in the U.S. Therefore, the policymakers can use our study as a reference in order for them to achieve the development of economic growth as well as the economic stability of the country. According to Cornaggia et al. (2019), the increasing volume of IPO increases the employment and investment opportunity as the demand for labour and capital increases when the company which previously private listed go public. The economic condition will be improved indirectly. Thus, the policymakers can issue suitable monetary policy to control the inflation of the country. The policymakers can issue the expansionary policy if they wish to increase inflation by increasing the money supply of the country. This is because our research shows the consumer price index and volume of IPO are in a positive relationship. If the policymakers wish to lower the inflation which is quite high, they can issue the contractionary policy to reduce the money supply ("Impacts of Federal Reserve Policies", n.d.).

## **5.3.2 Implication to Investor**

Normally, the retail investor would like to invest for the purpose of gaining additional income. Identifying the variables which affect the volume of IPO

will be important for them. So, our research brings the implication to the retail investors because the retail investors can identify the macroeconomic variables which affect the volume of IPO through this research, especially those retail investors who wish to invest the IPO in the U.S. Retail investors are suggested to have a thorough understanding on how the macroeconomic variables affect the IPO volume before making the decision to invest in the IPO. This is because a correct timing which there is a high volume of IPO can let the retail investors gain more. Careful consideration and thorough understanding can prevent the retail investors from wrong decision-making and bear for the losses.

## **5.3.3 Implication to Educational Field**

This research implicates the education field, especially those researchers or academicians who wish to have the research which topic related. This can serve as a reference for future research which is topic-related. Those in the education field are suggested to discover more variables that may affect the volume of IPO and compare this research with others in order to carry out improvement on the future research and increase the understanding of this type of research. Those researchers and academicians also suggested carrying out more research related as there is only a limited amount of study on the macroeconomic variables that affect the number of IPO. Most of the study is more focusing on the perspective of corporate finance.

## 5.3.4 Implication to Company which Want to Issue IPO

Our research not only brings the implication to the policymaker, investor, and education field, the research also implicates the companies which want to issue the IPO. The research can act as guidance or reference for the company before the management of the company have a decision making to issue IPO. The company management team should use their professional knowledge and experience to evaluate everything before letting the company go public. The company also suggested analysing and evaluating all the variables which may affect the volume of IPO before doing the decision in order to prevent the company from the face with difficulty in which unable to raise the desired amount of capital. This is because the macroeconomic effect on the low IPO volume may show the company not willing to go public during that economic condition because can't raise sufficient capital and less investor willing to invest during that period.

# **5.4 Limitations of Study**

Limited available data is one of the limitations of our study. Initially, this study plans to examine the quarterly data from year 1991 to 2020 for each variable data. However, one of the variables is only available from year 2001 to 2020. Therefore, quarterly data from year 2001 to 2020 had been chosen to use in this study. Besides, monthly and daily data are more reliable because of its high accuracy. However, this study failed to collect the data in monthly and weekly. This is because most of the variables selected are recorded annually or quarterly; not each variable data is recorded monthly and daily. Hence, quarterly data decided to be used to conduct this research.

Moreover, the variables are difficult to find a similar journal to support the result in this study. The finding retrieved from developing countries might not be suitable to apply in developed countries such as United States because most of the journals are based on developing countries' performance and trends. This study is only aimed to be conducted in United States, a developed country. Thus, the result obtained was only useful and helpful for stakeholders in United States. Different countries have different characteristics such as culture, policy factors, and background. Therefore, the finding might not reflect the character of Initial Public Offering in other developed or developing countries.

Furthermore, limited variable is also one of the weaknesses in this research. Initially, our research studies the relationship between the number of IPO and independent variables such as stock market return, industrial production, inflation, GDP Growth rate and lending interest rate. However, the indicator of stock market return, market index (S&P 500) and Industrial Production Index (IPI) showed insignificant with other variables during the EViews running process. Therefore, after trying a different approach, the decision made is to take out the stock market index (S&P 500) and Industrial Production Index (IPI) while remaining the other three independent variables to get a significant result.

#### 5.5 Recommendation for Future Research

As mentioned in the limitations of the study part before, we can notice that there is limited availability of data. Therefore, future researchers are recommended to study and get the quarterly data that is available in the earlier years. This can make sure the future researchers are able to carry out a study with sufficient data and get a precise result after running the test. Those research data is also required to get from reliable websites for instance Bloomberg, Yahoo Finance, World Bank database, OECD Economic Outlook Database and so forth to prevent the inaccuracy of the data.

Furthermore, the journal is really important as a reference to support the study conducted. Thus, future researchers are recommended to look for textbooks, other references, and more resources in order to support the content of the research if there is a lack of similar journals on the online platform such as UTAR online library, Google Scholar, Science Direct, SAGE Journals and many more. Those textbooks and reference books which required to perform as the supporting evidence of the research which conducted by future researchers can be found in the library. The application of different sources of reference can contribute to the improvement of the result of the research conducted by future researchers and lead to the success.

On the other hand, there is a result in this study that shows an inverse to the result observed in the previous study reviewed. This result may be affected by the type of interest rate which is different from the interest rate used by past research. Thus, future researchers are suggested to carry out the topic-related study by looking for various interest rates besides the lending interest rate. This is to determine whether different types of interest rates carry out different results. Therefore, research results can be improved and more appropriate to be used as a reference for future researchers. By identifying the most appropriate interest rate which can positively affect the number of IPO, retail investors, policymakers, and IPO issuers can get definite assistance from this research.

At the same time, the result which is inverse to the result observed in the previous study review may also affect by the different type of GDP data adopted by the past study. Similar to the recommendation mentioned above, future researchers are recommended to carry out the study with different type of GDP. The future researcher can observe any variations through different research results obtained. Therefore, they can get the improvement from this research and provide more creditable references for those who benefit from similar research.

Originally, there are 5 macroeconomic variables adopted in this study to examine the relationships between the number of IPO and Gross Domestic Product growth rate, inflation, lending interest rate, stock market return, and industrial production. However, 2 of them which are stock market return and industrial production showed insignificantly relationships with the number of IPOs. So, this means these 2 macroeconomic variables are not the important factors to affect the number of IPOs. Thus, future researchers are recommended to revisit these 2 variables to determine the possible reason that led to this insignificant relationship.

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#### **APPENDICES**

### **Appendix 4.1: Descriptive Analysis**

	IPO	CPI	LIR	GDP
Mean	44.80000	92.68950	4.572625	1.710000
Median	39.00000	93.18500	4.025000	2.100000
Maxim um	193.0000	110.1100	8.620000	4.400000
Minimum	1.000000	74.21000	3.250000	-9.100000
Std. Dev.	29.38544	10.64052	1.603891	2.071421
Skewness	1.881525	-0.197589	1.173723	-2.589721
Kurtosis	10.07944	1.872959	3.232836	11.97214
Jarque-Bera	214.2632	4.754623	18.54905	357.7533
Probability	0.000000	0.092800	0.000094	0.000000
Sum	3584.000	7415.160	365.8100	136.8000
Sum Sq. Dev.	68216.80	8944.435	203.2247	338.9720
Observations	80	80	80	80

#### **Appendix 4.2: Augmented Dickey Fuller Test**

### **Appendix 4.2.1: Number of IPO (log level)**

Null Hypothesis: LNUMBER\_OF\_IPO has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fu Test critical values:	ller test statistic 1% level 5% level 10% level	-6.190291 -3.515536 -2.898623 -2.586605	0.0000

<sup>\*</sup>MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation Dependent Variable: D(LNUMBER\_OF\_IPO)

Method: Least Squares Date: 03/01/22 Time: 22:57 Sample (adjusted): 2 80

Included observations: 79 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNUMBER_OF_IPO(-1)	-0.664614 2.351303	0.107364 0.391429	-6.190291 6.006966	0.0000
	2.331303	0.391429	0.000900	0.0000
R-squared	0.332291	Mean depen	dent var	0.001448
Adjusted R-squared	0.323620	S.D. dependent var		1.031989
S.E. of regression	0.848732	Akaike info o	riterion	2.534845
Sum squared resid	55.46668	Schwarz cri	terion	2.594831
Log likelihood	-98.12636	Hannan-Qui	nn criter.	2.558877
F-statistic	38.31971	Durbin-Wats	son stat	2.049047
Prob(F-statistic)	0.000000			

## **Appendix 4.2.2: Number of IPO (log difference)**

Null Hypothesis: D(LNUMBER\_OF\_IPO) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fulle Test critical values:	er test statistic 1% level 5% level 10% level	-13.35003 -3.516676 -2.899115 -2.586866	0.0001

<sup>\*</sup>MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation Dependent Variable: D(LNUMBER\_OF\_IPO,2)

Method: Least Squares Date: 03/01/22 Time: 22:59 Sample (adjusted): 3 80

Included observations: 78 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNUMBER_OF_IPO(-1)) C	-1.397130 0.012752	0.104654 0.107963	-13.35003 0.118114	0.0000 0.9063
R-squared Adjusted R-squared S.E. of regression Sum squared resid Log likelihood F-statistic Prob(F-statistic)	0.701050 0.697117 0.953502 69.09666 -105.9503 178.2234 0.000000	Mean depen S.D. depend Akaike info d Schwarz cri Hannan-Qui Durbin-Wats	lent var riterion terion nn criter.	0.015066 1.732543 2.767957 2.828385 2.792147 2.143822

#### **Appendix 4.2.3: Consumer price index (log level)**

Null Hypothesis: LCONSUMER\_PRICE\_INDEX has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.504744	0.5261
Test critical values:	1% level	-3.515536	
	5% level	-2.898623	
	10% level	-2.586605	

<sup>\*</sup>MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(LCONSUMER\_PRICE\_INDEX)

Method: Least Squares Date: 03/01/22 Time: 23:04 Sample (adjusted): 2 80

Included observations: 79 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LCONSUMER_PRICE_INDEX(-1)	-0.008108 0.041644	0.005388 0.024364	-1.504744 1.709236	0.1365 0.0914
	0.041044	0.024304	1.703230	0.0314
R-squared	0.028566	Mean dependent var		0.004994
Adjusted R-squared	0.015950	S.D. depend	lent var	0.005575
S.E. of regression	0.005530	Akaike info c	riterion	-7.532236
Sum squared resid	0.002355	Schwarz cri	terion	-7.472250
Log likelihood	299.5233	Hannan-Qui	nn criter.	-7.508203
F-statistic	2.264254	Durbin-Wats	son stat	1.736766
Prob(F-statistic)	0.136481			

#### **Appendix 4.2.4: Consumer price index (log difference)**

Null Hypothesis: D(LCONSUMER\_PRICE\_INDEX) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test st	atistic	-7.510492	0.0000
Test critical values:	1% level	-3.516676	
	5% level	-2.899115	
	10% level	-2.586866	

<sup>\*</sup>MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(LCONSUMER\_PRICE\_INDEX,2)

Method: Least Squares Date: 03/01/22 Time: 23:05 Sample (adjusted): 3 80

Included observations: 78 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LCONSUMER_PRICE_INDEX(-1)) C	-0.851410 0.004228	0.113363 0.000847	-7.510492 4.989925	0.0000 0.0000
R-squared Adjusted R-squared S.E. of regression Sum squared resid Log likelihood F-statistic Prob(F-statistic)	0.426014 0.418462 0.005580 0.002367 295.0413 56.40749 0.000000	Mean depen S.D. depend Akaike info d Schwarz cri Hannan-Qui Durbin-Wats	dent var criterion terion nn criter.	-1.26E-05 0.007317 -7.513881 -7.453452 -7.489690 1.949237

#### **Appendix 4.2.5: Lending Interest Rate (log level)**

Null Hypothesis: LLENDING\_INTEREST\_RATE has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test s Test critical values:	1% level 5% level 10% level	-2.238608 -3.516676 -2.899115 -2.586866	0.1946

<sup>\*</sup>MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(LLENDING\_INTEREST\_RATE)

Method: Least Squares Date: 03/01/22 Time: 23:08 Sample (adjusted): 3 80

Included observations: 78 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LLENDING_INTEREST_RATE(-1) D(LLENDING_INTEREST_RATE(-1)) C	-0.049972 0.598313 0.070133	0.022323 0.086734 0.033395	-2.238608 6.898267 2.100118	0.0281 0.0000 0.0391
R-squared Adjusted R-squared S.E. of regression Sum squared resid Log likelihood F-statistic Prob(F-statistic)	0.408819 0.393054 0.059866 0.268798 110.4725 25.93234 0.000000	Mean depen S.D. depend Akaike info c Schwarz crit Hannan-Qui Durbin-Wats	lent var criterion terion nn criter.	-0.010451 0.076844 -2.755704 -2.665061 -2.719418 2.198887

#### **Appendix 4.2.6: Lending Interest Rate (log difference)**

Null Hypothesis: D(LLENDING\_INTEREST\_RATE) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic Test critical values: 1% level 5% level 10% level		-4.569084 -3.516676 -2.899115 -2.586866	0.0004

<sup>\*</sup>MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(LLENDING\_INTEREST\_RATE,2)

Method: Least Squares Date: 03/01/22 Time: 23:10 Sample (adjusted): 3 80

Included observations: 78 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LLENDING_INTEREST_RATE(-1)) C	-0.406493 -0.003028	0.088966 0.007044	-4.569084 -0.429933	0.0000 0.6685
R-squared Adjusted R-squared S.E. of regression Sum squared resid Log likelihood F-statistic Prob(F-statistic)	0.215496 0.205174 0.061426 0.286759 107.9499 20.87653 0.000019	Mean depen S.D. depend Akaike info d Schwarz cri Hannan-Qui Durbin-Wats	lent var criterion terion nn criter.	0.002056 0.068899 -2.716665 -2.656236 -2.692474 2.147286

#### **Appendix 4.2.7: Real GDP (log level)**

Null Hypothesis: LREAL\_GDP\_\_YOY\_\_\_ has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fulle Test critical values:	r test statistic 1% level 5% level 10% level	-5.242456 -3.525618 -2.902953 -2.588902	0.0000

<sup>\*</sup>MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LREAL\_GDP\_\_YOY\_\_\_\_

Method: Least Squares Date: 03/01/22 Time: 23:12 Sample (adjusted): 2 77

Included observations: 71 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LREAL_GDPYOY(-1)	-0.522478 0.363161	0.099663 0.092761	-5.242456 3.915022	0.0000 0.0002
R-squared Adjusted R-squared S.E. of regression Sum squared resid Log likelihood F-statistic Prob(F-statistic)	0.284851 0.274486 0.503991 17.52648 -51.08130 27.48335 0.000002	Mean depen S.D. depend Akaike info c Schwarz crit Hannan-Qui Durbin-Wats	lent var riterion terion nn criter.	-0.008537 0.591698 1.495248 1.558985 1.520594 1.120030

# **Appendix 4.2.8: Real GDP (log difference)**

Null Hypothesis: D(LREAL\_GDP\_YOY\_\_) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller Test critical values:	test statistic 1% level 5% level 10% level	-8.691855 -3.528515 -2.904198 -2.589562	0.0000

<sup>\*</sup>MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(LREAL\_GDP\_\_YOY\_\_\_,2)

Method: Least Squares Date: 03/01/22 Time: 23:13 Sample (adjusted): 3 77

Included observations: 69 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LREAL_GDPYOY(-1))	-0.970281 -0.040456	0.111631 0.057921	-8.691855 -0.698465	0.0000 0.4873
R-squared Adjusted R-squared S.E. of regression Sum squared resid Log likelihood F-statistic Prob(F-statistic)	0.529984 0.522969 0.479647 15.41411 -46.19736 75.54834 0.000000	Mean depen S.D. depend Akaike info d Schwarz cri Hannan-Qui Durbin-Wats	dent var criterion terion nn criter.	-0.079915 0.694462 1.397025 1.461782 1.422716 1.849515

# **Appendix 4.3: Johansen Co-Integration Test**

Date: 03/02/22 Time: 11:28 Sample (adjusted): 2001Q4 2020Q4 Included observations: 77 after adjustments Trend assumption: Linear deterministic trend

Trend assumption: Linear deterministic trend Series: NUMBER\_OF\_IPO CONSUMER\_PRICE\_INDEX LENDING\_INTERES...

Lags interval (in first differences): 1 to 2

#### Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None * At most 1 At most 2 At most 3	0.331662	60.40977	47.85613	0.0022
	0.174249	29.38171	29.79707	0.0558
	0.148115	14.63910	15.49471	0.0670
	0.029375	2.295759	3.841465	0.1297

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None * At most 1 At most 2	0.331662 0.174249 0.148115	31.02806 14.74260 12.34334	27.58434 21.13162 14.26460	0.0173 0.3074 0.0984
At most 3	0.029375	2.295759	3.841465	0.1297

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

<sup>\*</sup> denotes rejection of the hypothesis at the 0.05 level \*\*MacKinnon-Haug-Michelis (1999) p-values

<sup>\*</sup> denotes rejection of the hypothesis at the 0.05 level

<sup>\*\*</sup>MacKinnon-Haug-Michelis (1999) p-values

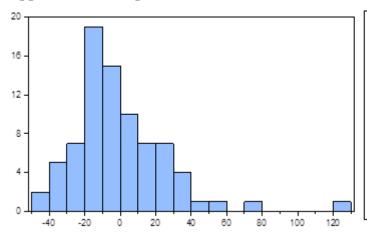
# **Appendix 4.4: Granger Causality Test**

Pairwise Granger Causality Tests Date: 03/02/22 Time: 12:27 Sample: 2001Q1 2020Q4

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
CPI does not Granger Cause IPO	78	2.05311	0.1357
IPO does not Granger Cause CPI		4.29605	0.0172
LIR does not Granger Cause IPO	78	1.77255	0.1771
IPO does not Granger Cause LIR		3.48095	0.0360
GDP does not Granger Cause IPO	78	4.94565	0.0097
IPO does not Granger Cause GDP		8.75429	0.0004
LIR does not Granger Cause CPI	78	0.33844	0.7140
CPI does not Granger Cause LIR		1.34740	0.2663
GDP does not Granger Cause CPI	78	0.04905	0.9522
CPI does not Granger Cause GDP		0.87899	0.4195
GDP does not Granger Cause LIR	78	0.88785	0.4159
LIR does not Granger Cause GDP		1.65060	0.1990

# Appendix 4.5: Jarque-Bera Test



Series: Residuals Sample 2001Q1 2020Q4 Observations 80					
Mean	3.47e-14				
Median	-6.426705				
Maximum	129.6311				
Minimum	-48.45806				
Std. Dev.	26.95923				
Skewness	1.694144				
Kurtosis 8.594717					
Jarque-Bera 142.6045					
Probability	0.000000				

# **Appendix 4.6: Multicollinearity**

Variance Inflation Factors Date: 02/28/22 Time: 13:44 Sample: 2001Q1 2020Q4 Included observations: 80

Variable	Coefficient	Uncentered	Centered
	Variance	VIF	VIF
CPI	0.104493	96.29981	1.237120
LIR	4.630427	11.49769	1.245572
GDP	2.366069	1.794228	1.061604
C	1257.883	133.1992	NA

# **Appendix 4.7: Heteroscedasticity**

Heteroskedasticity Test: ARCH

F-statistic	7.572379	Prob. F(1,77)	0.0074
Obs*R-squared	7.073443	Prob. Chi-Square(1)	0.0078

Test Equation:

Dependent Variable: RESID^2 Method: Least Squares Date: 03/02/22 Time: 18:34 Sample (adjusted): 2001Q2 2020Q4 Included observations: 79 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C RESID^2(-1)	510.0636 0.299069	230.0989 0.108681	2.216715 2.751796	0.0296 0.0074
R-squared Adjusted R-squared S.E. of regression Sum squared resid Log likelihood F-statistic Prob(F-statistic)	0.089537 0.077713 1923.040 2.85E+08 -708.4546 7.572379 0.007387	Mean depend S.D. dependo Akaike info c Schwarz crite Hannan-Quir Durbin-Watso	ent var riterion erion nn criter.	725.5889 2002.421 17.98619 18.04618 18.01023 1.935510

# **Appendix 4.8: Autocorrelation**

# Appendix 4.8.1: Durbin-Watson Test

Dependent Variable: IPO Method: Least Squares Date: 02/09/22 Time: 23:00 Sample: 2001Q1 2020Q4 Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CPI	1.179508	0.323254	3.648858	0.0005
GDP	-0.108925	1.538203	-0.070813	0.9437
LIR	4.988250	2.151843	2.318129	0.0231
С	-87.15112	35.46664	-2.457270	0.0163
R-squared	0.158313	Mean depen	dent var	44.80000
Adjusted R-squared	0.125088	S.D. depend		29.38544
S.E. of regression	27.48618	Akaike info c	riterion	9.513950
Sum squared resid	57417.23	Schwarz crite	erion	9.633051
Log likelihood	-376.5580	Hannan-Quir	nn criter.	9.561701
F-statistic	4.764932	Durbin-Watson stat		1.542763
Prob(F-statistic)	0.004258			

# Appendix 4.8.2: Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test: Null hypothesis: No serial correlation at up to 2 lags

F-statistic	0.519072	Prob. F(2,72)	0.5973
Obs*R-squared	1.122884	Prob. Chi-Square(2)	0.5704

Test Equation: Dependent Variable: RESID Method: Least Squares Date: 03/15/22 Time: 13:26 Sample: 280

Included observations: 79
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C LENDING_INTEREST_RATE REAL_GDPYOY CONSUMER_PRICE_INDEX LAGN_IPO RESID(-1) RESID(-2)	108.6799 -6.389559 0.182825 -1.472029 1.271201 -1.287196 -0.256923	112.7952 6.681355 1.584625 1.486610 1.253217 1.263853 0.276954	0.963515 -0.956327 0.115375 -0.990192 1.014350 -1.018469 -0.927675	0.3385 0.3421 0.9085 0.3254 0.3138 0.3119 0.3567
R-squared Adjusted R-squared S.E. of regression Sum squared resid Log likelihood F-statistic Prob(F-statistic)	0.014214 -0.067935 27.30069 53663.58 -369.6773 0.173024 0.983274	Mean depen S.D. depend Akaike info o Schwarz cri Hannan-Qui Durbin-Wats	dent var dent var criterion terion nn criter.	-1.69E-14 26.41807 9.536134 9.746085 9.620247 1.983765

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# FACULTY OF BUSINESS AND FINANCE UNIVERSITI TUNKU ABDUL RAHMAN

Date: 6 April 2022

#### SUBMISSION OF FINAL YEAR PROJECT /DISSERTATION/THESIS

It is hereby certified that Evon Foo Yuet Wen (ID No: 18ABB02588) has completed this final year project entitled "Relationship between Initial Public Offering and Macroeconomic Factors in the U.S." under the supervision of Mr. Adam Arif Lee Aik Keang from the Department of Finance, Faculty of Business and Finance.

I understand that University will upload softcopy of my final year project in pdf format into UTAR Institutional Repository, which may be made accessible to UTAR community and public.

Yours truly,

(Evon Foo Yuet Wen)

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Date: 6 April 2022

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It is hereby certified that Tang Hui Yi (ID No: 18ABB02196) has completed this final year project entitled "Relationship between Initial Public Offering and Macroeconomic Factors in the U.S." under the supervision of Mr. Adam Arif Lee Aik Keang from the Department of Finance, Faculty of Business and Finance.

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(Tang Hui Yi)	

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Date: 6 April 2022

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It is hereby certified that Wong Wee Kang (ID No: 18ABB05735) has completed this final year project entitled "Relationship between Initial Public Offering and Macroeconomic Factors in the U.S." under the supervision of Mr. Adam Arif Lee Aik Keang from the Department of Finance, Faculty of Business and Finance.

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Yours truly, Kang (Wong Wee Kang)

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(APPENDIX F)

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# FACULTY OF BUSINESS AND FINANCE

Full Name(s) of	Evon Foo Yuet Wen; Tang Hui Yi; Wong Wee Kang	
Candidate(s)		
ID Number(s)	18ABB02588; 18ABB02196; 18ABB05735	
	, , ,	
Programme / Course	Bachelor of Finance (Honours)	
Title of Final Year Project	Relationship between Initial Public Offering and	
	Macroeconomic Factors in the U.S.	

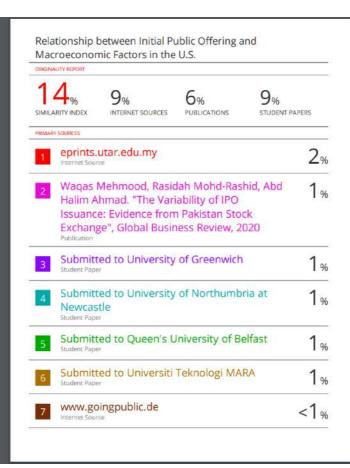
Similarity	Supervisor's Comments (Compulsory if parameters of originality exceeds the limits approved by UTAR)	
Overall similarity index:14%	Parameters of originality within the limit approved.	
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Parameters of originality required, and limits approved by UTAR are as follows: (i) Overall similarity index is 20% and below, and (ii) Matching of individual sources listed must be less than 3% each, and (iii) Matching texts in continuous block must not exceed 8 words  Note: Parameters (i) – (ii) shall exclude quotes, bibliography and text matches which are		

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Based on the above results, I hereby declare that I am satisfied with the originality of the Final Year Project Report submitted by my student(s) as named above.

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Signatu	re of	Supervisor
Name:	ADA	M ARIF LEE AIK KEANG
Date :	07/04	4/2022

less than 8 words.



# Relationship between Initial Public Offering and Macroeconomic Factors in the U.S.

by 21FN22M EVON FOO YUET WEN

**Submission date:** 05-Apr-2022 02:01PM (UTC+0800)

**Submission ID:** 1782527745

File name: Final FYP.docx (80.03K)

Word count: 10074 Character count: 52941

#### Chapter 1: Research Overview

#### 1.0 Introduction

The beginning of the chapter will provide a broad together with complete view of our final year project which is the relationship between initial public offering and macroeconomic factors in the U.S. Our study comprises of 20 years.

# 1.1 Research Background

#### 1.1.1 Introduction of Initial Public Offering

Initial Public Offering (IPO) is a process of a private corporation first selling the company shares to the public, such as institutional and retail investors in the stock exchange, with the help of an investment bank (Ernst & Young, 2018). This process is so-called 'going public,' the privately held company transforming into a public company. It allows companies to raise capital to build their business by creating a new stock issue and selling existing shares.

An IPO is a stage in a company's growth process when they believe their business is mature enough to accept the rigours of Securities and Exchange Commission (SEC) regulations, benefits, and responsibilities to public shareholders, so they will begin to advertise their interest in going public. The company's primary advantage in going public is the financial benefit of raising capital as it has many investment opportunities, especially for a growing company, as the funds can use in research and development (R&D), mergers and acquisitions (M&A), fund capital expenditures, and repay debt (Hunsaker, 2017). An IPO is an important event for a company seeking long-term growth because it provides the opportunity for the company to raise a large amount of capital to gain greater capacity to grow and expand its business.

The process of IPO is considered complicated and time consuming. For a company to go public, it is a must to fulfil the requirement set by SEC. The timeline for an IPO is six

months to nine months. The first step is to build a team consist of lead investment bank, auditors and law firms ("U.S.IPO Guide", 2021). A trustable underwriter will guide the company for coordinating, preparing relevant documents, offering initial draft, dealing with the due diligence and help the company to meet the requirement of SEC. The following month will be the company need to prepare the document to submit to the authorities. Another process is to organize an IPO roadshow. The purpose of the roadshow is to present to the interested parties and draw the attention of future owners of the company. After the approval of SEC, the IPO team then can set the initial offer price based on the industry and company's financial status. The last step is the underwriters will make an analyzation of the IPO share and the company is successful listed on the market. The company then will need to strive their best to maximize shareholder's wealth.

#### 1.1.2 Benefits and Challenges to Become a Listed Company

The financial benefit that a company undergo the IPO process is to source for additional capital to expand and get publicity in the market. A successful listing can enable a firm to obtain capital to complete a strategic acquisition, generate opportunities to increase customer's base, or provide exit opportunities for private equity or other investors. Another advantage of the company going public is an increased company reputation because the new potential customers will know the company's product and services by the generate publicity from IPOs. As IPOs often generate publicity by exposing their products to a new potential customer base. The increased transparency and the credibility of the stock listing can also help them obtain better terms when seeking to borrow funds. As a result, this may help the company to increase its market share. Many venture capitalists use IPOs to cash in on successful companies. Founders can also use IPOs as an exit strategy by selling the share after the company IPO.

However, the initial public offerings (IPOs) market is complex and challenging. While IPOs offer many benefits, they also involve significant costs, primarily associated with the process, such as banking and legal fees and ongoing requests for disclosing important and even sensitive information. They are required to file their financial statements to the SEC annually. These financial statements must be prepared under the United States Generally Accepted Accounting Principles and audited by a certified public audit firm. In addition, it might need to

meet additional requirements and continuing obligations set by the stock exchange and SEC as a public company. The requirements are different in each country and stock exchange.

### 1.1.3 Reasons for the Company to be Listed in the U.S.

The stock exchange is where investors can trade different financial instruments, including equities, bonds, and commodities. They bring the companies and investors together to help them raise capital by issuing shares to investors. Exchanges provide liquidity to the market, which means that the market has enough buyers and sellers to process transactions more efficiently without delay. The exchange also ensures that trading is conducted orderly and fair to deliver important financial information to investors and financial professionals. The buyers and sellers' consummate transactions via open outcry at a central exchange or electronic trading platform.

United States is the largest equity market globally that consists of two stock exchanges:

New York Stock Exchange (NYSE) and National Association of Securities Dealers Automated Quotations (NASDAQ). The New York Stock Exchange is the world's largest stock exchange, and it is an auction-based exchange that allows investors to physically and verbally communicate to buy and sell orders. While NASDAQ is the second-largest stock exchange in the United States, it is an electronic exchange that only allows buyers and sellers to be connected by computers over a telecommunications network.

According to Doidge et al. (2004), since the United States is the largest equity market globally, the foreign companies listed on United States markets are widely perceived to have advantages, such as cheaper cost of capital and an increased shareholder base, greater liquidity, enhanced prestige. Apart from that, reputation is also one of the factors in being a listed company in the United States for foreign companies. This is because the United States has a well-established supervisory authority such as SEC to regulate companies listed and publicly traded in the United States. While this often means that foreign companies require to learn new procedures and more paperwork, it pays off in the long run. The increased scrutiny and

transparency provided by SEC oversight is seen as an advantage by investors. It helps the company improve its reputation in the market and benefit from it as the U.S stock exchange has the large market capitalisation in the world. Therefore, the investor will tend to trust the company when they read its financials and make investments (Kurt Schacht, 2017).

#### 1.1.4 Trend of Initial Public Offering in U.S.

Number of IPO from 2001 to 2020 233 <sub>226</sub> 237 <sup>256</sup> Numbers 225 2 160 <sub>146 146</sub> 

Figure 1.1: Number of IPOs in the United States from the year 2001 to 2020.

Source: IPOScoop & PWC

The window of opportunity is very useful for the companies because it allows them to determine when the window of opportunity is open, and then they will take action to go public. When the window of opportunity is open, the market will show strong growth, and when the market succumbs to maturity, the window of opportunity will close. Therefore, the company requires to use the right insights to make the right moves at the right time. When a company is properly planned for going public, IPOs prices will provide an optimal valuation because it provides IPO investors with the greatest upside to their investment in the months and years following the IPO (Ernst & Young, 2018).

IPOs are dynamic as macroeconomic factors, world events, political changes, and new regulations drive them to different peaks and valleys. Therefore, the companies might not have a perfect time to go public. The window of opportunity for IPOs is difficult to predict because the external shocks happen suddenly without any advance announcement or warning. The theory and the empirical evidence suggest that IPO activities are driven by internal factors—firm-specific determinants and external factors—macroeconomic determinants. However, people believe that sound macroeconomic fundamentals are considered one of the inducements to expand the IPO base in the market.

Based on figure 1.1, the number of IPOs illustrates the extreme fluctuations in IPO volume over 20 years. From 2001 to 2020, the lowest number of listed companies was in 2008, with only 47 companies going public due to the economic crisis in that particular year. The legacy of the 2007 and 2008 financial crises and the economic volatility that continues to affect the market have made investors more diligent in reviewing IPOs. Therefore, the number of IPOs only increased by 14 to 61 in 2009. All financial markets throughout the world were affected by the global financial crisis of 2007 and 2008. Although the world suffered from the Covid-19 pandemic in 2020, U.S. obtained the highest number of IPOs, 421. The phenomena of IPO trends are observed in developed countries, including the United States. Recently, many companies which showed interest in entering the stock market during the Covid-19 pandemic since 2020 had hit the highest number of IPOs between 20 years. These phenomena are due to the change in market conditions and the change in United States' economic performance. The changes in an economic condition, also known as macroeconomics factors, have led to active participation in the IPO, thus impacting the number of IPOs. Therefore, macroeconomic factors may affect the number of IPOs, representing good and bad news in the market.

#### 1.2 Research Problem

Every company that wants to go public must be aware of the timing and if any variables are important to consider. Macroeconomic variables are the key indicators to acknowledge the situation of the country's economy. Unfavourable macroeconomic factors can influence the

industry-level and firm-level business performance along with the company's decision to go public (Laohakosol et al., 2018). Therefore, the company will become distress in the event of collecting additional fund from IPOs due to the unfavourable performance of macroeconomic factors. Subsequently, the company may consider it is not the perfect time to go public and the company will hold up their decision of going public (Mehmood et al., 2020). Hence, the overall business environment conditions may deteriorate during high uncertainty in the IPO market and adverse macroeconomic factors.

Previous studies investigated the relationship between Initial Public Offering and macroeconomics factors such as Poland (Kovandová & Zinecker, 2015)(Meluzín et al., 2014), United Kingdom (Angelini & Foglia, 2018), Sri Lanka (Dai & AWGCN, 2015), Malaysia (Ameer, 2012), Nepal (Laohakosol et al., 2018), Pakistan (Mehmood et al., 2020), and China (Lim et al., 2012). These studies suggest that macroeconomic variables are the most suitable indicator for examining the factors that affect IPOs because macroeconomic changes simultaneously affect the cash flow of many companies and affect the risk-adjusted discount rate.

There is very limited literature on number of IPOs and macroeconomic variables in the developed country in the previous literature. Most studies have focused on IPOs from a corporate finance perspective. The volatility of IPOs is because of an opposing macroeconomic outlook, which has not been substantially and broadly studied. For that reason, the macroeconomic factors are being applied to the study. In addition, United States chosen to be our research project is due to the economy of U.S economy being considered as a highly developed mixed economy, and New York Stock Exchange and NASDAQ are the world's largest stock exchanges in view of their trade volume and market capitalization. U.S. is also equipped with the most advanced technology and innovative economy which the company in the U.S. are at or near forefront in many industries. As a result, we take the initiative to conduct a research project on the relationship between the number of IPOs and the macroeconomic factors including inflation, Gross Domestic Product growth rate, and lending interest rate in the U.S. Along with the study, the relationship between initial public offering and macroeconomics factors can be identified.

#### 1.3 Research Question

#### General Research Question

1. Is there significant relationship between macroeconomic factors and number of IPOs in the United States?

#### Specific Research Question

- 1. Does inflation affect the number of IPO in the United States?
- 2. Does Gross Domestic Product growth rate affect the number of IPO in the United States?
- 3. Does lending interest rate affect the number of IPO in the United States?

#### 1.4 Research Objectives

#### General Objective

 To investigate the relationships between macroeconomic factors and the number of IPOs in the United States.

#### Specific Objective

- To investigate the relationship between inflation and the number of IPOs in the United States.
- 2. To investigate the relationship between GDP growth rate and the number IPOs in the United States.
- 3. To investigate the relationship between lending interest rate and the number of IPOs in the United States.

#### 1.5 Research Significance

This research is being conducted for the purpose of investigating the relationships between the number of IPO and macroeconomic factors in the United States. Therefore, it is important as this research helps to identify the effect of the macroeconomic factors on the IPOs in the United States. This study contributed significance of the study to the policymakers, retail investors, educational field and the company which wants to issue IPO in the United States.

First, the policymaker can get the benefit from the research because our research provides an understanding of how macroeconomic factors affect the volume of IPOs. IPO is important for a country since the company can raise the fund from the public and this helps on improving the economy of a country. According to Quaadman (2020), this is because the employment opportunity increases when there is an increasing volume of IPO and the capital gain will also flow to the country. Therefore, the findings of the research are valuable for the policymaker as policymaker can impose suitable policy in order to make sure the economic condition of the country will not be affected heavily by referring to the research.

On the other hand, the outcome of this research is important to the retail investors and able to bring benefit to them. The research helps retail investors to have a better understanding of the impact of macroeconomic variables on the IPOs' volume. A better understanding helps retail investors to enhance their decision-making and prevent the risk of losses. This is because when the retail investors buy the IPO stock in a good condition, there is a high potential for the retail investors to receive a large number of capital gains after a long period. During a good economic condition, there are many IPOs in the market and the retail investors can make a wise decision on choosing an IPO that is expected to have strong growth.

As mentioned in the problem statement part before, there is only a limited amount of reference focused on the number of IPOs and macroeconomic factors in the developed country. Most of the literature found are mainly discussed the IPO from the perspective of corporate finance. Therefore, this research is beneficial to the education field. This is because there are only a few researchers who discussed the relationships between number of IPO and the

macroeconomic elements. So, this study can act as a new reference for future researchers and students to discuss the topic related to our study for the educational purposes.

The research also brings benefits to the companies that would like to go public through IPO in the United States. Since this research provides information on the effect of the macroeconomic factors on the IPOs in the United States, the company can consider the study as a reference to decide the best timing for the company to go public. Normally, going public is for the purpose of raising capital for the company's development. So, good timing is important for the company to go public because the company is unable to raise the expected amount of capital if it goes public at the wrong timing. For example, the company has difficulty in raising capital during a period of low GDP growth rate because this shows a poor economic condition, and the investor is not willing to invest to prevent the loss. Therefore, it is important for the company to make a wisely decision by referring to the research.

#### Chapter 2: Literature Review

#### 2.0 Introduction

Capital demand hypothesis, theory of IPO wave and business cycle theory are selected as our underlying theories. Furthermore, we also formed hypothesis for the three independent variables which include inflation (consumer price index), GDP growth rate and lending interest rate.

#### 2.1 Underlying Theories

The decisions of choosing to go public for a firm is a huge decision. It shows that the firm need to give up their private benefits such as need not to disclose the information. But going public indeed brings significant benefits to the firm as well. According to Zingales (2005), the researcher argue that the bargaining power of a firm will reduce if the firm goes public and which will lead to decrease of profit. On the contrary, go public will increase the firm cash flow as well as their liquidity (Benniga et al., 2004). Holmstrom and Tirole (1993) also argue that going public will help the company itself to observe and monitoring the outsiders such as investment bank, analysts and others' activities.

#### 2.1.1 Capital Demand Hypothesis

According to Lowry (2021), the criteria of a company demand for capital will bring significant effect on volume of IPO. Capital demand hypothesis express that fluctuation on number of IPO is caused by the company's aggregate demand for capital. Indeed, beyond the fact that when a company growth faster, the company will expand their business as well and eventually the company will acquire capital from the public. In view of the capital demand increase, the number of IPO will also increase. Another key fact to highlight is that business cycle and economic situation also contribute to this theory. Du (2014) summarizes that if is in economic expansion, company will seize the opportunity to go public as the economic perform well. This statement has been proven by Dittmar and Dittmar (2008) that varies in economic

situation has direct impact to the aggregate capital demand. In another word, economic expansion makes company to take the initiative to go public hence the volume of IPO increase.

#### 2.1.2 Theory of IPO Wave

Maug (2000) declare that when a firm first issue to a relatively new industry and solve the obstacles by themselves it creates a learning process for the following firm. Consequently, the next issuer will benefit from the process as it lower down the hurdle for public offering in future. Thus, a hot IPO market will exist in the relevant industry. It will then provoke the IPO wave. IPO wave can be defined as IPO clustering of a company's free-riding on the information production based on the former IPOs. The wave that created by the hot issue market is due to some of the company might not expertise either in their management or the control of the company, they will take the advantage of the former IPO as earlier IPO had created useful information for these companies (Ameer, 2012). As a result, these companies will place in a higher position in the market. IPO wave follows by a high level of asymmetry information (Batnini, 2015). High volume of IPO is then explained by He (2007) that investment bank plays a vital role to produce information to the investor. In view of the new IPO, the investor will evaluate the IPO price based on the past performance IPO and the information generate from the investment bank. The information improves the quality of the company and end up that low quality company go public thus facilitate to high volume of IPO.

#### 2.1.3 Business Cycle Theory

From a theoretical and general perspective, business stage divided into four stages which include expansion, peak, contraction and through. It is necessary to mentioned that business cycle possess conceptual and intellectual history in U.S. The cycle will be repeated and cannot be breakable (Stock &Watson, 1998). Economic activities are mainly the factors that contribute to the business cycle such as GDP, inflation and so forth. Observation of Canova (1998) stated that business cycle serves as a benchmark to study the soundness and rationality of those theoretical models. According to Stock and Watson (2002), there is a long expansion period in 1990 following by recession in 2001. The paper also examined that the little moderation in volatility of U.S. economy is also caused by monetary policy. A complete

business cycle in U.S. is located from year 2001 until year 2007. Bivens and Irons (2008) made an assumption that the expansion ended at the beginning of year 2008. It is undeniable that business cycle plays an important role for a company. This is in light of the fact that business cycle able a company to make informed business decisions and to benefit the company when it comes to expansion period (Smyth, 2020).

#### 2.2 Hypothesis Development

#### 2.2.1 Number of Initial Public Offering

Number of Initial Public Offering can be defined as the figure of the company going public in U.S. Initial public offering is a vital instrument for a company to raise capital by offering new stock issuance to public investors. A privately-owned company who wishes to listed on New York Stock Exchange (NYSE) need to fulfil the requirement of SEC. According to Kenton (2021), New York Stock Exchange is the one of the largest equities-based change's platforms. Ameer (2012) claimed that the increase of the regulatory requirement shortens the time-to-market and the capital market able to enlarged.

There are many papers had studied the fluctuation of IPOs and macroeconomic factors. According to Lowry (2003), other than macroeconomic that cause the fluctuation of number of IPO, high level of uncertainty also will create a lemon problem which lead to the decrease number of IPO. The added determinants that move the number of IPO is also because of the asymmetric information in the market (Ritter & Welch,2002). In addition, as mentioned in the previous part, the complicated process of going public is also the cause and mechanism to discourage the company to go public. As a result, volume of IPO has downturn trend.

It is needful to highlight that number of IPO in this study refers to the number of companies that have gone public from 2001 to 2020 quarterly without considering whether it has succeeded at market capitalisation and market pricing during the Initial public offering

period. It also includes all companies listed on the United States stock exchange from 2001 to 2020 quarterly and does not classify them into various categories such as company industry.

### 2.2.2 Inflation (Consumer Price Index)

Inflation is also a vital determinant on the volume of IPOs. This can be proven by the findings from Mehmood et al. (2020), the researchers found out that consumer price index is positive significantly in expressing the number of IPOs. A paper that published by Loughran et al. (2020) had examined the influences of inflation towards IPOs. There are 15 countries that shows inflation had bring great impact towards stock price level. In fact, according to fisher effect hypothesis, it predicts the stock return and inflation. Fisher effect hypothesis claim that high inflation is due to high interest rate which will led to losses of competitive advantage. Wei (2007) found out that the equity return will not perform well if the country is suffering from inflation. A clear manifestation of the unexpected inflation will cause the company reluctant to go public, further reducing the number of IPOs. According to Geetha et al. (2011), since World War II, in the United States the average inflation rate is between 2% and 5% and it led to a natural bias condition in the stock market. The company acknowledge that the inflation and economic condition will affect the decision of the investor, so company will tend to avoid go public in the period of inflation. Inflation indeed is which will reserve their investment decision during inflation period. Omran and Pointon (2001) stated that high inflation does not motivate company to go public since higher inflation, investor will demand higher return which the company need to bear increases in cost of capital for equity offering. Due to the evidence below, the hypothesis is proposed as follows:

H1: There is negative relationship between inflation and the number of IPOs.

#### 2.2.3 GDP Growth Rate

GDP growth rate also serve as a major determinant that able to affect the number of IPOs issued. Normally, the GDP growth rate refer to the percentage change in the GDP. It depends on the consumption demand level of a country (Mehmood et al., 2020). Refer to the capital demand hypothesis, when there is an increase in the economic growth, there will be an increasing capital demand. This is because an increasing economic growth provide more

opportunities for the new investments arise in the market. Therefore, the demand of capital of the firms increases and they will raise the capital from the public to expand the business (Langlet & Lilliehöök, 2017). Refer to the previous research related to this topic, common proxy which been used for the capital demand is GDP growth (Lowry, 2003). According to Langlet and Lilliehöök (2017), there is a positive relationship between the GDP per capita growth and the number of IPOs in Europe. This means the IPO volume in Europe increase when the GDP growth rate of Europe increase. On the other hand, the researchers have conducted research for Gulf Cooperation Countries (GCC) and global simultaneously. But the result gained are different within these 2 regions. Aidrous and Glavina (2020) declared the GDP growth bring a positive impact to the global IPO market but GDP growth also negatively affected the GCC IPO market at the same time. This result obtained because the size of these 2 markets is different. Therefore, GCC IPO market which smaller than global IPO market can respond more sharply than global IPO market. Mehmood et al. (2020) also claimed the GDP growth rate move in a same direction with the IPO volume in Pakistan. The higher GDP growth rate act as a sign for the people and the firms to make an investment in the market. Business cycle theory also emphasize that when economy enter expansion period, the market will also mirror the stages. This means a strong health of the economy increase the number of IPOs issued. Besides, Meluzín et al. (2014) have declared the GDP growth rate bring a crucial impact to the number of IPOs in the Poland from the period of 1992 until 2012. However, research which conducted in Nepal from the period of 1993 until 2015 shows the study did not discover significant relationship between the GDP growth rate and the number of IPO (Laohakosol et al., 2018). This result is quite different with others research which been conducted. Due to the evidence showed, the hypothesis is as follows:

H2: There is a positive relationship between GDP growth rate and the number of IPOs.

# 2.2.4 Lending Interest Rate

Interest rate affect the decision of the firms on issuing the IPO. When refer to the neoclassical economic theory, the interest rate, investment and financing action able to interact dynamically. Firms able to raise more capital to acquire the target or issued the IPO with the lower level of lending interest rate. Normally, the firm unwilling to go public during the period with a higher lending interest rate. This is because the borrower or the firms need to pay for a higher cost in the future when there is a higher lending interest rate. Thus, the expected return

and reward of the firms will be affected since they need to pay a higher cost to the lender or the bank. So, the firms are discouraged to issue IPO when the lending interest rate increasing (Laohakosol et al., 2018). According to Mehmood et al. (2020), number of IPO in Pakistan has discovered had opposite relationship with lending interest rate. This shows the firms unwilling to issued IPO during a high interest rate period because the firm will need to pay a higher cost of the bank loans. Laohakosol et al. (2018) declared the lending interest rate can negatively and significantly affect the number of IPOs in Nepal. This negative relationship represents the number of IPOs decrease when the lending interest rate increase. This is because the high lending interest rate let them not willing to issue the IPO since the firms' return will be discounted heavily compared to the low lending interest rate period. Due to the evidence showed above, the hypothesis is as follows:

H3: There is a negative relationship between the lending interest rate and the number of IPOs.

# 2.3 Proposed Theoretical Framework

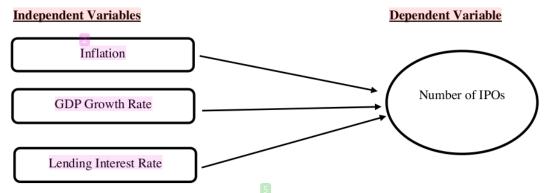


Figure 2.1: Proposed theoretical framework for the relationship between macroeconomic factors and the number of IPO in the United States from 2001 Q1-2020 Q4.

The framework above shows the relationships between the macroeconomic factors and the number of IPOs in the United States. When we review the previous literature, we have decided on using the inflation, GDP growth rate and lending interest rate as our independent variables while using the IPO volume as the dependent variable in our research project.

#### Chapter 3: Methodology

#### 3.0 Introduction

As a mean to analyses time-series data, under this chapter will discuss about mathematical model and techniques developed for our study.

#### 3.1 Research Design

Quantitative research method will be put in this research project to identify the patterns, forecasting causal relationship. In order to identify the effect of macroeconomic variables such as inflation, GDP growth rate, and lending interest rate towards the number of IPOs in the United States, 20 years from 2001 to 2020 has been studied. In pursuance of describing the cause and effect between number of IPO and macroeconomic components, causal research is being conducted. Furthermore, the consumer price index is the proxy for inflation, percentage of GDP growth rate is an indicator for GDP and percentage of lending interest rate applied to the study.

#### 3.2 Data Collection Method

Secondary data are being developed in our study. These statistic and data are the timeseries data derived from the sources such as IPOScoop, PWC, Bloomberg and Federal Reserve Economic Data. The data were collected quarterly from 2001 Q1 until 2020 Q4 which total up to 80 observations.

Table 3.1: Variables, unit measurement and sources of data.

Variables	Unit Measurement	Sources
Number of IPOs	Frequency	IPOScoop & PWC
Inflation	Index	Bloomberg
GDP Growth Rate	Percentage (%)	Bloomberg
Lending Interest Rate	Percentage (%)	Federal Reserve Economic Data

#### 3.3 Proposed Data Analysis Tool

# 3.3.1 Augmented Dickey Fuller Test (ADF)

From a theoretical viewpoint, Augmented Dickey Fuller test examines the stationary of a given time series as economic time series commonly is non-stationary. In order to perform ADF test, all variables are transferred into natural logarithms to find out their first differences for every unit root at the level. ADF estimation equation is as follows:

$$\Delta y_t = \alpha + \beta_t + \gamma y_t + e_t$$

Where  $\Delta y_t$  is  $y_t - y_{t-1}$  and is tested for the number of IPOs.  $\alpha$  is the constant. If  $\gamma = 0$  random walk process present while  $-1 < 1 + \gamma < 1$  stationary process exists. Besides, Schwarz Bayesian Criterion is also selected to identify the number of the suitable lag length in the regression for ADF test (Prabhakaran, 2019).

# 3.3.2 Johansen Co-integration Test

Johansen Co-integration test is a test which been used to test for the long-run cointegration relationships between the multiple variables of the research. Normally, this test is used for larger sample sizes and time-series data. So, this Johansen Co-integration test is suitable for us to carry out in our research since we focus our research in the United States which has a large population or sample size and we use time-series data as our research data. Furthermore, the Johansen Co-integration test is more preferable than the Engle-Granger test because this test allowed for testing multiple cointegration relationships ("Cointegration", n.d.). According to Hjalmarsson and Österholm (2007), Johansen Co-integration test begin with the vector autoregressive (VAR) model. When there is an error correction mechanism appears, the VAR converted into the vector error correction (VEC) model (Tran & Jeon, 2011). Under Johansen Co-integration test, there are two forms of test which are trace test and the maximum eigenvalue test. The hypothesis of the research is as follows:

H<sub>0</sub>: There is no long-run relationship between independent variables and dependent variables.

H<sub>1</sub>: There is long-run relationship between independent variables and dependent variables.

# 3.3.3 Granger-causality Test

Granger-Causality test was proposed by Granger in 1969 and modified by Sims in 1972. It is used to test the causality relationship between independent and dependent variables in the short-run (Gujarati & Porter, 2009). According to Rossi (2013), the Granger Causality Test identifies whether a time series variable can predict another variable. However, we can only know the direction of causality between the variables and cannot estimate the effect on the dependent variable in the short run. There are two approaches to establish the Granger-Causality test, which are the p-value and F statistics test.

H<sub>0</sub>: Variable X does not granger causes the variable Y.

H<sub>1</sub>: Variable X does granger causes the variable Y.

When p-value is smaller than the significance level or F-test statistic is larger than the critical value, the null hypothesis is rejected. Therefore, there is sufficient evidence to conclude that variable X does granger causes the variable Y.

#### 3.3.4 Normality Test- Jarque-Bera Test

Jarque-Bera test uses for examine the normality of the econometric model. It can be used to determine whether the sample data is normality distribution by observing the skewness and kurtosis measurement. There are two approaches to test the normality distribution, which are Jarque-Bera formulation and p-value.

H<sub>0</sub>: Error terms are normally distributed.

H<sub>1</sub>: Error terms are not normally distributed.

Null hypothesis is rejected, if the p-value is lower than the significance level or JB statistic is larger than the critical value, reject null hypothesis. Therefore, there is adequate evidence to conclude that error terms are not normally distributed.

#### 3.3.5 Multicollinearity

Multicollinearity is the econometrics problem arises when independent variables had a relationship accompanied by one another in the regression model (Gujarati & Porter, 2009). There are several ways to detect multicollinearity in the model. We can look at a high R<sup>2</sup> but few significant t-value; thus, we can assume it has multicollinearity problems in the model. Other than that, we can look at the high pair wide of two or more variables whether they correlate. The model will consider a multicollinearity problem when the pair-wide correlation between two variables is more than 0.8. We can use Variance Inflation Factor (VIF) and Tolerance (TOL) method to identify the problem of multicollinearity in our economic model. The model has a high collinearity problem when the VIF≥10 or TOL is close to 0. The model has perfect collinearity when VIF is infinite or TOL is 0. The model has no collinearity when the VIF is 1 or TOL is 1.

Table 3.2: Formula of VIF and TOL.

VIF	$VIF = \frac{1}{(1-r)}$
TOL	$TOL = \frac{1}{VIF}$

#### 3.3.6 Heteroscedasticity

Heteroscedasticity refers to the unequal scatter of the error term in the regression analysis (Frost, n.d.). This is a problem that normally happens when all the error terms do not have constant variance over the range of the measured values ("What is Heteroskedasticity?", n.d.). Thus, this is considered a problem because Ordinary Least Squares (OLS) regression considered all error terms to have a constant variance. In this situation which all the residuals have a constant variance is known as homoscedasticity (Frost, n.d.).

In order to detect the presence of heteroscedasticity in the research, an autoregressive conditional heteroscedasticity (ARCH) test can be applied when doing the data analysis. Gujarati and Porter (2009) stated that the ARCH test is test which been used to evaluate the volatility of the time series data. This is suitable for our research as the ARCH test is suitable to test for time series data. When there is the presence of a heteroscedasticity problem in the

regression model, this problem can be solved with the help of the Generalized Least Squares (GLS) and Weighted Least Squares (WLS). The hypothesis of our research is as follows:

H<sub>0</sub>: There is no presence of heteroscedasticity.

H<sub>1</sub>: There is a presence of heteroscedasticity.

#### 3.3.7 Autocorrelation

Autocorrelation uses to identify the relationship between the variable's past value and current value. Positive correlation describes that an increase in the time series tend to increase in other time series, while negative correlation describes an increase in the time series tends to decrease in other time series.

In order to identify whether there is an autocorrelation problem, tests such as Durbin-Watson test need to be carried out. Values range below 2 is considered as positive autocorrelation while value range above 2 is considered as negative autocorrelation in Durbin Watson test. On the other hand. It can be taken into consideration that the consequence of autocorrelation will make the OLS estimators assumed the framework are still unbiased which lead to OLS estimators will be no longer BLUE. In addition, R<sup>2</sup> will also be overestimated.

When the autocorrelation problem has been detected, Cochrane-Orcutt Procedure can solve the problem. Cochrane-Orcutt procedure will require to iterate the procedure when the autocorrelation problem exists. Other than that, Newey-West estimator is also a remedy to solve the autocorrelation problem. Newey-West estimator is commonly used to tackle autocorrelation in time series data where it can enhance OLS regression.

H<sub>0</sub>: There is no autocorrelation problem.

H<sub>1</sub>: There is an autocorrelation problem.

We reject the H<sub>0</sub> when the p-value of F-statistic is lower than 0.05, otherwise do not reject the null hypothesis.

#### Chapter 4: Data Analysis

#### 4.0 Introduction

This segment will provide the result generated for our study. All the test generated is by using EViews. Moreover, this chapter will show the significant effect as well as the relationship between the number of IPO and inflation, GDP growth rate and lending interest rate for our study.

#### 4.1 Descriptive Analysis

Table 4.1: Descriptive Data

	IPO	CPI	LIR	GDP
Mean	44.8000	92.6895	4.5726	1.7100
Median	39.0000	93.1850	4.0250	2.1000
Maximum	193.0000	110.1100	8.6200	4.4000
Minimum	1.0000	74.2100	3.2500	-9.1000
Std. Dev.	29.3854	10.64052	1.6039	2.0714
Kurtosis	10.07944	1.872959	3.232836	11.97214

Table 1 included 80 observations quarterly from 2001 to 2020. The median of CPI is 93.185, the average CPI is 92.6895, the lowest CPI is 74.21, and the highest is 110.11. The standard deviation of CPI is 10.64052, which shows a large fluctuation compared with other variables. Moreover, the kurtosis is less than 3, which means that CPI data is quite stable.

Besides, the median of LIR is 4.025, the average LIR is 4.5726%, the lowest LIR is 3.25%, and the highest is 8.62%. The standard deviation of LIR is 1.6039. The data of LIR is quite volatile as kurtosis is more than 3, which is 3.232836.

Furthermore, the median of GDP is 2.1; the average GDP is 1.71% which, the lowest GDP is -9.1%, and the highest is 4.4%. The standard deviation of GDP is 2.0714. In addition, the data of GDP has a high kurtosis of 11.97214; it is more volatile than others.

#### 4.2 Inferential Analysis

#### 4.2.1 Multiple Linear Regression Model

The quantitative model is as below:

$$IPO_t = \beta_0 + \beta_1 CPI_t + \beta_2 LIR_t + \beta_3 GDP_t + \mu_t$$
 Model 4.1

The estimated quantitative model is as below:

$$\widehat{IPO_t} = \beta_0 + \beta_1 CPI_t + \beta_2 LIR_t + \beta_3 GDP_t$$
 Model 4.2

N = 80

 $R^2 = 0.158313$ 

Adjusted  $R^2 = 0.125088$ 

Where  $IPO_t$  = Number of Initial Public Offering

 $CPI_t$  = Consumer Price Index

 $LIR_t$  = Lending Interest Rate

 $GDP_t$  = Gross Domestic Product

Multiple linear regression model is formed to identified the estimation of number of IPO in the Unites States and the three variables. Time series data is used to estimate the model (model 4.1 and model 4.2) which included 80 observations, the data is collected from quarter 1 year 2001 until quarter 4 year 2020. Number of IPO is the output variable whereas inflation, GDP growth rate and lending interest rate are the explanatory variables selected for this project.

#### **Quantitative Model Estimation and Interpretation**

$$\widehat{IPO_t} = \beta_0 + \beta_1 CPI_t + \beta_2 LIR_t + \beta_3 GDP_t$$
 Model 4.2

$$\widehat{IPO_t} = -87.1511 + 1.1795 + 4.9883 - 0.1089$$
 Model 4.3

EViews has generated quantitative estimated model (model 4.3).

#### Interpretation of Beta

$$\beta_0 = -87.1511$$

On average, when all the variables are constant, the number of Initial Public Offering will decrease by 87.1511.

$$\beta_1 = 1.1795$$

If consumer price index increases by 1 index, on average, the number of Initial Public Offering will increase by 1.1795, ceteris paribus.

$$\beta_2 = 4.9883$$

If lending interest rate increases by 1 percent, on average, the number of Initial Public Offering will increase by 4.9883, ceteris paribus.

$$\beta_3 = -0.1089$$

If growth domestic product increases by 1 percent, on average, the number of Initial Public Offering will decrease by 0.1089, ceteris paribus.

#### Interpretation of R- Squared and Standard Error

$$R^2 = 0.158313$$

 $R^2$  of the model is 0.158313. It means that 15.83% of the variation in number of IPO explained by the variation in consumer price index, lending interest rate and gross domestic product.

#### Standard Error = 27.48618

There are 80 observations of the sample size and the standard error of the model is 27.4861. The standard error to the mean ratio also known as coefficient of variation. The standard error to the mean ratio is 0.61353 or 61.35% (27.48618 / 44.8). The higher the ratio, the greater the level of dispersion around the mean.

# 4.2.2 Augmented Dickey fuller Test (ADF Test)

Augmented Dickey Fuller test was carried out to identify time series data. Before performing unit root test, all the variables are transfer into natural logarithms and being tested for the first differences. The hypothesis is stated as below:

H<sub>0</sub>: The variables are not stationary, unit root exists.

H<sub>1</sub>: The variables are stationary.

Table 4.2: ADF Test.

Variables	Log Level	Log Difference	
N_IPO	-6.190291***	-13.35003***	
Consumer Price Index	-1.504744	-7.510492***	
ending Interest Rate	-2.238608	-4.569084***	
Real GDP	-5.242456***	-8.691855***	

Note: All variables are transformed in to natural logarithms. The Augmented Dickey Fuller (ADF) tests are conducted with intercept. T-statistic is the reported number in the table. Number of lags is depended on the selection of Schwarz info criterion. \*\*\*, \*\*, \* denote statistical significance at the 1%, 5% and 10% accordingly.

Table 2 above is the result of Augmented Dickey Fuller test generated by EViews. The reported number is categorized into log level and log difference. Based on the hypothesis stated above, null hypothesis is rejected if the series is stationary.

# 4.2.3 Johansen Co-integration Test

Table 4.3: Johansen Co-Integration Test

Hypothesised	Trace		Max-Eigen	
number of CE(s)	Test	Critical Value	Test	Critical Value
	Statistic	(%)	Statistic	(%)
r = 0	60.40977	47.85613	31.02806	27.58434
$r \le 1$	29.38171	29.79707	14.74260	21.13162
$r\!\leq\!2$	15.49471	15.49471	12.34334	14.26460
$r \leq 3$	2.295759	3.841465	2.295759	3.841465

Johansen Co-integration test is been used for the purpose to test for the long run relationships between the dependent variable and independent variables.

#### Hypothesis:

 $H_0 =$ There is no long-run relationship between dependent variables and independent variables.

 $H_1$  = There is long-run relationship between dependent variables and independent variables.

The table above showed the result of the Johansen Co-integration test which get from the EViews12. Based on the table above, the  $H_0$  is rejected because the test statistic of 60.40977 for the trace test is greater than the critical value of 47.85613 at the significance level of 5%. On the other hand, test statistic of 31.02806 under the max-eigenvalue test also greater than critical value (27.58434) at the significance level. The test statistic in both tests are greater than the critical value at significance level of 5%. This shows both tests reject the  $H_0$ . Therefore, there is long run relationship between dependent variable and independent variables.

#### 4.2.4 Granger Causality Test

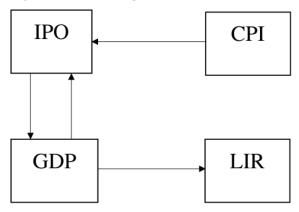
Ho: No granger cause relationship between variable X and variable Y in short run.

H<sub>1</sub>: Granger cause relationship between variable X and variable Y in short run.

Table 4.4: Granger Causality between variables' result.

Variable X	Variable Y	Prob.	Result	Conclusion
CPI	IPO	0.0420	Reject	Granger cause
IPO	CPI	0.4115	Do not reject	No granger cause
LIR	IPO	0.7363	Do not reject	No granger cause
IPO	LIR	0.5969	Do not reject	No granger cause
GDP	IPO	0.0077	Reject	Granger cause
IPO	GDP	0.0111	Reject	Granger cause
LIR	CPI	0.3063	Do not reject	No granger cause
CPI	LIR	0.9883	Do not reject	No granger cause
GDP	CPI	0.7861	Do not reject	No granger cause
CPI	GDP	0.2442	Do not reject	No granger cause
GDP	LIR	0.0051	Reject	Granger cause
LIR	GDP	0.4215	Do not reject	No granger cause

Figure 4.1: Relationship between each variable



# CPI and IPO

The result shows that there is a unidirectional causal relationship from CPI to IPO.

# LIR and IPO

The result shows that there is no causal relationship between these two variables.

# GDP and IPO

The result shows that there is causal relationship between these two variables.

# LIR and CPI

The result shows that there is no causal relationship between these two variables.

# GDP and CPI

The result shows that there is no causal relationship between these two variables.

# GDP and LIR

The result shows that there is a unidirectional causal relationship from GDP to LIR.

# 4.3 Diagnostic Checking

# 4.3.1 Jarque-Bera Test

Table 4.5: Result of Jarque-Bera Test.

P-value	0.0000
$H_0$	: Error term is normally distribution
$\mathbf{H}_1$	: Error term is not normally distribution
Decision Rule	: Reject $H_0$ , if P-value is less than significant level. Otherwise, do not reject $H_0$ .
Level of significant	: 5%
P-value  Decision Making	: 0.0000  Reject Ho since p-value is less than significant level.
Conclusion	: Error term is not normally distribution.

# 4.3.2 Multicollinearity

Table 4.6: Result of Variable Inflation Factor (VIF).

	Centered VIF	Result
CPI	1.2371 < 10	Do not reject
LIR	1.2456 < 10	Do not reject
GDP	1.0616 < 10	Do not reject

Based on table 7, the result shows the VIF of each variable are below 10, which means that model does not exist multicollinearity problem.

# 4.3.3 Heteroscedasticity

Table 4.7: Result of ARCH Test.

P-value	0.0074

Heteroscedasticity is the unequal scatter of the error term in the regression analysis.

Autoregressive Conditional Heteroscedasticity (ARCH) test is generated to test for the presence of the heteroskedasticity problem

# Hypothesis:

 $H_0$  = There is no presence of heteroscedasticity.

 $H_1$  = There is a presence of heteroscedasticity.

The table above showed the result of the ARCH test which get from the EViews 12 to test for the heteroscedasticity. Based on the table above, the  $H_0$  is rejected because the p-value of 0.0074 is smaller than significance level of 5%. Therefore, heteroscedasticity problem exists in this research.

#### 4.3.4 Autocorrelation

Autocorrelation also named as serial correlation which is to identify the repeating pattern of the model.

Durbin-Watson Test is formed to distinguish autocorrelation problem. The test will generate value between 0 to 4, where:

Table 4.8: Identification of autocorrelation.

No Autocorrelation	Positive Autocorrelation	Negative correlation
2	0 to <2	>2 to 4

Ho: There is no autocorrelation problem.

H<sub>1</sub>: There is autocorrelation problem.

Table 4.9: Result of Durbin-Watson Test.

Test Statistic	1.543006

Since the test statistic for Durbin Watson test falls between 0 to less than 2 which is 1.543006. Hence, we can conclude that there is a positive autocorrelation in this quantitative model.

# **Breusch-Godfrey Serial Correlation LM Test**

For the purpose to solve autocorrelation in the model, Breusch-Godfrey test is generated by using EViews.

Table 4.10: Result of Breusch-Godfrey Serial Correlation LM Test.

Test Statistic	0.5704

Since the test statistic is greater than critical value. We cannot reject null hypothesis. Hence, we can conclude that there is no autocorrelation problem in this model.

# Chapter 5: Conclusion

#### 5.0 Introduction

This chapter is a summary for this project. It comprises from Chapter 1 to Chapter 4. The project intends to study the relationship between macroeconomic factors and the number of Initial Public Offering in the United States. The data collected for this project is from 2001 Quarter 1 until 2020 Quarter 4 with a total number of 80 observations. The independent variables included inflation, GDP growth rate and lending interest rate while the dependent variable is the number of IPO. All the test in Chapter 4 is generated by using EViews.

# 5.1 Discuss of Findings

Table 5.1 Summary of outcome.

Dependent	Independent	Significance	Predicted Sign	EViews Result
Variable	Variable	Level		
Number of IPO	Inflation	5%	Negative	Positive
Number of IPO	Real GDP Growth Rate	5%	Positive	Negative
Number of IPO	Lending Interest Rate	5%	Negative	Positive

Table 5.1 summarized the results from Chapter 4. Each variable is tested with 5% of significance level. Number of IPO which is the dependent variable has tested positive with the independent variables inflation and lending interest rate. On the other hand, real gross domestic has a negative relationship with the number of IPO.

As mentioned above in the table, there is positive relationship between number of IPO and inflation. Consumer Price Index (CPI) is method to measure inflation. Omran and Pointon (2001) claimed that there is negative relationship and stated that company will be unmotivated when there is high inflation happening. This is due to the reason that investor will request

higher return and lead to the increase of cost of capital. However, Mehmood et al. (2020) discover that inflation is positive significantly towards the number of IPO in Pakistan. Whenever the market is developing and trending, it cannot be denied that inflation will cause violation in the stock market, but some stock will tend to perform better in high inflation condition. Although the risk that might face under high inflation period, it is also an indicator for the investor that the company are likely to grow as well. Investor will gain confidence from the market.

GDP is a proxy for a country to represent their market condition and business operations. This paper used GDP growth rate as a measurement and the result obtained is negative sign which is not as expected. However, Laohakosol et al. (2018) has studied the relationship between the number of IPO in Nepal and GDP growth rate. The result at last indicated that GDP growth has no significant influence the number of IPO.

The table point out that lending interest rate possess positive relationship with the number of IPO in the United States which is opposed to the finding of Mehmood et al. (2018) and Ameer (2012). As a consequence of the finding of the researchers does not clearly mention the type of interest used for their study, it may have different result with our study. Besides, the cause and mechanism that the result is opposite may due to the different in terms of country size, type of interest used in every finding.

Furthermore, as mentioned in Chapter 2 our project consists of three underlying theories which are capital demand theory, theory of IPO wave and business cycle theory. Based on our research, we found out that the result of our project is consistent will all the theories stated. It is necessary to highlight that capital demand hypothesis also based on the condition of the market. Alternatively, theory of IPO wave is a theory of when there is hot IPO market when the former IPO established a learning process for the new IPO issuer. Lastly, the business cycle indeed act as an important tool for the company to determine the time to go public. Company will benefit from going public during the expansion period.

#### 5.2 Summary on Statistical Analysis

Table 5.2: Summary of result

Test	Result
Normality	Error term is not normally distributed.
Multicollinearity	Not existed multicollinearity problem.
Heteroscedasticity	Existed heteroscedasticity problem.
Autocorrelation	Autocorrelation detected and solved.
	,
Unit Root Test	Only CPI and LIR are non-stationary at log level, others are
	stationary.
Cointegration	The four variables have long run equilibrium relationship.
Granger Causality	There is a unidirectional causal relationship from CPI to IPO, and
	GDP to LIR, others does not have causal relationship between
	each other.

# 5.3 Implication of Study

# 5.3.1 Implication to Policymaker

The implication of our research to the policymakers is to provide them the understanding and discussion on how the macroeconomic variables affect the number of IPO in the U.S. Therefore, the policymakers can use our study as a reference in order for them to achieve the development of economic growth as well as the economic stability of the country. According to Cornaggia et al. (2019), the increasing volume of IPO increases the employment and investment opportunity as the demand for labour and capital increases when the company which previously private listed go public. The economic condition will be improved indirectly. Thus, the policymakers can issue suitable monetary policy to control the inflation of the country. The policymakers can issue the expansionary policy if they wish to increase inflation by increasing the money supply of the country. This is because our research shows the consumer price index and volume of IPO are in a positive relationship. If the policymakers wish to lower the inflation which is quite high, they can issue the contractionary policy to reduce the money supply ("Impacts of Federal Reserve Policies", n.d.).

#### 5.3.2 Implication to Investor

Normally, the retail investor would like to invest for the purpose of gaining additional income. Identifying the variables which affect the volume of IPO will be important for them. So, our research brings the implication to the retail investors because the retail investors can identify the macroeconomic variables which affect the volume of IPO through this research, especially those retail investors who wish to invest the IPO in the U.S. Retail investors are suggested to have a thorough understanding on how the macroeconomic variables affect the IPO volume before making the decision to invest in the IPO. This is because a correct timing which there is a high volume of IPO can let the retail investors gain more. Careful consideration and thorough understanding can prevent the retail investors from wrong decision-making and bear for the losses.

#### **5.3.3** Implication to Educational Field

This research implicates the education field, especially those researchers or academicians who wish to have the research which topic related. This can serve as a reference for future research which is topic-related. Those in the education field are suggested to discover more variables that may affect the volume of IPO and compare this research with others in order to carry out improvement on the future research and increase the understanding of this type of research. Those researchers and academicians also suggested carrying out more research related as there is only a limited amount of study on the macroeconomic variables that affect the number of IPO. Most of the study is more focusing on the perspective of corporate finance.

#### 5.3.4 Implication to Company which Want to Issue IPO

Our research not only brings the implication to the policymaker, investor, and education field, the research also implicates the companies which want to issue the IPO. The research can act as guidance or reference for the company before the management of the company have a decision making to issue IPO. The company management team should use their professional knowledge and experience to evaluate everything before letting the company go public. The company also suggested analysing and evaluating all the variables which may affect the volume of IPO before doing the decision in order to prevent the company from the face with difficulty

in which unable to raise the desired amount of capital. This is because the macroeconomic effect on the low IPO volume may show the company not willing to go public during that economic condition because can't raise sufficient capital and less investor willing to invest during that period.

#### 5.4 Limitations of Study

Limited available data is one of the limitations of our study. Initially, this study plans to examine the quarterly data from year 1991 to 2020 for each variable data. However, one of the variables is only available from year 2001 to 2020. Therefore, quarterly data from year 2001 to 2020 had been chosen to use in this study. Besides, monthly and daily data are more reliable because of its high accuracy. However, this study failed to collect the data in monthly and weekly. This is because most of the variables selected are recorded annually or quarterly; not each variable data is recorded monthly and daily. Hence, quarterly data decided to be used to conduct this research.

Moreover, the variables are difficult to find a similar journal to support the result in this study. The finding retrieved from developing countries might not be suitable to apply in developed countries such as United States because most of the journals are based on developing countries' performance and trends. This study is only aimed to be conducted in United States, a developed country. Thus, the result obtained was only useful and helpful for stakeholders in United States. Different countries have different characteristics such as culture, policy factors, and background. Therefore, the finding might not reflect the character of Initial Public Offering in other developed or developing countries.

Furthermore, limited variable is also one of the weaknesses in this research. Initially, our research studies the relationship between the number of IPO and independent variables such as stock market return, industrial production, inflation, GDP Growth rate and lending interest rate. However, the indicator of stock market return, market index (S&P 500) and Industrial Production Index (IPI) showed insignificant with other variables during the EViews

running process. Therefore, after trying a different approach, the decision made is to take out the stock market index (S&P 500) and Industrial Production Index (IPI) while remaining the other three independent variables to get a significant result.

#### 5.5 Recommendation for Future Research

As mentioned in the limitations of the study part before, we can notice that there is limited availability of data. Therefore, future researchers are recommended to study and get the quarterly data that is available in the earlier years. This can make sure the future researchers are able to carry out a study with sufficient data and get a precise result after running the test. Those research data is also required to get from reliable websites for instance Bloomberg, Yahoo Finance, World Bank database, OECD Economic Outlook Database and so forth to prevent the inaccuracy of the data.

Furthermore, the journal is really important as a reference to support the study conducted. Thus, future researchers are recommended to look for textbooks, other references, and more resources in order to support the content of the research if there is a lack of similar journals on the online platform such as UTAR online library, Google Scholar, Science Direct, SAGE Journals and many more. Those textbooks and reference books which required to perform as the supporting evidence of the research which conducted by future researchers can be found in the library. The application of different sources of reference can contribute to the improvement of the result of the research conducted by future researchers and lead to the success.

On the other hand, there is a result in this study that shows an inverse to the result observed in the previous study reviewed. This result may be affected by the type of interest rate which is different from the interest rate used by past research. Thus, future researchers are suggested to carry out the topic-related study by looking for various interest rates besides the lending interest rate. This is to determine whether different types of interest rates carry out different results. Therefore, research results can be improved and more appropriate to be used

as a reference for future researchers. By identifying the most appropriate interest rate which can positively affect the number of IPO, retail investors, policymakers, and IPO issuers can get definite assistance from this research.

At the same time, the result which is inverse to the result observed in the previous study review may also affect by the different type of GDP data adopted by the past study. Similar to the recommendation mentioned above, future researchers are recommended to carry out the study with different type of GDP. The future researcher can observe any variations through different research results obtained. Therefore, they can get the improvement from this research and provide more creditable references for those who benefit from similar research.

Originally, there are 5 macroeconomic variables adopted in this study to examine the relationships between the number of IPO and Gross Domestic Product growth rate, inflation, lending interest rate, stock market return, and industrial production. However, 2 of them which are stock market return and industrial production showed insignificantly relationships with the number of IPOs. So, this means these 2 macroeconomic variables are not the important factors to affect the number of IPOs. Thus, future researchers are recommended to revisit these 2 variables to determine the possible reason that led to this insignificant relationship.

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