Effects of economic policy on property development firms' financial health

by

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Certificate of Original Authorship

I, Xianli Yu, declare that this thesis is submitted in fulfilment of the requirements for the award of a Doctor of Philosophy Degree, in the School of Built Environment of Faculty of Design, Architecture and Building (DAB) at the University of Technology Sydney.

This thesis is wholly my own work unless otherwise referenced or acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

This document has not been submitted for qualifications at any other academic institution.

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Abstract

This research investigates how government economic policies impact the financial health of property development firms in China. Property Development is a capital-intensive process, and the revenue can be received only when the development is completed. The financial performance of property development firms is sensitive to the changing economic environments.

Chinese government continuously introduces various economic policies targeted at different economic problems. What are the main determinants of the financial health of firms? How do economic policies affect the financial health of property development firms? To what extent do economic policies affect the financial health of different types of property development firms? This research aims to answer the above research questions.

A deductive approach and difference-in-differences (DID) technique are applied in the empirical study using the Chinese development firm's annual financial results from 2001 to 2016. The DID model indicated that the negative economic policy impact on financial health was reduced by altering the levels of financial flexibility. This research is vital to developers planning financial strategies for managing their risk of unforeseen circumstances and provides empirical evidence for understanding the effects of policies introduced. It is significant for the government to formulate appropriate policies in regulating the economy.

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List of Abbreviations

CCC	Cash Conversion Cycle
CAPM	Capital Asset Pricing Model
DID	Difference-in-Difference
FCF	Free cash flow
MM	Modigliani-Miller
NPV	Net Present Value
MRA	Multiple Regression Analysis
WACC	Weighted Average Cost of Capital
WCM	Working Capital Management

Chapter 1 Introduction

1.1 Research Background and Problem Identification

a) Nature of property development firms

Property development has played a significant role in Chinese economics. A developer is "*an entrepreneur who provides the organization and capital required to make buildings available in anticipation of the requirements of the market in return for profit*" (Mengistu and van Dijk, 2018). Property development firms are key players in the property development market. Being capital-intensive is one of the unique characteristics of property developments. Property development firms usually buy a block of land, build the real estate according to planning regulations, and sell the developed real estate once the construction is completed. It is a project-based and relatively short-term business depending on the size of the development. Costs were incurred during the development stage, while revenue is only realized at the sales/presales stage. The comprehensive costs incurred in the property development throughout the development process include land acquisition costs (only purchasing the land use right in China), development costs, financing costs, marketing costs, and other administrative costs. Therefore, property development firms must finance this funding gap to ensure the development project will continue until completion. The capital needs for a property development depends on the development's cost structure and budget. Given the nature of property development, i.e., there are no incoming cash flows during development but a large of capital required for land acquisitions, constructing buildings and other development expenses, property development firms are considered riskier than property investment firms, which can generate income from rental properties.

The two primary financing methods are debt financing and equity financing. Equity financing means selling shares to raise capital, while debt financing is sourcing funds from a third party and agreeing to pay back later with interest. In China, bank loans are still considered the major funding source for property development firms. Obtaining bank loans is not only based on the credentials of the borrowers but also largely depends on the monetary policy as money supply (money circulated in the economy), interest rates, and credit policy (guidelines) introduced by the central bank restrict the direction of loans to certain areas or sectors, and the amount of the loan outstanding that should be granted to the property-related area. Based on this, macroeconomic policy profoundly affected property development firms.

Property development differs from property investment in that property developments add value to existing real estate assets by contributing additional resources. In contrast, property investments hold portfolios of real assets that can generate revenue (Gerbich et al., 1999). Property investment firms receive regular rents from the acquired investment portfolios, which can be residential or commercial premises. Property investment firms usually make long-term investments with the aim of financial return, and capital gains are expected at the end of the investment period. Though investment firms are

affected by the economic environment and policies, investment firms obtain funds relatively easily due to cash flows from rental and collateral availability.

Property development firms react differently to changes in government policies. Unlike property investment, property development firms stress their role as the scarce resources' distributor, operating in an imperfect price mechanism determined by the demand and supply, with the optimal use of scarce land resources through development activities. Development institutions and organizations are often regarded as mediating property market outcomes (Guy and Henneberry, 2002). According to the data released by the National Bureau of Statistics of China in 2019, 99,544 property development firms were operating in mainland China. Among these, 95,691 were domestic firms, 2,664 were firms based in Hong Kong and Macao, and 1,189 were foreign firms. Of the 95,691 domestic firms, 671 were state-own property development firms (SOE) monitored and regulated by the State-owned Assets Supervision and Administration Commission of the State Council; 230 firms were collective firms, where collective enterprises are the economic entities that work in collective activity; and all the other remaining firms were private firms. Among all the ownership structures mentioned above in China's property market, two key players, namely, the state-owned and publicly listed property development firms, shape the Chinese property sector. Listed property firms finance their development project through selling shares or issuing bonds depending on the size of the project, sources of funds available in the market, and the cost of capital. As Wang (2021) mentioned, SOE property development firms have implicit advantages, such as access to financing channels, low-costing financing, and tax incentives, are well connected to social networks, and are often regarded as "too big to fail" according to the market perception. However, as the SOEs have many advantages, the disadvantage is also obvious; there is a lack of performance incentives. Further, as Wang (2021) mentioned, the most publicly listed property development firms were tradable A-share. According to the China Securities Regulatory Commission, in 2021, 142 listed property development firms were positioned as the "market leader" and compatible in capital operating capacity and land reserve ability.

As a result, property developers become rather sensitive in reacting to the economic policy. When the government tightens its policies, restricting available funding will affect a developer's cash flows, profitability, growth prospects, and survival. For property development firms, capital risk is more vital than any other kind of risk, which is the primary factor that causes real estate enterprises to go bankrupt (Chong, Wu & Dong, 2008). Therefore, property development firms become less resilient when facing external shocks.

Studying and identifying property development firms' risk and maintaining financial health is important in several aspects, as property development firms play a vital role in the financial system and significantly affect the country's economy. The property sector contributed 17% of China's total GDP, and its upper and lower stream sectors, including the construction, financial, and retail sectors, are quite sensitive to the changes in the property sector, and the property development firms are the key actors in this sector. Furthermore, the effects of the 2008 subprime crisis indicated how the housing market

collapse could cause economic trouble and expand globally. A few studies can be found that have directly indicated the link between property development firms with their investment, development behavior, and financial stability. Whitley et al. (2004) stated that considering the property sector's link to the private non-financial sector through its role as collateral, there is a close relationship between the property sector and the financial health of the rest of the corporate sector. The local government in China has relied heavily on land-generated revenue (Liu and Xiong, 2018). Zhang et al. (2016) studied the coefficient between property investment and the non-performing loans of commercial banks in China. He concluded that with overexposure to property development loans when facing the downward pressure of the housing market, developers' financial health will worsen. There is an increased likelihood that property development firms will choose to default, which will later become a non-performing bank loan. The increase in non-performing bank loans will eventually harm the financial system and the real economy. Also, a few studies have claimed the importance of corporate financial performance to overall financial stability. Gadanecz and Jayaram (2008) stated that the corporate sector's riskiness measured by corporate leverage, earnings to meet payment obligations, and the likelihood of corporate defaults could be future problems for the banking and financial sectors. Therefore, the property sector plays a significant role in the economy, and property development firms, as its key actor, should maintain financial health and avoid systematic risks.

b) The city tiers

Property development firms are not restricted to develop properties in one city. In China, there are mainly three levels of city tiers classified by their economic development and infrastructures, representing the purchasing power of their urban population. Tier-1 cities are Beijing, Shanghai, Guangzhou, and Shenzhen. These four cities have political and cultural influence over the country, and their residents consider having relatively higher purchasing power.

Tier-2 cities comprise 30 cities, mostly major counties or coastline cities, such as Xiamen, Fuzhou, Wuxi, Kunming, Harbin, Jinan, Changchun, Wenzhou, Shijiazhuang, Nanning and so on. Tier-3 cities comprise 63–71 cities that are as prosperous as the district level and are relatively economically developed cities.

The decisions on where to develop are based on firms development strategies, the group of customers they target, and their financing ability. They thoroughly investigate the current country's economic policies before stepping forward.

c) Government policies in China

The housing market has been the principal engine for China's economic growth over the last couple of decades. There are several stages of development in China's housing market, namely, exploration, reform, rapid growth, regulated and targeted, and systematic regulations stages. Each stage is elaborated on in Table 1.1. The Chinese housing sector started with a welfare-based system from 1949 to 1978.

Workers' organizations mainly provided public rental housing. The housing policy followed the socialist model focusing on guaranteed, standardized, subsidized, and equal access to housing (Chen and Han, 2015).

The development of the property market in mainland China began with a series of gradual reforms on lands as well as the housing system in the late 1980s. The reform policies focused on three components: rent reform, privatization of public housing, and build-up of a housing market (Wang and Murie, 1996). The Chinese government undertook a series of small-scale pilot experiments in different locations on measures such as subsidized housing sales, rent increases with subsidies, and preferential housing sales to test the maturation of the Chinese housing market.

The housing market experienced rapid growth after the introduction of housing marketization with the termination of the housing allocation system in 1998 and the confirmation of the housing sector as the pillar industry in the economy in 2003. The reformed housing policies established a private ownership system and market price mechanisms, abolished urban housing subsidies, and alleviated housing shortages (Lim and Lee, 1990; Chen, 1996).

The market-oriented housing reform achieved economic liberalization from the welfare housing system. The remarkably long and sustained growth also surged Chinese households' demand for quality housing and housing prices (Wang, 2011).

In 2008, the global financial crisis hit hard on the Chinese economy, particularly with a sharp export downturn. To prevent continuing economic downturns, the Chinese government presented a massive stimulus program by injecting a total of four trillion Chinese yuan (CNY) (i.e., USD 586.68 billion) in 2009 and 2010 into the market (Wong, 2011). The growth of housing prices accelerated during the years, and the overflow of liquidity to the property market pushed the prices. As housing prices soared, the Central Economic Working Conference in 2016 raised the concept that "Housing is not for speculation but for living," frequent regulation in the housing market was then initiated. In 2020, the government introduced the "Three red lines" property rule targeted precisely to the debt ratio to cash, equity, and assets to regulate the high indebtedness of property development firms to target the liquidity crisis that appeared in late 2020.

Table 1.1 Development of the Chinese housing market

Exploration stage	Reform stage	Rapid growth stage	Frequenty regulated stage	Targeted and systematic regulation stage
During the economic reform and opening up, the reform of housing market is still under exploration.	The housing marketisation introduced in 1998, symbolised that the reform in housing market has begun.	In 2003, the property market has been positioning as the pillar industry in the Economy.	In order to targeting the soaring housing prices, a series of economic policy that aims at spressing speculation activities as well as stablised the prices has been implemented.	Under the backgrount of economic transformation of "new normal". The aims of supressing housing speculation and stablised prices is unchanged, the regulation in the housing market became more well directed and targeted.

(Source: Documents from the State Council; Chu et al., 2023)

Housing prices have increased dramatically during the past two decades in China. It climbed up from CNY 2,359 per square meter (psm) (equivalent to AUD 435/psm) in 1998 to CNY 10,139/psm (equivalent to AUD 2112.29/psm) in 2021 on average nationwide (National Bureau of Statistics of China, various issue, from 1998 to 2021) (refer to Figure 1.1).

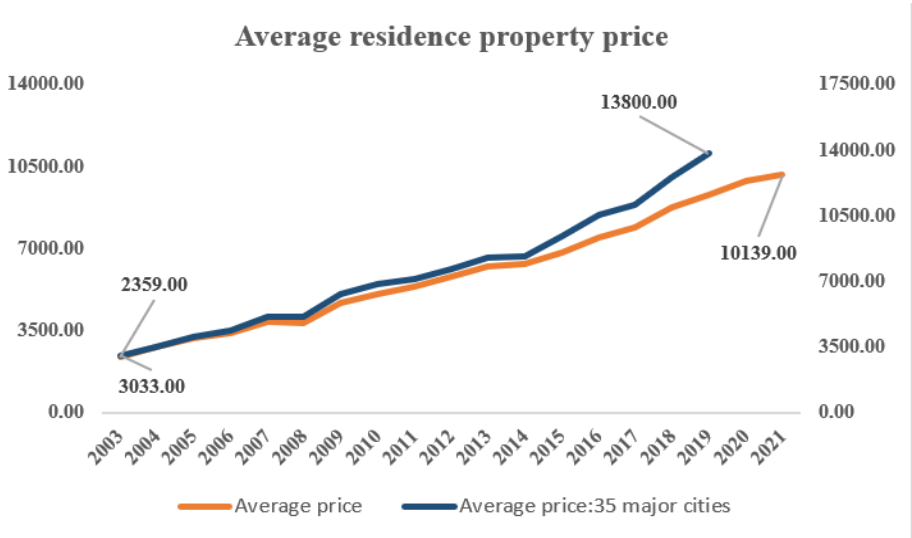

Figure 1.1 Average residence property price

(Source: National Bureau of Statistics of China)

The rapid growth of housing prices in China began due to the 1990s housing marketization reform but was accelerated by the stimulus packages in 2008. First, a four trillion stimulus package was injected that aimed to mitigate the downward economic pressure from the global financial crisis. It fits into five categories: enlarging the domestic demand, adjusting and boosting the key industries, promoting technological upgrades, building a more comprehensive social welfare system, and preserving financial stability to support economic development. Banks expanded credit and increased lending to residential purchasers and property developers (Dreger and Zhang, 2013).

Second, the increase in housing prices was determined by the market demand and supply driven by the economic and market conditions (Chen et al., 2020). On the demand side, as the urbanization process developed, the immigrants created a new demand for housing. On the supply side, the increase in construction costs pushed the housing price growth. Empirical studies have testified to the relationship between credit expansion and housing price increase in China, which provided solid evidence that rapid housing price growth was supported by credit expansion (Xiao, 2008; Dong et al., 2022).

The rapid increase in house prices can affect the economy, banking, finance system, and housing affordability.

1) Housing bubbles and the probability of a financial crisis

The significant rise in housing prices in China has raised a growing concern about the meltdown of the housing boom and destroyed China's economy. China is the world's second-largest economy and a major engine for global economic growth. The deterioration of China's economy will generate a contagious effect worldwide, slowing down the fragile global economy that has just recovered from the worldwide crisis that originated in the US and Europe.

The possible impacts of the housing bubble burst in China can be learned from the Asian Financial Crisis in 1997 and the Global Financial Crisis in 2008, both of these crises caused an economic meltdown. Montiel and Reinhart (1999), Goldstein (1998), and Brunnermeier (2008) studied the causes of the Asian financial crisis and subprime crisis, respectively. They stated that the overflow of cash, over-financing, and investment were the roots of the housing bubble boom and bust. The Financial Crisis Inquiry Commission (2011) investigated the causes of the subprime financial crisis. Their results suggested that the rocket-high real estate prices, low lending costs, and loose monetary policies created the bubble. The over-used leverage vehicles expanded and complicated the negative impact when the bubble burst. The lack of transparency in the financial system, failure in financial regulations, and irresponsible credit agencies pushed the crisis further. It led to irretrievable loss not only to the US but also to the world.

a) Impacts on the general economy

Property prices affect general economic conditions. In China, the property market contributes to a large proportion of GDP, growing from 4.61 percent to 6.87 percent during the last decade between 2008 and 2018 (National Bureau of Statistics of China, various issues). There is an essential link between housing investment and the national economy. Liu et al. (2002) examined the relationship between housing investment and the economy using Granger causality analysis. Their results indicated that housing investment growth could predict growth in GDP in the short term. Simultaneously, the long-term development of the national economy guides long-term housing investment. Cui (2009) anaAlyzed the panel data that covered 31 provinces in China from 1995 to 2006 and concluded that housing prices affected macroeconomic stability as increasing housing prices tend to stimulate total investment and consumption.

Furthermore, the property sector is, directly and indirectly, related to over 70 upstream and downstream industries. This industry includes the financial, construction, and building materials, such as the steel and cement industry (Bilec et al., 2006; Zhu et al., 2018; Wan and Qiu, 2023). The property market and its related industries are the main economic development engine. Negative economic impacts can be presumed if those markets or industries face a downturn.

b) Banking and financial system risk

The real estate and banking cycles are correlated via the interaction of banking and financial institution systems. This connection can be found in both advanced and emerging economies. Herring and Wachter (1999) studied the correlation between the banking crisis and property booms. They stated that when housing price decreases, the decline in housing price would increase banks' perceived lending risk and weaken banks' capital position. Ivashina and Scharfstein (2010) analyzed the banking panic during 2008. From their perspective, the meltdown of subprime mortgages raised concerns about the solvency and liquidity of financial institutions. This panic has cut the credit supply, further deepening the economic downturn.

2) Housing affordability

Housing affordability is a tremendous task faced by all countries, especially in China, as it has the world's largest population. The dramatic increase in housing prices has intensified the housing affordability problem in China. It has also raised doubts about whether the free market is more appropriate than the welfare system as the primary allocation mechanism for urban housing (Shen, 2012). The discussion of the housing affordability problem has been more predominant in the last two decades as housing prices and rents have increased at a more incredible pace compared with the growth rate from the previous years (Cai and Lu, 2015).

The housing price-to-income ratio is an essential index for measuring real estate health as it detects residents' housing affordability and regional spatial justice (Yin et al., 2019). The average housing price of 35 major cities has been growing at a year-on-year basis of around 17 percent over the last two decades, while the household income of these cities has only grown at an annual rate of less than 10 percent. Therefore, the increase in housing prices has led to an unusually high housing price-to-income ratio (Zhang et al., 2016). Young and low-income families are the population groups that have particularly encountered housing affordability problems. Goodman et al. (2018) stated that housing affordability creates many social issues in emerging and developed countries. Housing is critical for family well-being as, on a physical level, it provides a sense of safety (Bratt, 2002). Housing affordability has increased the gap between the rich and the poor (Wang et al., 2012).

As the housing prices have stayed high, the Chinese government is concerned about problems in housing affordability, speculative bubble boom and bust, and the possible downward pressure on the economy that was spread over. In 2018, the Chinese government introduced a series of restrictive housing-related measures to ensure sustainable property market development and sustainably maintain economic stability. These restrictive measures include both supply-side and demand-side policies. A more hash land acquisition policy that increased the required pay-up land conveyance fee (depending upon the leasing period and land-use intensity) was implemented from the supply side. The lending restrictions have limited liquidity injected into property markets and discouraged financial institutions from financing property development projects. From the demand side, restricting second-house purchasing and rising down-payment requirements prevented speculated buyers from accessing the market. With these measures, housing price growth was stabilized, with an average growth rate of 9 percent (refer to Figure 1.2, and the overheated housing market was controlled. Due to the restrictive policies, some property development firms, particularly small and private development firms, have difficulty acquiring land and accessing capital while facing sales decline. Some property development firms have become financially distressed or even bankrupt.

Figure 1.2 Percentage change in housing prices from 2010 to 2020
(Source: CEIC)

In 2020, the property development sector contributed to approximately 7.4 percent of the GDP (National Bureau of Statistics of China, 2020). Being capital-intensive is one of the main characteristics of property development. In each development stage, developers face challenges from tightening cash flows and high leverage. The risks faced by property development can be affected by external elements such as the economic environment and policy changes. Moreover, demand-side, and supply-side factors, such as planning and land supply, the dependency on land sales from local governments, and the ownership structure (state-owned or private firms), could alter the property market conditions and, therefore the property development firms' performance (Galster, 1997; Tian and Ma, 2009; Han and Lu, 2017).

Previous research in property development and government policies

Many articles have addressed government policies in real estate properties. The policies mainly focused on the housing market and housing prices (Phang and Wong, 1997; Angel and Mayo, 1996; Case and Shiller, 1988; Kim and Kim, 2000; Berry and Dalton, 2004), housing affordability (Kim, 1993; Ndubueze, 2009; Worthington, 2012; Yap and Ng, 2018), land and housing supply (Son and Kim, 1998; Hannah et al., 1993; Kim and Kim, 2000; Yan et al., 2014; Su and Qian, 2020), and property development (Williams and Butler, 1981; Healey, 1991, 1992, 1994; Healey and Barrett, 1990). However, few papers addressed policy and property development, particularly in the financial performances of property development firms.

Housing policy, housing prices, and markets

Several papers deal with the housing market and housing prices. For instance, using regression models, Phang and Wong (1997) studied government policies and private housing prices in Singapore. They found that interest rates, income growth rates, and housing supply did not play a statistically significant role in determining private housing prices between 1975 and 1994. However, government policies relating to using compulsory savings for private housing finance purposes, the liberalization of rules on public housing ownership criterion, and housing finance significantly impacted private housing prices. Buckley and Ermisch (1982) empirically examined how prices have been affected by various government policies. They asserted that government policy strongly influences the functioning of the housing market and affects house prices. Berry and Dalton (2004) described the boom in Australian house prices. They discussed the drivers behind the price changes across geographic and dwelling-type submarkets, such as interest rates, investor behaviors, and demographic changes. They also discussed the costs of broader issues of macroeconomic policy.

Housing policy and housing affordability

Worthington (2011) discussed housing affordability in Australia from 1985 to 2010, linking with demand and supply drivers and government policy responses. They found housing affordability in Australia has worsened significantly in urban and regional areas and has become the world's most unaffordable country. Ndubueze (2009) developed a new composite approach to measuring housing affordability in Nigeria using data from the Nigerian Living Standards Survey 2003–2004. The thesis concluded the national housing policy that deemphasizes government involvement in housing provision does not allow the country's full potential for tackling its serious affordability problems. Yap and Ng (2018) explored the affordability of the Malaysian housing market and found the supply of affordable housing is insufficient in the residential property market. They found income, property price, land cost, and demand and supply are the significant factors affecting housing affordability.

Land policy and housing supply

Government policies on land have affected development activities and housing supply. Examples of researchers are Kim and Kim (2000), who studied the driving forces behind the Korean government's real estate policy decision-making on new apartments, control of land use, green belts, and spatial deconcentrating policies. They used case studies to explain why inefficient and inequitable policies could stay long and why policy reform failed. Yan et al. (2014) investigated the government intervention in the land market and its impacts on land supply and new housing supply. Evidence from major Chinese markets found that government policy was vital in the land and new housing supply markets. Su and Qian (2020) studied the varying central-local dynamics of land supply in different tiers of cities and investigated the relationship between land supply and property investment. They found that the multi-purposed central land policy and varying land leasing strategies adopted by different tiers of cities contribute to the varying land supply trajectories.

Property development and planning policies

There was also literature on property development and government policies (williams and Butler, 1981; Healey, 1991, 1992; 1994; Healey and Barrett, 1990). Healey (1994) examined the impact of public policy on the opportunities available for property development in an urban region and the effects of such policy on the institutional organization of the property development sector. This research addressed how public policy shapes the structure and relations of property development activity. Mengistu and van Dijk (2018) analyzed how relevant institutions function using a case of property developers in transitional real estate markets of Addis Ababa and whether changes lead to the development of more credible institutions. They found that, though the government provided restrictive policies on the developers, the credibility of developers in Addis Ababa improved after 1996, corresponding with a period of high and sustained economic growth.

The findings of the previous research addressed the policy impacts on development opportunities and the credibility of property development firms, but there was no research investigating the financial performance of property development firms affected by the policy changes. This thesis is also an Industrial Doctoral Project (IDP), and the industry partner wishes to identify the relationship between economic policies and the financial performance of property development firms. Therefore, this research focuses on how the policies would affect the financial performance of property development firms. This research focuses on how property development firms react to the changes in external factors, in particular, how the policies would affect the financial performance of property development firms. The research questions are derived, including

a) What are the main determinants that influence the financial health of property development firms?
b) How do economic policies affect the financial health of property development firms? and
c) To what extent do economic policies affect the financial health of different types of property development firms?

The government's economic policies significantly impacted the financial health, growth prospects, and even survival of property development firms. It is crucial for assessing, evaluating, and identifying how economic policies affect property development firms. Why do some of the development firms survive and others do not? Effective strategies could be generated based on thoroughly understanding how the policies impact property development firms.

1.2 Research Aim and Objectives

This research investigates how government economic policies impact the financial health of property development firms in China.

To achieve the research aim, the objectives are to:

1) understand the main determinants of the financial health of property development firms;
2) investigate how government policy affects the financial health of property development firms; and
3) understand the policy effects on different types of property development firms.

1.3 Research Methodology and Methods

The financial health of property development firms in China is the focus of this research, which is a part of the financial-economic problems. A deductive approach will solve this problem. After obtaining the ethics approval, the investigation will understand the research's theoretical framework, develop research hypotheses, and test them through empirical study. The details of the research approach are as follows.

1.3.1 Literature review

The literature review includes the main financial-economic theories that explain the impacts on the financial health of firms. The study will also extend to understanding the external and internal determinants of firms' financial health. This review will help establish the theoretical framework and identify the research gap. The study will also support developing the research hypotheses and approach applied.

1.3.2 Development of research methodology and methods

A deductive research methodology will be established based on the identified research gap and problems. This section explains the procedure for developing regression models identifying the main determinants of the financial health of development firms and the steps of conducting DID models.

1.3.3 Development of models

Hypotheses will be developed to test the main determinants of the financial health of development firms and government policies' impact on the financial health of property development firms using the DID model. DID estimates a causal effect by comparing the outcome trend over time between the intervention groups. Most of the financial data can be accessed from the firms. Thus, secondary financial data will be collected for empirical testing. The effects of government policy on different types of property development firms' financial health will also be studied. Parallel trend testing will be applied to verify the developed models.

1.3.4 Result discussion and conclusion

The findings from the model will be discussed according to the literature, and the study's implications will also be explained.

1.4 Significance of the Research

This research plays a vital role, as described below.

1) Contributes to the literature

This research contributes to the body of knowledge in identifying financial health determinants for particular property development firms, with its unique features differentiated from other sectors. Also, it is the first that applies the DID approach in testing the effects of economic policy on property development firms.

2) Support decision-making on managing financial risks

The Chinese government has actively monitored property markets. Therefore, the government's economic policies are important in stabilizing and cooling-down overheated housing markets. Understanding how the policies impact property development firms' financial health is essential for developers to manage their financial risks. Also, it can help developers reconsider and restructure their financial strategies to adopt the policies changed.

3) Provide informed information for future government policy formulation

Investigating how economic policies impact the property development firms' financial status and the effects of policy on the different types of property development firms can provide valuable information for the government in formulating more effective policies that meet the target.

The property market plays an active role in promoting economic growth. However, past financial crises suggest that the property market is also the root cause of financial system fragility and economic meltdown. Property developers are one of the principal actors participating in the housing market. They coordinate the entire development process, from land acquisition and construction to sales. Therefore, it is essential to study the financial risks associated with restrictive policies, the property development process, and capital structure decisions.

4) Contributed to the theory

Have filled the gap in the studies of how property development firms could be affected by the policies and proposed possible ways of risk mitigation.

Have added to the theory that apart from liquidity, solvency, profitability as well as operating efficiency, financial flexibility also plays an important role in affecting financial health.

1.5 Scope of the Research

This research has been limited to focusing on property development firms in China.

The study evaluates property development firms that add value to the land, including building new development properties, either commercial or residential, or renovating existing buildings. The firms varied from large to small development firms.

This research focuses on economic policies, namely, the stimulus package for property markets. The stimulus package includes monetary and fiscal economic policies to prevent the spread of financial crises and maintain national economic growth. When "economic policy" is used in the thesis, it implies a series of policies or "a stimulus package" applying to economics.

This research also focuses on the financial health of property development firms. Firms can be measured by business performance or financial performance. This research narrows to the impacts on the financial health of property development firms. It analyzes the external and internal factors contributing to the financial health of property development firms.

1.6 Chapter Summary

This thesis is structured as below (also see Figure 1.3).

Chapter 1 describes the research background and identifies the research problems, which assists in establishing the research aim and objectives. The overview of the research methodology and methods is elaborated. The research's significance and scope have also been pointed out.

Chapter 2 covers the financial-economic theories that form the theoretical basis for the research. The main determinants of financial health for firms are reviewed. By systematically reviewing this literature, the research gap is identified.

Chapter 3 elaborates on the research methodology and methods applied in this research. It explains the reason for using the deductive approach for the study. It introduces the DID method and continues with the development of the model, the overall assumptions, the interpretations of the results, and the verification.

Chapter 4 presents the research findings from the applied approaches, including the data collection process and pre-processing procedures, the DID model development, and the effects of the stimulus policy before and after on the property development firms. The policy impact on the different types of firms is also provided.

Chapter 5 discusses the research findings on the financial health of property development firms that may replicate the literature. The different effects of property development firms are also addressed.

Chapter 6 provides a summary and conclusion on the stated research objectives of the study. The research limitations and areas for further research are also discussed.

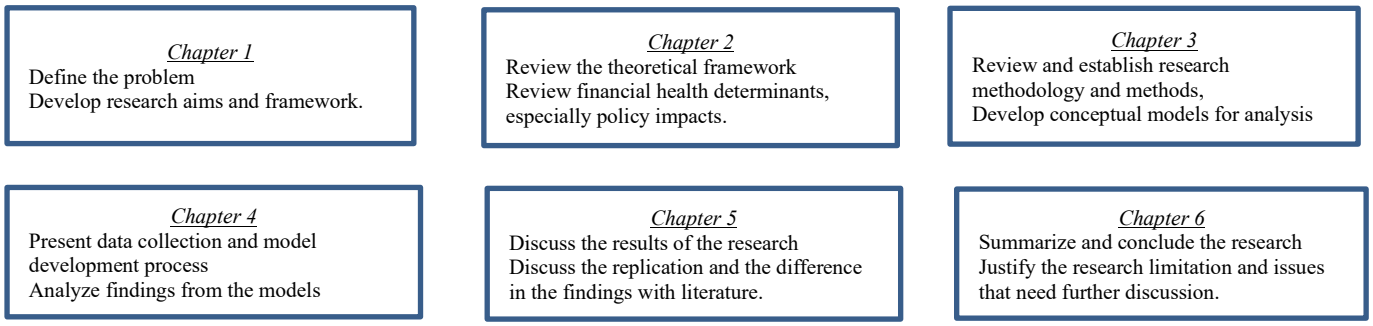

Figure 1.3 Chapter Summary
(Source: by author)

Chapter 2 Literature Review

2.0 Introduction

Investigating the main determinants of financial health for property development firms to understand how a change in government policy impacts the financial performances of property development firms is crucial in this research. Both academics and practitioners assess the financial health and long-term sustainability of companies by evaluating four main areas; liquidity, solvency, profitability, and operating efficiency (Beaver, 1966; Altman, 1968, 1983; Chen and Wong, 2004; Rafiei et al., 2011; Stobierski, 2020). The sources of information derived for the evaluation were the financial data that describe corporate return and profits, capital structure and investment, and working capital management (WCM) decisions made by companies. Financial economics could explain decisions at the intersection of finance and economics (Eichberger, 1997). The principles of financial economics have been widely applied and not limited to studying real estate investment trusts (Corgel, Mcintosh and Ott, 1995), herding behaviors in the financial market (Devenow and Welch, 1996), the stock market (Ferson, Sarkissian and Simin, 2003), social mood (Nofsinger, 2005), mergers and acquisitions (Kaplan, 2006), consumer lending discrimination (Yinger, 1998; Bartlett et al., 2022), the pattern of corporate financing or capital structure decision (Smith and Watts, 1992; Beattie et al., 2006; Hang et al., 2018; Chauhan and Huseynov, 2018), corporate governance (Pillai and Al-Malkawi, 2018; Bhagat and Bolton, 2019; Kovermann and Velte, 2019;), firm's behavior (Fanti and Buccella, 2017; Al-Najjar and Kilincarslan, 2017; Coccia, 2018), and firm's macroeconomic activity (Kalay et al., 2018; Chang et al., 2019; La Rocca et al., 2019).

This literature review commences with a discussion of the theoretical framework of financial economics and the main components of the theory. Section 2.1 outlines the theoretical framework of financial economics that establishes the academic background of this research. It continues by reviewing the definition of financial economics and how it can be applied to analyze corporate financial health. Finally, it breaks into different models of financial economics that explain each financial decision; asset pricing, capital structure, capital budgeting, and WCM made by companies under the theoretical framework. Section 2.2 reviews the works involving firms' financial health, including internal and external factors and risk measurement techniques. Section 2.3 examines the main characteristics of property development firms that make them unique among other sectors. The conclusion is provided as the research gap is identified in section 2.4.

2.1 Theoretical Framework of Financial Economics

Financial economics analyzes the use and distribution of resources in markets. It studies allocating scarce resources over time by assessing the costs and benefits of financial decisions (Bodie et al., 2009). Ross (1987) advised that financial economists utilize the data within the financial database and are concerned with the relationship between the prices of different financial assets. Monetary economics

concentrates on economic activities, namely, asset pricing or utilization of capital and corporate finance or source of finance. In complementing financial economics study, the financial theories consist of concepts and quantitative models that assist the thinking process and evaluation or making decisions (Bodie et al., 2009). It involves analyzing the interrelation of financial variables, especially time, risk, opportunity costs, and information. It helps to evaluate various circumstances of the application of financial theory and analyzes of the financial performance of firms driven by various determinants (Xie et al., 2003; Klapper and Love, 2004; Bhagat and Bolton, 2008; Brick et al., 2006), firms' ownership structure (Demsetz and Villalonga, 2001; Chen et al., 2006); investment risk and return (Kelly et al., 2019; Boehmer et al., 1991; Cheridito, 2005), firm valuation (Lorenz and Lützkendorf, 2008; Bancel and Mittoo, 2014), and price predictions or valuations (Laeven and Levine, 2007). Figure 2.1 provides a summary of this financial economics framework.

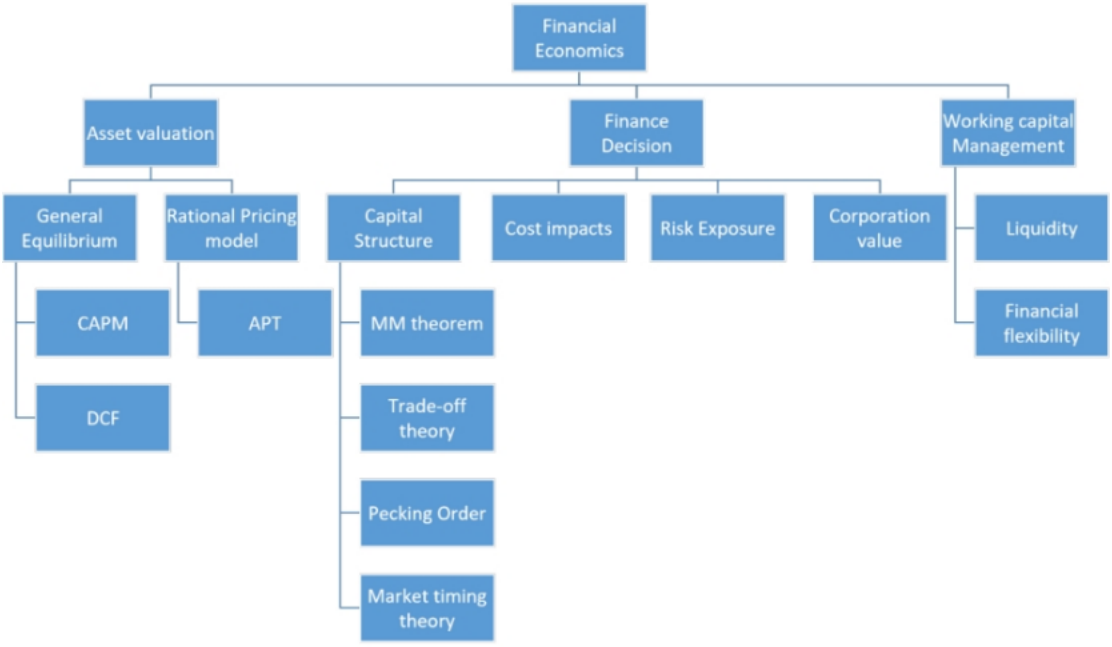

Figure 2.1 Framework of Financial Economics (Source: Author)

2.1.1 Asset pricing principles

Asset pricing is essential in financial economics, as it aims to determine the values of claims to uncertain payments (Drobetz 2000, p.9). This indicates that different timing and risk of uncertain payments produce different asset values. A higher risk represents a high rate of return. Asset pricing is usually used to value firms' asset prices, which determines firms' value. Asset pricing includes two principles in financial economics: general equilibrium asset pricing and rational asset pricing. The general equilibrium theory states that the asset value is determined by demand and supply. The rational asset-pricing model assumes that asset prices reflect the arbitrage-free price of the asset. The model is

commonly applied to pricing fixed-income securities such as bonds and derivative instruments. The changes in asset value affect the financial performances of firms.

2.1.1.1 General equilibrium model

A price is considered reasonable if it is an equilibrium price based on the conditions that supply equals demand for any asset. Investors are satisfied with their current position in the assets given their preferences, wealth, and income and offered the asset prices (Munk, 2013). Based on this principle, the general equilibrium asset pricing model was developed and used to evaluate diverse portfolios (Krause, 2001). Sharpe (1964) suggested that in equilibrium, capital asset prices are adjusted according to demand and supply. The market presents the investor with two prices: the price of time, or the pure interest rate, as well as the cost of risks, which is the additional expected return per unit of risk. The capital asset pricing model (CAPM) is one of the prototype models of the general equilibrium model.

Capital asset pricing model (CAPM)

The equilibrium asset pricing model has been applied in firm valuation. CAPM can be used to value firms, project returns, and risks, according to Brennan and Schwartz (1984). Financial economists and later Nobel laureates in economics William Sharpe (1964), Lintner (1965), and Mossin (1966) developed CAPM based on current portfolio theory. Markowitz (1952) was the first to introduce the modern portfolio, which he later revalued in 1959 (Markowitz, 1959); the portfolio investment problem can be formulated based on portfolio assets' mean and variance. This theory demonstrated that securities should be selected based on their features and how they correlate with other securities, resulting in a portfolio with the same expected return but a lower risk (Elton and Gruber, 1997). Based on the modern portfolio theory, the portfolio's expected return is maximized for a given level of risk. The principle behind this is that investments with different financial assets are less risky than only one type of asset. Investors should evaluate the overall risk and return for the portfolio they hold. Studies on co-movements of stock were carried out in mature markets like the US, Japan, and European and other countries. Qiu and Hou (2006) conducted an empirical study on the relationship between diversification and production efficiency using samples from listed companies in China. The results suggested that the increasing level of diversification will improve the level of production efficiency. Diversification is a way to decrease portfolio risk. An investor can reduce risks by holding a combination of investments that are not perfectly positively correlated.

CAPM is a model typically applied to evaluate whether a firm, stock, or portfolio is fairly valued with risk and expected return. The risk-free rate in the CAPM accounts for risk-free return, typically adopted as the yield on a 10-year government bond. The other component of the CAPM is the risk premium, which is based on the beta of that security. Investors are compensated by the risk premium, or the

systematic or non-diversifiable risk generated by the market for taking on additional risk (Perold, 2004) (Equation 2.1).

$$E(r_i) = r_f + E(r_m - r_f)\beta_i \quad (2.1)$$

Where r_f represents the risk-free rate of return, $E(r_i)$ is the expected return on security *i*, $E(r_m)$ denotes the expected return on the market, and β_i is the beta of security *i*.

Considering the modern asset pricing framework, Bossaerts and Plott (2004) discovered that risk aversion is the driving force behind trading and markets to equilibrate at a point where risk premia are determined solely by covariance with aggregate risk. Hou et al. (2012) suggested that expected returns play a key role in firm valuation in estimating the implied cost of capital. Da et al. (2012) argued that although the CAPM is based on stock returns, it does not limit its use for estimating the cost of capital as stocks are backed by projects and the options to modify current projects and undertake new ones. Based on this premise, they developed a method for estimating a firm's project CAPM betas and project return.

Ang and Chen (2007) constructed a conditional CAPM with time-varying betas and time-varying market premia to systematic stochastic volatility to anticipate average returns of the market portfolio. This model captures predictable time-varying in both mean and conditional volatility of the market excess return. Baberies et al. (2015) studied a consumption-based asset pricing model. They found that apart from addressing the actual evidence, their model can capture data on expectations that reflect investors' behavior and improve the risk and return prediction on stock pricing. The higher the risk of firms, the more challenging the firms' financial performance.

Discounted cash flow model

The value of a particular asset is not easy to determine. When firms continue to invest funds in assets, these assets will produce cash flows that allow the firm to either reinvest in more assets or pay the owners. These assets represent a firm's capital; in other words, capital is a firm's assets (Peterson and Fabozzi, 2002). Firms pursue investments that enhance shareholder value. However, a firm may be unable to invest in all the projects, as the amount of capital for each project is limited. Thus, capital budgeting techniques determine which project will yield the best return over an applicable period. A capital budgeting decision is characterized by cash flows (costs and benefits) spread out over several periods. It assesses a project's cash inflows and outflows to determine whether the cash flow meets a set of benchmarks such as net present value (NPV) and internal rate of return (IRR). A project is feasible when NPV is greater than zero and the IRR is greater than the required rate of return. The firm's size, revenues, profitability, leverage level, expenditure, familiarity with the project, cash availability, and the level of education of decision-makers all affect the decision of capital budgeting approaches (Ahmed,

2013). Malenko (2019) studied an organization's optimal capital budgeting process between headquarters and divisions by incorporating a capital allocation framework. He concluded that the optimal mechanism could be achieved with a dynamic spending account and setting a standard on the size of individual projects that allows financing separately between the headquarters and divisions.

The equilibrium asset pricing model has also been applied in firm valuation. Brennan and Schwartz (1984) held that the development of CAPM determines firm valuation. Firm valuation is critical in corporate finance, according to Brennan and Schwartz (1984), as it determines the firm's risk, the rate of return demanded by investors based on capital market data, and the impact of financing policy on firm value. The underlying notion of present value, which is the current value of the future sum of cash flows given a specified rate of return, is used in the valuation process. It is a means of determining a company's fair value. One of the most used valuation methods is discounted cash flow (DCF), which determines the current value of an investment based on future cash flow estimations. The DCF model has been widely used to predict asset prices and evaluate investment projects. The DCF model considers future anticipated variables such as cash flows, growth rate, and discount rate, according to Takács et al. (2020). They developed a new DCF model to measure both values and market correction. They discovered an overall undervaluation in US stock markets, with diverse price error patterns across industries. With an average response period of 2 years, the results demonstrated that market corrective mechanisms had performed well in the post-crisis era. French and Gabrielli (2005) discussed that the DCF model would overlook the uncertainty of current and future markets. They recognized this uncertainty using a probability-based DCF model to address this shortcoming. The result shows that the central tendency is closer to the single-point estimation.

Porta et al. (2002) proposed a DCF model evaluating the impact of minority shareholder legal protection and controlling shareholder cash-flow ownership on firm valuation. They discovered that countries with superior minority shareholder protection have higher firm value. Berkman et al. (2005) compared the DCF method with price-earnings methods on equity valuation in the international equity market. The result shows that DCF and P/E valuation have equal accuracy.

The DCF model uses NPV and IRR to support decision-making. The model is widely applied to value assets or investments by deciding on the optimum use of scarce cash resources (Block, 1997; Brijlal, 2008; Rossi, 2015). NPV states a firm is encouraged to take on an investment project when the present value of its expected future cash flows, discounted appropriately for the project's riskiness, exceeds the cost of investment (Bernardo et al., 2001).

$$NPV = \sum_{t=1}^{n} \frac{ACF_t}{(1+k)^t} - C_0 \quad (2.2)$$

Where

ACFt = the annual cash flow in year *t*
k = the appropriate discount rate or required rate of return, or cost of capital
C_0 = the initial outlay of cash, i.e., the investment amount
n = the investment's expected life

When NPV is greater than zero, it means the value of the investment is greater than the cost, and thus the investment is recommended to accept, or vice versa.

On the other hand, IRR focuses on the rate of return in the DCF equation. The discount rate is the ratio of the present value of an investment's cash flows to the present value of its cash outflows, which equals zero. The formula is shown in Formula 2.3.

$$\sum_{t=1}^{n} \frac{ACF_t}{(1+irr)^t} - C_0 = 0 \quad (2.3)$$

Where

ACF_t = the annual cash flow in year *t*
irr = the internal rate of return of the investment
C_0 = the initial outlay of cash, i.e., the investment amount
n = the investment's expected life

The decision rule under the IRR technique is to accept the investment if its IRR is greater than the cost of capital, or vice versa.

NPV and IRR procedures are commonly used in valuing firms, making property transaction decisions, development appraisals, property performance monitoring, loan security, tax issues, company accounts, and insurance reinstatement (Crosby et al., 2018).

2.1.1.2 Rational asset pricing

Rational asset pricing focuses on the concept of arbitrage-free pricing and equilibrium. It is based on the efficient market hypothesis that asset pricing quickly responds to all publicly available information (Ross, 1987). Any deviation from a reasonable price will be "arbitraged away" quickly. In other words, the demand curve is perfectly elastic as the financial market is filled with assets that closely substitute. The state of asymmetry between the two markets is exploited by rational asset pricing. If this discrepancy exists, the arbitrageur can "lock in" a risk-free profit by simultaneously buying and selling in both markets. Asset prices are predictable, and this implication of predictability holds whether the market is efficient; otherwise, mispricing occurs. Investors should generally be aware of any cross-

sectional or time fluctuation in expected return, assuming markets are efficient and prices (Lewellen and Shanken, 2002).

The assumption of rational asset pricing is typically used to price financial assets such as securities, especially bonds. It is fundamental for valuing derivative instruments like futures, options, and swaps, as well as hedging and initiating. The classical model is the option pricing formula (Merton, 1973) developed by Black-Scholes, who value derivatives in dynamic markets. The rational asset pricing model can also be used to value shares. A standard influencing model in pricing shares is the arbitrage pricing theory (APT) (Equation 2.4). The theory's core idea is that a financial asset's expected return could be modeled as a linear function of several macroeconomic factors, each with a beta coefficient. From 1983 through 1990, Clare and Thomas (1994) used APT to investigate the impact of macroeconomic conditions on aggregate stock market returns in the United Kingdom. According to the researchers, crude prices, corporate failure, the retail price index, the outstanding amount of private lending, the current account balance, and the redemption yield on a UK corporate debenture and loan index all played an impact. Elton, Gruber, and Blake (1995) developed the relative pricing (APT) model to explain expected returns in the bond market and assess bond performance using various types of bonds.

$$E(r_i) = r_f + \beta_{i1} * RP1 + \beta_i 2 * RP2 + \ldots + \beta_i k_n * RP_n \qquad (2.4)$$

Where r_f is the risk-free rate of return, β_i is the sensitivity of the asset or portfolio in relation to the specified factor, and RP is the risk premium of the specified factor.

The asset price movement has been valued using rational asset pricing methods. Rorner (1992) suggested that asset price movements are caused mainly by the trading process revealing knowledge rather than by external news or irrationality. The rational asset pricing models have also been used to anticipate asset returns (Kirby, 1998), investigate rational asset pricing bubbles and portfolio constraints (Hugonnier, 2012), and explore rational asset pricing bubbles and debt constraints (Werner, 2014).

Asset pricing principles can be used in evaluating investment decisions as it adjusts the required rate of return for an investment level of risk (Acharya and Pedersen, 2005; Dhankar and Singh, 2005; Elbannan, 2014). The required rate of return (RRR) can be used by individuals or organizations considering an investment opportunity to estimate the minimum acceptable return on investment. According to the investment theory, asset pricing refers to assisting in the decision-making process of a chosen investment, determining the asset-specific required rate of return on the investment in question, or pricing derivative instruments for trading purposes.

The asset pricing principles are important in valuing asset price, risk-return profile, and portfolio management (Boatsman and Baskin, 1981; Hodgson and Vorkink, 2004; Blenman and Wingender,

2019). As the models represent the market reality and are invaluable in advising what optimal allocation looks like and assessing the performance of an investment product, the asset pricing principles are relevant in evaluating the financial health of companies in terms of decisions on the types of asset investment, the proportion of different types of assets, and their risk-return portfolios.

The asset pricing model can estimate a firm's cost of equity or project selections, which is the return required by a corporation to judge whether an investment meets its capital return requirements (Gordon and Gould, 1978). The cost of capital is the sum of the cost of equity and the cost of debt. It is utilized for financial decisions, which will be discussed in the following section, and plays a vitally important role in allocating funds between different sectors of the economy (Booth, 1981).

2.1.2 Finance decision

Finance is another sub-discipline under a financial economic framework. It focuses on studying the decisions of utilizing funding sources, capital structure, capital investment, and WCM while maximizing the value of companies (Vernimmen et al., 2022). For instance, firms may refuse to issue stock and intend to rely on internal sources of funding, and prefer debt to equity if external financing is required (Myers and Majluf, 1984); managerial overconfidence can cause corporate investment disorder (Malmendier and Tate, 2005); and investment cash flow sensitivities should be increasing when firm's intangible assets (a proxy of pledgeability) value rises but only if firm's facing financial constraints (Almeida and Campello, 2007). To remain financially stable and healthy, financial managers make financial decisions every day to achieve the objectives of maximizing the company's value.

2.1.2.1 Capital structure decision

The firm's capital structure relates to the debt and equity mix used to fund its assets and operation activities. The capital structure aims to achieve a level of financial leverage that maximizes the company's worth. Equity financing is the process of raising funds through stock transactions. It can originate from various sources, but one of the most prevalent is an initial public offering. Debt is something that organizations or individuals borrow, usually in the form of money, to make large transactions that they could not afford under certain circumstances. A borrowing arrangement allows a borrower to take out a loan, knowing that it will be repaid later, usually with interest. Debt is raised by bond issuance or loans due back to the lender, whereas equity can be derived by issuing common stock, preferred stock, or retained earnings. The capital structure takes into account both short- and long-term loans.

The advantages and disadvantages of raising equity or debt have been studied thoroughly in the literature. Bogan (1950) mentioned that the role of equity financing is distinct from other risk capital; greater risk is incurred when all the capital is borrowed, and risk is the least with equity financing as no

fixed obligation is attached. Healthy and profitable firms tend to rely heavily on equity financing (Fahn et al., 2017); equity finance generally strengthens a firm's creditability, while debt usually increases a firm's bankruptcy risk. Ghonyan (2017) studied the motivation of firms to go public and proved that more funds available in the public capital market would help with business and development growth. However, problems such as information asymmetry and agency problems negatively influence firms going public. The cost of financial distress is incurred when a firm comes under the threat of bankruptcy (Robichek and Myers, 1966). With taxes, the value of a firm can be increased by using debt as interest payment can be compensated by taxable corporate income (Miller, 1977).

Debt-to-equity (D/E) ratio is usually applied to gain insight into a firm's debt-to-equity mix and how dangerous its borrowing practices are. An alteration in a firm's debt-to-equity ratio can significantly impact its value and cost of capital (Abeywardhana, 2017). Conversely, this risk is the most significant threat to the firm's ability to expand. Durand (1952) stated that financial leverage could boost a firm's worth by lowering the cost of capital after applying the Net Income (NI) approach. Empirical studies have revealed that the D/E ratio has a positive or negative relationship with the value of a company. By investigating the period from 2008 to 2012, Heikal et al. (2014) discovered a strong negative effect on the company's automotive earnings growth on the Indonesia Stock Exchange. However, Kamar (2017) found that return on equity (ROE) and D/E ratios had a beneficial impact on the stock price of the cement industry from 2011 to 2015. Similarly, Nuryani and Sunarsi (2020) found that the current ratio and D/E ratio had a substantial impact on the predicted dividend growth of 34.2 percent.

According to Myers (2001), the debt-equity decision is based on various fundamental condition theories established over the last five decades to explain the capital structure and its determinants, different outcomes of capital structure, and how firms choose their debt-equity mix. Modigliani and Miller's theorem (1958), Kraus and Litzenberger's (1973) capital structure trade-off theory, Myers' pecking order theory (1984), free cash flow theory, and market timing are the main theories that guide selecting appropriate capital structure.

Modigliani-Miller Theorem

The Modigliani-Miller (MM) theorem (1958) developed the capital structure irrelevant theory; a company's value is irrelevant to its capital structure, and there is no optimal D/E ratio based on a series assumption. These assumptions include that the financial market is perfect with no transaction or bankruptcy costs, perfect information and all relevant information are available, and no financial frictions. Most of these assumptions are unrealistic (Brusov et al., 2011). In the real world, bankruptcy costs, agency costs, taxes, and information asymmetry exist. When these assumptions change, the value of a company will be altered by the changing D/E ratio. Modigliani and Miller (1963) developed this by incorporating the effect of taxes on the cost of capital and company value, demonstrating that the

value of a corporation increases with leverage due to the tax deduction of interest on loan capital. As a result, the company's capital cost decreases.

The MM theorem (1958) claims that a firm's market value is determined by the present value of its future earnings and underlying assets and is unaffected by its capital structure. Brusov et al. (2011) investigated how a company's capital structure affects different financial indicators, such as cost of capital, profits, profitability, and shareholder value. They modified MM's theory to account for a corporation's weighted average cost of capital (WACC) over a finite lifespan. In two limited scenarios, 1-year and perpetuity companies, they generated analytical expressions for the WACC of companies with arbitrary lifetimes. They noticed that the WACC values of companies in the market for various durations are substantially different. As the WACC in each type of capital is proportionately weighted, asset pricing predicts the predictor of a firm's financial cost. The WACC is the sum of the product of the cost of debt and the proportion of debt capital invested in the company; it is also the sum of the multiplication of the cost of equity and the proportion of equity capital invested in the company (Frino et al., 2009, p. 213).

$$WACC = \left(r_d * \frac{D}{D+E}\right) + \left(r_e * \frac{E}{D+E}\right) \qquad (2.5)$$

Where r_d and r_e represent the cost of debt and equity capital, respectively. D and E indicate the value of debt and equity used by the company.

A WACC computation considers all capital sources, including common stock, bonds, and any other long-term debt. CAPM measures the cost of equity and risk by highlighting how financial markets price securities. Therefore, a firm's WACC is linked to the equity premium (market risk premium) (Jagannathan and McGrattan, 1995). The type of capital structure a company chooses affects its marginal cost of debt. When issuing debt, companies are concerned about financial flexibility and credit ratings, but when giving equity, they are concerned about earnings per share dilution and recent stock price rises (Graham and Harvey, 2001).

Changes in capital pricing will ultimately impact a company's value and, as a result, its financial health. Modigliani and Miller (1958) proposed that the cost of capital is equal to the capitalization rate of a pure equity stream of its class under the assumption of no corporate income tax, perfect capital markets, and no transaction costs. When firms have excessive borrowing over their equity, the cost of capital will be expected to increase and expose the firm to the "risk to be ruined." The expected returns (or cost of equity) calculated by the assets pricing model play a key role in firms' valuation, capital budgeting, and other corporate financial settings (Hou et al., 2012). Suchard et al. (2013) analyzed the relationship between a firm's cost of capital and its governance. They found that the cost of capital would decrease

with the presence of institutional block holders and higher insider ownership, eventually enhancing the firm's value.

Trade-off Theory

The trade-off theory is one of the important capital structure theories. It states that the optimal level of debt is where the marginal benefit of debt finance equals its marginal cost (Abeywardhana, 2017). This theory represents balancing the costs and benefits when choosing the debt or equity financing proportion. It can be applied to a company that seeks debt level balance, the tax advantages of additional debt against the costs of possible financial distress.

The benefits of debt tax-deductibility of interest (Kim, 1978), and the cost of bankruptcy and agency, according to Fama and French (2002), determine the optimal capital structure (Jensen and Meckling, 1976; Myers, 1977). The direct and indirect costs of bankruptcy are connected with the trade-off theory. According to Bradley et al. (1984), bankruptcy costs include legal and administrative expenses and additional indirect costs such as lost customers and a loss of confidence amongst employees and suppliers because of uncertainties. Branch (2002) defined bankruptcy cost into four categories: 1) firm's distress cost, 2) cost from claimants, 3) losses from distressed firms that are offset by gains to other entities, and 4) real losses borne by parties other than the distressed firm that are offset by gains to other entities. Following the studies of Altman (1984) and Merton et al.,(2022) on measuring the cost of bankruptcy, according to Kisgen (2006), bankruptcy cost is a driving factor for optimal capital structure. It helps explain the degree of risk premiums. The trade-off theory of capital structure is extended to credit rating capital structure. This means that the costs and benefits of various rating levels would influence capital structure decisions. Enterprises closer to a rating change issue less debt capital than firms that are not closer to a rating change.

Therefore, the trade-off theory can predict moderate borrowing by tax-paying firms. Serrasqueiro and Caetano (2015) suggested that the trade-off theory is adoptable by small to medium firms when they make financing decisions. They researched small- and medium-sized Portuguese businesses, and the findings showed they are relatively effective in dealing with aggressive competition. A negative relationship exists between debt and corporate performance, revealing agency issues between owners and creditors. The negative association between a company's debt and its performance indicates that the less debt a company has, the less risk that the company faces, which leads to improved financial performance. Debt and fixed asset levels have a detrimental impact on performance, but management and ownership separation have a beneficial effect. Hackbarth et al. (2007) used the trade-off theory in investigating the optimal mix and priority of bank and market debt. The bank debt was found to have a superior trade-off between tax shields and bankruptcy costs. Hennessy and Whited (2007) established a framework for determining financial and investment strategies when facing uncertainties of convex costs of external equity, collateral constraints, and debt overhang. The results provided inconsistency

with traditional trade-off theories and capital structure that profitable firms tend to be unleveraged; leverage is a decline in lagged liquidity and external equity costs. This evidence shows that tax is the "second-order" in selecting capital structure policies but reflects either market timing or asymmetric information-based pecking order theory.

Pecking Order Theory

The pecking order theory is one of the most influential theories of corporate finance (Chen and Chen, 2011). It states that firms adhere to a hierarchical financing order, prioritizing their financing with internal sources, then debt, followed by equity as a last resort. A firm prefers internal financing (i.e., retained earnings) over external financing. When firms have to raise external funding, they prefer debt over equity; the firm utilizes internal funds first, then issue debt, and finally, as a last resort, issue equity capital (Myers and Majluf, 1984; Al-Tally, 2014). A firm's capital structure results from a series of hierarchical funding decisions made over time (Shyam-Sunder and Myers, 1999). Owng to information asymmetries between a firm and potential investor, the firm favors internal financing (retained earnings) to debt; if external funding is required, they prefer short-term debt over long-term debt, and debt over equity (Chen and Chen, 2011). When there is a lack of internally generated cash for a firm's investment needs, it borrows more (Shyam-Sunder and Myers, 1999). Therefore, the quantity of debt reflects the firm's accumulative demand for external funds (Myers, 2001). According to Frydenberg (2003), a company's debt issuing gives the market confidence that the company can afford more debt without fear of repayment burdens. Chen and Chen (2011) applied this theory to explore the factors influencing debt decisions among 305 Taiwanese electronic companies listed on the Taiwan Stock Exchange in 2009. The data indicated that firms prefer to take on less debt and use their earnings to fund their operations. The higher the profit, the less debt is used. Serrasqueiro and Caetano (2015) studied 53 small- and medium-sized firms' capital structure decisions and found a negative relationship between profitability and debt. This finding illustrates that firms prefer internal financing over external financing because profitable businesses are more likely to retain profits over time and are less reliant on debt.

However, different methodologies may lead to different implications regarding the validity of the pecking order theory. Vasiliou et al. (2009) investigated whether Greek firms followed the financing pattern and claimed that the pecking order financing hierarchy does not necessarily hold though a negative relationship between leverage and profitability was found. Frank et al. (2020) supported this viewpoint. They argued that tax considerations, transaction costs, agency frictions, or behavioral factors can alter a pecking order structure. In addition, if a firm uses a variety of financing contracts, there are commonly multiple equilibria. Thus, there is no assurance that a pecking order would be even if adverse selection affects equity.

Free Cash Flow (FCF) Theory

The cash a company generates after accounting for financial outflows to sustain operations and maintain capital assets is called free cash flow (FCF). FCF serves two purposes: to maintain assets in place and to fund future investment (Richardson, 2006). Managers with a high level of FCF are incentivized to develop their company beyond its ideal size. When a company has a lot of FCF, conflicts of interest between managers and shareholders become prominent regarding payment policy. The cash flow generated in excess of what is required to support all projects with a positive present value is referred to as FCF. Raising debt is a good way to lower FCF agency costs (Jensen, 1986).

When companies have an overflow of free cash, they are more inclined to raise debt capital to lower agency costs, triggering tensions between managers and shareholders (Jensen, 1986). According to De Miguel and Pindado (2001), firms are more concerned about overinvestment in the presence of asymmetric information. As suggested by the FCF theory, more debts will be issued to avoid the manager's preference to invest in negative present-value projects. According to Myers (2001), the relationship between FCF and capital structure is that a high amount of debt will increase a company's value when it has a high degree of FCF.

Market Timing Theory

Moving investment money in and out of a financial market or swapping funds between asset classes while using a predictable strategy is called market timing. Following the market direction might be profitable if an investor can predict when the market will go up or down. When extra financing is needed, firms raise a larger proportion of their financing deficit with net external equity, with the expectations that the equity risk premium is low, or the higher first day of the return of Initial Public Offering (IPO), or prior (post) realization Fama French value factor is lower (higher); this is consistent with market timing of capital structure (Huang and Ritter, 2004). According to market timing theory, firms are more likely to issue equity when their market values are high, compared to the book and historical market value. As a result, today's capital structure reflects the culmination of previous attempts to time the equity market (Baker and Wurgler, 2002). Capital structure is still a puzzle among financial scholars (Abeywardhana, 2017), and these theories have emerged over time to clarify capital structure decisions. Different capital structure theories focus on different aspects of financing and help lay the foundation for financing decisions.

The market timing theory of capital structure describes how corporations issue additional equity when their share price is overvalued and buy back shares when their share price is undervalued (Baker and Wurgler, 2002). According to this idea, money and capital market conditions can lead to an optimal capital structure. The price of shares fluctuates, impacting company financing decisions and capital structure, which suggests that capital structure changes are influenced by market timing (Bessler et al.,

2008). Debt ratios are inversely associated with historical stock performance (Bessler, et al., 2013). However, according to Hovakimian (2006) and Alti (2006), market timing does not substantially impact a firm's capital structure in the long run. Although market timing theory has gained substantial empirical evidence in developed markets, it may not apply in emerging markets. Celik and Akarim (2013) testified how equity market timing affects firms' capital structure decisions. They concluded that market timing is not valid in markets in Turkey.

2.1.2.2 Finance decision and cost impacts

One of the advantages of having more debt is that interest is tax deductible, lowering the effective cost of debt and the cost of capital for businesses as a whole (Abeywardhana, 2017). The second statement of the MM theorem states that a company's cost of equity is proportionate to its leverage level. According to the MM framework (1963), the tax shelter given by debt argues that the best capital structure is all debt. Graham (1996) demonstrated that the additional use of debt is positively related to firm-specific marginal tax rates that account for net operating loss and that higher tax-rate enterprises issue more debt than their low-tax-rate counterparts, based on data from 10,000 firms from 1980 to 1992. Modigliani and Miller proposed a formula in their 1963 work to quantify the size of tax savings under particular conditions: if the debt is riskless, one dollar of interest rate saves the firm from paying *t**$1* in taxes, where *t* is the corporate income tax rate (Graham, 2005).

Using more debt in a company's capital structure reduces the net agency costs of equity. Jensen and Mecking (1976) initiated research on this area based on the work of Fama and Miller (1972). The agency cost implies the type of conflict came across by Jensen and Mecking, conflicts between shareholders and managers arise as managers hold less than 100 percent of the residual claim, that is to say, they do not claim the entire gain from their profit enhancement activities while bearing the entire cost of these activities (the manager bears the entire cost of refraining from these activities but captures only a fraction of the gain). This conflict will ultimately lead to less effort put by the manager in managing firm resources, and therefore, the manager would not always act in the shareholders' best interests. This inefficiency can be reduced proportionately by increasing the fraction financed by debt (Harris and Raviv, 1991). Maloney, McCormick, and Mitchell (1993) confirmed that debt enhances managerial decision-making by finding that firms with higher leverage outperform others in the acquisition market. Ofek (1993) also found that leverage increases the probability of operational and financial actions, such as labor cutbacks, in the first year of financial distress.

When more equity is used instead of debt, the cost of asymmetry information rises. The Pecking order theory derives from the concept of asymmetry in information, which describes the situation when one party has obtained more information than the other, eventually leading to an imbalance in transaction power. Firms' managers typically possess more information regarding the company's performance, risk exposures, and future outlook. According to the Pecking order theory, as more equity increase the cost

of asymmetry information, a firm should prefer to finance itself internally from retained earnings. If this source of finance is unavailable, a firm should finance itself through debt. This theory was first introduced by Myer and Majluf (1984), who describe a hierarchy when considering sources of finance. Frank and Goyal (2003) studied the Pecking order theory of corporate capital structure based on a 1971–1998 cross-section of publicly traded American firms. They found a positive relation between financing deficit and net equity, which is closer than the relationship between financing deficit and debt issue. Komera and Lukose (2015) examined the pecking order theory of capital structure focusing on debt capacity and found that firms perform better when they have less debt capacity concern.

2.1.2.3 Finance decision and risk exposure

A failed business entity has been defined in various ways to illustrate the formal process that the firm faces or to characterize its financial issues (Altman and Hotchkiss, 1993). Failure, insolvent, default, and bankruptcy are four widely used terms in the literature. Corporate failure, often known as financial distress, occurs when businesses experience cash flow problems due to poor sales and excessive operating costs. Firms may raise short-term borrowings to manage cash-flow issues. The company faces insolvency or bankruptcy if the situation does not improve. The term "financial distress" refers to a scenario in which one's obligations are either not satisfied at all or are met with struggle (Wruck, 1990).

Financial distress is a situation where the firm cannot afford to pay debt or dividends, resulting in an overdraft of bank deposits, liquidation for the interests of creditors, or even entering the statutory bankruptcy proceeding (Sun et al., 2014). Uhrig-Homburg (2005) developed a simple model to testify whether a leveraged firm endogenized the firm's bankruptcy point. He suggested that a firm's default has two main reasons: the available cash flow is insufficient to cover payments to creditors (cash flow shortage), or the firm's liability exceeds the firm's assets (over-indebtedness). The results indicated that cash flow shortage is a major reason a firm goes bankrupt. Insolvency occurs when a company fails to meet its contractual financial commitments when they are due or cannot pay its debt. Interest and principal payments on debt and payments on accounts payable and income taxes are all examples of obligations. Even though the value of its assets exceeds the value of its liabilities, a company becomes technically insolvent if it cannot satisfy its existing commitments as they become due (Altman and Hotchkiss, 1993). If the value of a company's assets falls below the value of its liabilities, it becomes legally insolvent. When a firm cannot pay its debt and files a bankruptcy petition, it is declared bankrupt. This is a long-term rather than a transitory condition.

According to Leland (1996), bankruptcy is determined endogenously and will depend on the maturity of the debt and its amount. Where there's a bankruptcy cost, a higher debt ratio increases the risk of bankruptcy. Bankruptcy usually takes place when a firm's debt outweighs its equity. When a company cannot repay creditors, it may have very few options for the future. One of those choices could be to

declare bankruptcy, which is a legal term for the process of a firm being released from its debts and other obligations while providing creditors with a chance to make reparations. While using debt in a company's capital structure might be a beneficial strategy to fund operations, it is not without danger. On the contrary, the bankruptcy cost is seen as one of the determinants of capital structure. According to Kwansa and Cho (1995), the significance of the indirect cost of financial distress is vital to enterprises when deciding on capital structure.

2.1.2.4 Finance decision and firm's performance

The relationship between financial decisions and firm performance has also attracted intensive studies. Li et al. (2019) conducted an empirical study investigating the relationship between capital structure and firm performance, suggesting that credit risks have moderated this relationship. The debt ratio is negatively related to firm performance for the low credit risk small- and medium-sized enterprises (SMEs). However, this relation does not exist in SMEs with higher credit risk. According to Berger and Patti (2006), corporate governance theory predicts that leverage impacts agency cost and disrupts firm performance. Margaritis and Psillaki (2010) used a sample of French manufacturing enterprises to investigate the relationship between capital structure, ownership structure, and company performance. They discovered evidence for Jensen and Meckling's (1976) key prediction that more leverage improves company efficiency. Due to the underdeveloped status of the Indian bond market, Dawar (2014) provided empirical evidence that leverage has a negative impact on the financial performance of Indian firms. This contrast with the assumption of agency theory is commonly accepted in other developed or emerging economies.

2.1.2.5 Finance decision and corporate value

The MM theorem concluded that the leveraged firms have more value than the unleveraged firms. Masulis (1983) estimated the impact of change in debt proportion on firms' value; he found consistent results with tax base optimal capital structure. Firm values are positively related to changes in debt value.

The MM theorem provided a theoretical basis to examine the real world of why capital structure is relevant. However, ongoing debates exist on using debt against the MM theorem. Firms using more debt than equity capital will bring additional financial risk to investors. Jackson et al. (2013) assumed that debt financing (coupled with a large unpaid principal balance) caused managers to make two decision errors. The first error is that managers forego investments that increase the firm's value, and the second is to accept investments that decrease the firm's value. Hossain (2021) provided empirical evidence that the overall performances of high-leverage firms were significantly unstable and thus subject to a lower value than the low-gearing firms.

2.1.3 Working capital management (WCM)

Proper WCM is essential to a firm's financial health and operational success. Generally, working capital contains several accounts, including cash and cash equivalent, short-term investment, accounts receivable, account payables, and other expenses like prepaid expenses and accrual expenses (Sagner, 2011). It can be measured by the cash conversion cycle (CCC) (Tauringana and Afrifa, 2013). The CCC is one of the quantitative measures to estimate the time (measured in days) required to convert its investments in inventory and other resources into cash flows from sales. It is also termed a cash cycle or net operating cycle. The purpose is to evaluate the efficiency of a firm's operations and management. Richards and Laughlin (1980) asserted that the time devoted to WCM reflects the repayment capability: a firm's short-term investment and financing policies.

Managing working capital accounts can affect firms' health (Sagan, 1955). Dong and Su (2010) asserted that working capital plays an important role in the success or failure of a firm as it affects profitability and liquidity. Based on the data collected from Vietnam's stock market from 2006 to 2008, Dong and Su (2010) found that when the CCC increased, the firm's profitability declined.

Working capital is used in the day-to-day operations of a company. The difference between a company's current assets and current obligations or debts is known as working capital (Pass and Pike, 1984). It is a measure used for determining how well a company runs and how financially secure it is in the short term. WCM has two main goals: to ensure liquidity and profitability. It is critical to corporate finance as it has a direct impact on a firm's liquidity and profitability (Appuhami, 2008; Christopher and Kamalavalli, 2009; Dash and Ravipati, 2009; Deloof, 2003; Raheman and Nasr, 2007; Nazir and Afza, 2009; Mathuva, 2010; Sensini, 2020; Chambers and Cifter, 2022; Alvarez et al., 2021).

Sources of working capital can be account receivables, inventories, cash, cash equivalents, and bank credits (refer to Figure 2.2) (Sagner, 2011; Singh and Kumar, 2014).

Figure 2.2 Sources of working capital
(Source: Sagner, 2011; Singh and Kumar, 2013)

2.1.3.1 Managing and measuring liquidity

WCM strives to increase a company's profit while covering short- and long-term operating expenses (Panigrahi, 2014). Dash (2019) investigated the trade-off relationship between working capital and profitability. The Goal Programming Model was hired to determine how funds should be maintained between working capital, current assets, and fixed assets to achieve targeted levels of liquidity and profitability while minimizing the opportunity cost or loss of excess liquidity. The findings revealed that sustaining liquidity, turnover, and profitability is important. Working capital is a liquidity indicator that shows if current assets are sufficient to meet current liabilities.

Ensuring the firm has sufficient liquidity to finance various projects is at the heart of corporate finance practice (Almeida et al., 2014). They present a model of liquidity management based on Holmstrom and Tirole (1998) by presuming firms' liquidity demand arises based on a moral hazard problem that discourages firms from pledging their cash flows to outside investors. The results show that when a firm faces financial constraints, it will choose to increase its cash holding today to finance future investment opportunities. In studying a firm's investment decision based on its cash flow sensitivity, Lewellen and Lewellen (2016) concluded that liquidity has a profound impact on a firm's financial policies in practice. Hovakimian (2009) classified firms into high, low, and negative sensitivity groups, and a negative relation between cash flow and investment was identified.

Primary sources of liquidity include cash, short-term funds, and cash flow management. These resources represent funds readily accessible at relatively low cost (c). The source of cash flow can be derived from operating, investing, and financing activities. Operating cash flow resulted from transactions and other events determining that period's profit. Cash from investing activities is related to acquiring and disposing of long-term assets or other investments (not included in the cash equivalent).

Cash flow from financing changes is the size and composition of the contributed equity and borrowings of the company (Dickinson el at.,2011).

The ability of a business to create and use cash can be seen in the cash flow statement. It allows shareholders, creditors, and other financial statement users to judge a company's ability to generate cash and cash equivalents, as well as how it manages the amount, timing, and predictability of future cash flow generation and how it uses cash and cash equivalents. The ability of a company to generate cash flows from operations to finance investment and pay dividends is essential from a long-term perspective (V. Kousenidis, 2006; Sayari and Mugan,2013). As Schmidgall et al., (1993), Suhartono (2015) advised, cash flow is the blood of firms needed to conduct operations, repay their short-term obligation, reinvest in their business, return cash to shareholders (dividends), pay operating expenses, or hedge against future financial challenges.

Credit, defined as borrowing capacity, constitutes an important source of liquidity (Dehejia, 2015). According to Kashyap et al. (2001), borrowing generates liquidity with the cost of interest rate charges on loans. Banks provide lines of credit for a firm to meet its short-term liquidity needs while providing "term loans" to finance its long-term investments (Strahan, 1999). Available credit usually refers to a bank line of credit, often known as credit commitments or revolving credit facilities. The maximum amount that can be borrowed is referred to as a credit limit. If all available credit has been utilized, the credit limit has been reached, the account has been topped out, and there is no more accessible credit. Chen and Kieschnick and Rotenberg (2016) considered how changes in bank credit availability affect how publicly traded companies manage their working capital, which is critical to their operations. They discovered that changes in bank credit availability impact firms' working capital, and these effects vary dramatically between enterprises based on how reliant on bank financing.

WCM performance is measured by ratios such as working capital ratio, collection ratio, and inventory turnover ratio to monitor cash flow, current assets, and current liabilities. The variable CCC was used to measure WCM, according to Le et al. (2018). The research also considered the variables growth, cash flow, liquidity, risk, and leverage, which have been shown to impact firm performance in addition to WCM. According to the findings, WCM appears to have a beneficial impact on the financial performance of the companies in the sample.

2.1.3.2 Working capital management (WCM) and profitability

Many empirical studies have shown a strong link between WCM and profitability. WCM has a strong influence on the profitability of selected real estate firms in Jordan, according to Dalayeen (2017). The findings of Singh et al. (2017) indicated that WCM is linked to profitability, implying that aggressive working capital investment and finance policies lead to increased profitability.

García-Teruel and Martínez-Solano (2007) gathered a panel of 8,872 SMEs from 1996 to 2002. Using panel data methods, the authors investigated the relationship between WCM and SME profitability. The outcomes, which are robust in endogeneity, show that managers can create value by reducing inventory and the number of days their account receivables. Additionally, reducing the CCC could boost the profitability of the company.

Mathuva (2010) examined a sample of 30 firms listed on the Nairobi Stock Exchange from 1993 to 2008 and discovered that profitable firms take the shortest time to collect cash from their customers; firms maintain sufficient inventory levels to reduce costs of possible interruptions in the production process and loss of business due to product scarcity; more profitable firms have been allowed to take longer time to pay their creditors compared with less profitable firms that are less profitable. For the period 1992–1996, Deloof (2003) examined the relationship between WCM and corporate profitability in a sample of 1,009 big Belgian non-financial enterprises. Trade credit and inventory policies are measured by the number of days accounts receivable, inventories, and accounts payable are open. Managers can boost the profitability of the business by minimizing the number of days accounts receivable, and inventories are open, according to the research. Less profitable companies take longer to pay their expenses.

WCM and profitability were investigated by Samiloglu and Akgün (2016). A sample of 120 Turkish industrial companies registered on ISE between 2003 and 2012 was studied. In Turkey, multiple linear regression models were employed to investigate the association between WCM and firm performance. In the manufacturing sector, their findings reveal a substantial and negative association between the account receivable duration and return on asset, return on equity, operating profit margin, and net profit margin. According to the research, managers can generate shareholder value by lowering the accountant receivable duration, accountant payable period, and CCC.

Sensini (2020) found that the working capital cycle is statistically significant but negatively associated with firm profitability for 784 Italian SMEs (112 datasets). The working capital cycle is statistically substantial but negatively associated with firms' profitability.

2.1.3.3 Managing working capital

Firms' managements control working capital using a combination of policies and strategies based on the above criteria. The policies are designed to manage current assets (usually cash and cash equivalents, inventories, and debtors) and short-term borrowing to achieve acceptable cash flows and returns.

Cash management

Cash management requires an efficient cash collection policy and a sound CCC; it is incredibly critical to optimize the cash holding balance (Preve and Sarria-Allende, 2010). Businesses are increasingly holding cash; it works as the necessary fuel that helps other assets. Following Keynes (1960), there are three motives for holding cash: (a) the transaction motive; the cash transactions for personal and business exchange; (b) the precautionary motive, and (c) the speculative motive. According to Keynes (1960), the quantity of money demanded for transactions and precautionary motives is not sensitive to the change in the interest rate. On the other hand, the quantity of money demanded for a speculative motive is sensitive to "the rate of interest as given by the changes in the prices of debts of various maturities."

(a) Transaction motive and its optimal balance

Transaction motive of holding cash holds embedded in the famous Baumol model (Baumol, 1952; Preve and Sarria-Allende, 2010). The opportunity cost of the average holding cash balance is a function of the average return the firm expected to earn. Thus, the total opportunity cost of holding cash is estimated as

$$Opportunity\ cost = \frac{C}{2}r \tag{2.6}$$

where *C* is the cash balance at the beginning of each period and *r* is the return from non-cash investment. If a firm faces trading or transaction costs, trading costs can then estimate as

$$Trading\ cost = \frac{T}{C}tc \tag{2.7}$$

where *T* is the total amount of cash needed during the reference period, *C* is the initial balance of cash at the beginning of each period, and *tc* is the trading or administrative cost.

In a nutshell, cash managers will try to choose the level of cash balances, *C*, that minimizes the total cost (both opportunity cost and transaction cost) function:

$$Total\ cost = \frac{c}{2}r + \frac{T}{c}tc \tag{2.8}$$

Therefore, the optimal cash balance is depicted as follows:

$$C = \sqrt{\frac{2 \times T \times tc}{r}} \tag{2.9}$$

According to the above expression, the optimal investment in cash balances depends positively on the total amount of cash a firm needs to fulfill its transactions.

(b) Precautionary motive and its optimal balance

The precautionary demand for cash implies that firms need to reserve cash to cover the adverse shocks or simple fluctuations around expected cash flow. Based on this purpose, a stochastic cash flow is introduced. This is based on the Miller and Orr model (Miller and Orr, 1966), which suggested that it is insufficient to determine the optimal cash balance and allow the upper and lower limit of cash balance. This stochastic demand for cash has a positive relationship between the level of trading and administration cost while negatively related to the preceding interests.

According to Whalen (1966), the precautionary balance for cash is applied to "fortuitous expenditures" and "unpredictability of receipts." The third need of precautionary demand for cash is to keep funds on hand to satisfy a future responsibility. Three factors that influence the ideal level of precautionary cash holdings, according to Whalen (1966), are the cost of illiquidity, the opportunity cost of keeping precautionary balances, and the average volume and variability of receipt and disbursement. Frenkel and Jovanovic (1980) developed a stochastic model to evaluate the precautionary demand for cash; it shows that the precautional demand for cash depends on the interest rate. Duchin et al. (2015) showed that financially unconstraint firms would like to hold large investment portfolios and low precautionary savings. Sun (2014) investigated how the liquidity crisis changes firms' cash holding and saving propensities and found that when the demand-side effects of a crisis are severe, firms prefer to increase their cash holding. This effect is particularly prominent in firms that are financially unstable or have a high precautionary incentive.

(c) Speculative demand for cash and its optimal balance

Speculative demand is a demand for cash that is maintained to minimize capital loss from financial instrument holdings. Firms that profit from these opportunities prefer a higher cash balance as cash allows them to "invest" or generate (Preve and Sarria-Allende, 2010). When money is viewed as a hedging instrument, a company that produces fluctuating cash flows would like to maintain more cash as the option value of cash rises with uncertainty. Rezende (2015) extended Keynes' views of duration and considered convexity effects, finding an upward-sloping demand for short-term securities.

Inventory management

A firm that ignores inventory management will have major challenges with long-term profitability and may not be able to continue (Singh, 2008). Inventory management involves setting inventory levels to maximize the benefits while minimizing the costs of holding inventory (Sheffi, 2001). Many firms are self-financing (Bendavid et al., 2016). Their capacity to restock their inventories is influenced by

contemporary inventory levels, receivables (credit granted to consumers), and accounts payable (trade credit they have received from their supplier). Inventory minus days of outstanding payables (Aminu, 2012) can be used to measure the efficiency of WCM. However, a firm should consider setting optimal inventory levels. Further, no model can incorporate all these factors into a single optimization equation.

Debtor management

The credit mission and goals are established first, followed by the credit policy and the credit management process (involving credit screening, credit granting, risk reduction methods, cash collection, and reporting and monitoring of debtors), and ends at the debtors' management performance evaluation (Buhagiar, 2000). A standardized credit policy and a solid reporting and management system are recommended for SMEs to survive (Sunday, 2011). The consequences of modifying lending policy on inventory levels and cash flow must also be considered. For example, extending the loan period will increase debtors and stimulate sales; it also pushes up the stock level required to support higher sales. Debtors' late payments will also impact cash flow (Knott, 1998).

In conclusion, WCM plays a key role in the performance of a corporation. It measures the liquidity level of the firm and has profound effects on determining its profitability. Cash, inventories, and debtor management jointly play key roles in WCM; WCM aims to optimize firms' profitability and liquidity position.

2.2 Financial Health and Its Determinants

The review of financial economics provides a theoretical framework to study firms' financial health and help predict a firm's failure. The review provided above also assists in understanding the main factors that affect firms' financial health, which is crucial for preventing and mitigating corporate risk during an economic downturn. Diagnosing the financial health of a firm and predicting its failure has been a highly discussed topic recently (Cleary and Herb, 2006; Simić et al., 2012; Horváthová and Mokrišová, 2018). This is because firms need to know their financial situation, identify issues, and make adequate management decisions to improve the financial situation and prevent unfavorable effects on the companies. The financial health of companies can be affected by internal (Swarankar and Jain, 2020; Adedeji, 2014; Joshi and Ramapati (2018); Rastogi and Saxena, 2016; Vijayakumar, 2011) and external (Knight and Bertoneche, 2000; Vavrek et al., 2021) factors.

2.2.1 Factors affecting financial health

Financial health refers to the strength of the balance sheet and its operation within a set of boundaries. Financial health helps firms remain competitive, seeking steady development while minimizing potential financial risks (Kliestik et al., 2020). External and internal factors impact it, and financial ratios play an important role in revealing firms' financial health.

2.2.1.1 External factors

The world economy and global financial conditions significantly impact firms' financial health (Kaliyev and Nurmakhanova, 2023; Widagdo et al., 2020; Vavrek et al., 2021). Financial instability harms economic activities and corporate performance (Jarsulic, 1988; Mishkin, 1997; Mishkin, 1999; Martinez et al., 2019). Economic variables also significantly impact a firm's growth and profitability (Hansen and Wernerfelt, 1989; Holmes, 2010; Poudel, 2020), credit availability, and liquidity (Fowowe, 2017; Ali and Dhiman, 2019). The changes in economic policies restrict firms' behavior and impact firms' decisions (Ireland and Miller, 2004; Morikawa, 2016; Hu and Gong, 2019). A stable financial environment reduces risks that firms can concentrate on managing their business operations.

Financial instability, financial crisis, and firms

Financial stability is a condition where an economy's mechanisms for facilitating and enhancing economic processes, managing risks, and absorbing shocks (Schinasi, 2004) function sufficiently well for economic performance. According to Schinasi (2004), financial stability can be described as the financial system's ability (a) to allocate economic resources efficiently and effectively; (b) to evaluate and manage financial risks; and (c) to maintain its ability to perform the key functions through a self-corrective mechanism. Financial stability refers to the financial system's ability to control, contain, and handle the emergence of imbalances before they become a hazard to itself or economic processes while avoiding actual financial crises.

Theories behind financial instability

Prior to Keynesian economics, a school of classical economists, including Turgot (1793), Mountifort Longfield (1833), Mill (1871), and Irving Fisher (1930), believed that the free market would automatically adjust to full employment in the short to medium period, given that workers were flexible selecting their wages demands. A financial crisis would only occur when there are some exogenous shocks. Classical economists were aware that financial crises could cause business failures in general, bank failures in particular, and disturb real economic activities (Laidler, 2000). However, according to the Keynesian general theory, the level of employment is controlled not by the price of labor, as in classical economics, but by the level of aggregate demand, which ultimately determines economic production and inflation. Aggregate demand is unpredictable and fluctuates from this perspective, frequently leading to inefficient economic consequences, such as an economic downturn. Keynesian provided two theories of liquidity preference (i.e., money demand): the first is the theory of interest in which the rate of interest is not a return from saving but a reward for parting with liquidity for a certain period, and the second is a revision of the first theory. The Keynesian theory of interest rate refers to the market interest rate; the rate "governing the terms on which funds are being currently supplied" (Keynes, 1960, p. 165). The stability of demand for money (precautionary, transaction, and speculative

demand for money) leads to predictable and reliable relations between the monetary aggregates and the determinants of the demand for money (Murad et al., 2021). With fiscal and monetary measures, Keynes paved the way for the government to take the lead in addressing the economic crisis. In other words, Keynes prioritizes deficit financing, public expenditures, taxing, and consumption policies over savings, private investments, balanced government budgets, and low taxes (from the classic economic view). Further, they believed that government intervention could fix a depression by spending while smoothing future cycles with various macroeconomic techniques. Keynes' theory successfully explained the Great Depression in the 1930s and criticized that it resulted from the decline of return on investment after the end of World War I; while interest rate was high, the British decided to return to the gold standard, which decreased the efficiency of capital and dragged the country into a great depression. However, the crisis that developed in 2008 was significantly different from the General Theory of Keynes (Leijonhufvud, 2009).

Contrary to the post-Keynesian economy, Minsky's financial instability hypothesis (1986, 1995) is considered more relevant in explaining the mechanism for the 2008 financial crisis. In his framework, Minsky argued that financial systems are actually unstable, and financial fragility is regarded as an intrinsic feature of capitalism. The private sector immerses in the competitive environment, forgets past crises, and underestimates risks. In a period of accelerating economic growth, firms tend to sharply increase their indebtedness (which means increasing their borrowing), which results in a growing part of their cash flows drying up by the increasing interest payments. Consequently, when the economy slows down, debt servicing becomes increasingly susceptible. Enterprises attempting to lower their leverage and sell assets at fire-sale prices to become liquid may experience debt deflation during the economic slowdown, resulting in a decline in assets' prices and output. Shleifer and Vishny (1992, 2011) used this notation to describe markets that suffer from adverse selection in which sellers rarely find counterparts in their sectors facing the same risk. Instead, non-experts buy the assets and agree to hold them only if there is a significant discount.

Financial instability is the original cause of a financial crisis, which is rooted in financial shocks or financial propagation. Calomiris (1995) distinguished "financial shock" and "financial propagation." The difference between financial shock and financial propagation lies in their origin and impacts. "Financial shocks" are described as real-world disruptions that originate in financial markets and are more likely to occur during periods of fast financial innovation. The concept of "financial propagation" relates to how contracts, markets, and financial intermediaries can amplify shocks that occur elsewhere. Calomiris (1995) identified four financial propagators. The first is the cash flow limitation, representing that internal funds are less expensive than external funds due to agency and information costs. The second propagator arises from balance sheet restraints, similar to the first meaning of "financial fragility," where corporations increase their debt during the expansion period of the business cycle and are vulnerable to the danger of abruptly cutting their investments when demand falls. The third

propagator originates in financial institutions, having more substantial effects on small- and medium-sized businesses considered more vulnerable throughout cyclical financial constraints (Petersen and Rajan, 1994). This is because when financial institutions are also threatened by decreasing net value, they will restrict their loan supply due to risk management purposes; thus, borrowing is amplified (with less creditable firms, usually small- and medium-sized firms). The economy is now further hampered by a lack of liquidity. Finally, financial regulations will act as the fourth propagator, perhaps causing distortions that will exacerbate the financial accelerator.

Consequences of financial instability

The crisis became truly global due to two key transmission mechanisms: the quick increase in risk aversion (and financial market volatility) was carried globally given the extremely integrated global financial markets (Gros and Alcidi, 2010). The financial crisis has devastating economic consequences. Asset prices fell during the financial crisis, businesses and individuals could not pay off their debts, and financial institutions encountered liquidity shortages. Investors sell assets or withdraw money from savings accounts during a financial crisis, which is often associated with panic or a bank run. The bursting of the financial bubble, a stock market crash, a sovereign debt crisis, or a currency crisis are all examples of situations related to financial crises.

a) Stock market crash

A stock market crash is a major financial crisis consequence, a common phenomenon that has reappeared across different financial crises. From October 23 to 29, 1929, during the Great Depression, the New York Stock Exchange lost over 25 percent of its value (Cecchetti, 1992).

Bernhardt (2013) indicated that the first contemporary global financial crisis unfolded on October 19, 1987, known as “Black Monday.” The Dow Jones Industrial Average (KJIA) dropped 22.6 percent in a single trading section. It is also regarded as the sharpest decline in the United States since the Great Depression. The Federal Bank responded immediately and injected liquidity into the market by encouraging banks to continue lending on their usual term. Yang (2008) investigated financial contagion using data from seven stock markets around October 19, 1987. The result demonstrated that the crash was strongly associated with the US financial market innovation. Other markets, such as the United Kingdom, Germany, Hong Kong, and Australia, responded negatively.

The stock market crash was also observed during the sub-prime crisis of 2007–2008. Olowe (2009) investigated the relationship between stock return and volatility in the Nigerian market. The stock market crash in 2008 significantly contributed to the high volatility persistent in the Nigerian market. Anagnostidis et al.(2016) investigated the impact of the 2008 financial crisis on Eurozone market efficiency. According to the research, the Eurozone stock market showed substantial mean-reverting trends in the post-crisis era. Stock prices were more to the random walk paradigm than before the crisis,

contrasting with the pre-crisis time. This claimed that herding behavior would eventually contribute to market inefficiency during periods of market uncertainty.

b) Financial system fragility

As financial institutions collapsed, the global financial crisis deepened. According to Brewer et al. (2003), because of banking interconnections, a bank failure might adversely impact the failed bank's clients. The global financial crisis started in 2007, initiated by the crisis in the United States subprime mortgage market and evolved into an international banking crisis triggered by the collapse of investment bank Lehman Brothers on September 15, 2008 (William, et al.,2010). DeYoung and Torna (2013) studied whether fee-based non-traditional banking activities such as security brokerage and insurance sales, as well as asset-based non-traditional banking activities such as venture capital, investment banking, and assets securitization, contributed to the failures of hundreds of U.S. commercial banks. However, the revenues from these services fluctuate more than those from traditional interest-based banking, as can be seen from the results. They concluded that non-interest revenue from stakeholder activities, such as investment banking, insurance underwriting, and venture capital, increases the likelihood of bank failure.

c) Depreciation of assets value

The Asian financial crisis triggered currency depreciation. Krugman (1999) stated that during the Asian financial crisis, as the government abandoned its effort to maintain a fixed exchange rate, the currency depreciated immediately by over 20 percent and expanded to most of the neighboring countries within days. Corsetti et al. (2000) suggested that structural and political disorder, market overreaction, and herding should be blamed as the main causes of the exchange rate plunge. Kim and Ying (2007) used pre-crisis data from 1997 and the trade-weighted exchange rate from seven Asian countries to investigate the effect of currency depreciation. They found currency depreciation appeared strongly in seven countries.

The devaluation of real estate property and financial assets became normal during the 2007–2008 financial crisis. The boom and burst of the bubble are considered the original causes of the subprime crisis in the U.S. (Holt, 2009). Byrant and Kohn (2013) believed that the subprime crisis and the sharp housing price drop were due to the housing price boom and burst. Cumulative property-led financial assets directly triggered the financial crisis of 2007–2008. Real estate and financial assets were associated with the U.S. subprime crisis; this special design of the U.S. financial system allowed a classic credit risk to become a financial and banking crisis (Farhi and Cintra, 2009). As Sanders (2008) observed, negative housing price growth began in 2006 for most states. As negative housing price growth accelerated, the seriously delinquent loan rate also accelerated.

d) Poor performance of firms

The performances of firms were significantly affected by the financial crisis. This issue has attracted sustainable research. Claessens et al. (2012) investigated how the 2007–2009 financial crisis impacted firm performance, focusing on the implications of business cycle transitions, international trade, and credit market conditions. Profitability, sales, and investments were all affected. It was identified that enterprises are more sensitive to the business cycle and trading activities developments. Mitton (2002) examined 398 enterprises from Indonesia, Korea, and Malaysia and found that the financial crisis of 1997–1998 had a significant impact on firm performance. The impacts are focused on firms' leverage, profitability, ownership structure, and cash flow status. Borensztein and Lee (2002) explored the impact of the credit crunch after the Asian financial crisis; 534 Korean firms' data were collected and analyzed. The evidence shows some significant changes in determinants of credit allocation among borrowers. Among all the considerations, profitability was an important factor for a firm to remain to assess credit, while credit allocation seems to have improved by the financial crisis.

Economic variables, business cycles, and financial health

Macroeconomic indicators, such as interest rate and inflation (Chen & Mahajan, 2010; Natke, 2001), gross domestic product (GDP), government spending, credit spread, money market rate, and corporate tax, impact cash holdings and the financial health of businesses (Chen & Mahajan, 2010). According to Anand et al. (2018), enterprises should retain more cash when GDP grows, with increased crude oil prices, a widening credit spread, a budget deficit, and marketable securities anticipating tough economic conditions. Firms hoard less cash expecting higher exchange rates and long- and short-term bond rates. They discovered that due to market friction, Indian enterprises adjust slowly to target cash reserves, taking 1.66 years to reach. McNamara and Duncan (1994) predicted the fundamental firm performance measured by the rate of return on assets (ROA) responded to the macroeconomic variables, such as real GDP and Treasury bond rate. Their findings suggested a significant relationship between ROA and percentage change in GDP, the Treasury bond rate, and corporate profits after tax. Apart from macroeconomic factors, Huy et al. (2020) indicated that firms have also been affected by macroeconomic, credit, and legal risks.

The business cycle refers to the fluctuation in the national aggregate economic activity. A cycle consists of expansion and contraction phrases and the co-movement among economic variables. Aggregate economic activity is usually measured by a series of factors, including the nominal GDP (a measure of aggregate outputs). It also includes the aggregate measures of industrial production, employment, income, and sales, which are the key coincident economic indicators used to determine the business cycle (Burns and Mitchell, 1946). There are four phases in each business cycle: expansion, peak, contraction, and trough (Malabre, 2019). The economy is in an expansionary phase when it grows for two or more consecutive quarters. Interest rates are often lower, employment rates are growing, and consumer confidence is increasing. When the economy reaches its maximum productive output, the

peak phase occurs, signifying the end of the boom. A contractionary phrase begins after this point when job levels and housing begin to drop. A trough is the lowest point in the business cycle, marked by more unemployment, less credit availability, and plummeting prices.

The business cycle affects the financial status of firms by weakening or strengthening their sales return, liquidity, growth, or investment opportunities. The start of a recession is marked by negative aggregate shocks to corporate income, declines in equity values, and credit restrictions. A common risk of a recession on an individual firm is that it will run out of money. During the Asian financial crisis, Arslan-Ayaydin et al. (2014) discovered that enterprises sought financial flexibility primarily through conserved leverage strategies rather than retaining high cash balances. According to Beck et al. (2012), bank lending to businesses is favorably related to growth, whereas the association between household credit and growth is relatively small.

Firms often adjust their financial policies around different business cycle stages. Ang and Smedema (2011) investigated how firms manage their financial flexibility before a recession. They stated that as the other financial flexibility sources dry up (e.g., line of credit, cash flows, assets sales, and debt capacity), the firms' most reliable source of fund are internal funding, which means the firms' current cash holdings should depend on the future probability of recession. If the managers are rational, they should determine a cash level that functions as cost and benefit to prepare for a future recession.

Begenau and Salomao (2019) looked at firms' financing behaviors. They discovered cross-sectional disparities in investment returns, implying that funding demands and exposures to financial frictions are the main drivers of how firms respond to macroeconomic shocks. Using cross-national industry data, Raddat and Braun (2016) investigated the relationship between financial limitations, competition, and the cyclicality of markup. They discovered that markups expand in parallel with the business cycle, where there are more short-term financial restrictions (liquidity constraints).

Monetary policy and credit availability

Monetary policy affects an economy's money supply, changing interest rates and inflation. It also impacts company activities, net exports, unemployment, debt rates, and the relative cost of consuming versus saving, all of which directly or indirectly affect aggregate demand (Friedman, 1995). This is commonly referred to as monetary policy transmission because it illustrates how changes in the Central Bank's cash rate—the "instrument" of monetary policy—affect economic activity and inflation.

The term "credit availability" refers to the fact that monetary policy impacts expenditure directly through interest rates and indirectly through restrictions on credit and liquid cash. A central bank can purchase or sell government bonds, regulate foreign exchange rates, and vary the quantity of funds that banks must keep as reserves in addition to changing the interest rate. On the firms' level, the interest rate measures the marginal efficiency of capital investment (Tobin, 1978); it is the discounted rate

implicit in the market valuation of the securities, which are claims to its future earnings. It is also a rate appropriate for the valuation of streams of future returns with the time patterns, uncertainty, and covariance of business cash flow. In short, interest rate alternation by the central bank affects firms' profitability and liquidity levels.

Credit rationing is a technique that banks use to limit lending beyond the monetary base. The term "rationing" refers to a forced limitation on resource distribution. In nature, credit means money or goods received today by an individual or firm in exchange for a promise of payment (in money or goods) in the future (Jaffee, 1990). Credit rationing is the supply of additional credit limited by the lender to the borrower who demanded funds at a set quoted rate by the financial institution. New Keynesian emphasizes credit rationing as a channel of money transmission, apart from changes in interest rates. They claim that since borrowers and lenders have asymmetric information (where one side to an economic transaction has more material knowledge than the counterparts), an increase in interest rate will enhance adverse selection and unfavorable incentive effects, thus raising default risk (Neal, 1996). Blinder (1982) found that monetary (fiscal) policy would be more (less) effective with or without rationing. When there is a shortage of effective supply, firms that cannot obtain new credits must limit their output.

Firms can raise funds by borrowing or issuing securities from the equity market. Credit supply is the monetary instrument controlled by the central bank that can alter the amounts the business can borrow at a specific time from the capital market (Friedman, 1990). Based on the review of the pecking order theory in the previous section, firms will first seek finance internally by utilizing retained earnings. If external financing is required, they prefer debt to equity financing. They also consider that the cash flow from equity was altered by the security prices determined by asset pricing techniques (demand and supply). These natural characteristics have made credit supply a unique funding source and profoundly affect a firm's financial soundness by improving or worsening its liquidity and solvency.

A credit restriction significantly impacts firms by limiting the amount of cash flow that borrowing can infuse. If a recession already exists, credit limits, according to Irving Fisher (1933), play a critical role in weakening the economy. This is because a reduction in credit availability will reduce the amount of outstanding risky debt and limit the amount of wealth transmitted from borrowers to creditors. Simultaneously, the drop in cash flows (because of borrowing restrictions) and the fall in collateral values (due to the economic downturn) raised leverage and limited investment, further intensifying the recession. Fisher's idea is now known as the balanced sheet effect, which sparked research since his time. Bernanke and Gertler (1995) relates to institutions that use information from a company's balance sheet as market indications of creditworthiness by giving loans through the balance sheet channel.

In contrast, the "lending channel" focuses on the impact of financial intermediaries on a firm's operations. It claims that financial shocks influence the real economy via banks' credit supply channels

(Gambacorta and Marques-Ibanez, 2011). According to Oliner and Rudebusch's (1996) analysis, there is a broad credit channel for monetary policy transmission. He discovered that internal funds and investment shrink dramatically during a monetary contraction, creating liquidity constraints for small businesses. From the lending channels' perspective, monetary policy affects the availability of bank loans. If banks suffer friction when issuing unsecured liabilities, lending will be decreased. As a result, enterprises may find credit from other sources to be an inadequate substitute, whereas this monetary contraction has a higher impact on liquidity for bank-dependent firms (Ashcraft, 2007).

To ensure access to cash at the microeconomic level, high-leverage organizations rely more on lending distributed by financial intermediaries (e.g., banks and insurance companies). Banks and insurance businesses suffer when their fundamental or regulatory solvency deteriorates. Credit limits have been argued in the literature (e.g., Evans and Jovanovic, 1989; Greenwald and Stigliz, 1993; Hubbard, 1994; Schiantareli, 1995) that induce a misallocation of resources in a firm's output. Due to misallocation, credit-limited enterprises may earn lower profits than their unconstrained rivals (Rizov, 2004).

In conclusion, monetary policy significantly impacts firms' financial status through the money transmission channel as it determines how much funding firms can access and change their liquidity prospects. Also, the change in interest rate by the central bank can alter the required return from firms' investment and the discounted rate used to evaluate firms' value.

Fiscal policies

Fiscal policies entail using government spending, taxes, and borrowing to influence and gain control of the aggregate demand, output, and unemployment. Economists and academics have been interested in how fiscal policies affect entrepreneurship for decades. De Schoenmaker et al. (2014) examined how municipal taxes, government spending, and tax compliance costs affect firm profitability. The findings show that local taxes have a negative and economically significant impact on firm performance. Government spending had a lesser influence than previously thought. Alesina (2002) evaluated the effectiveness of fiscal policies, specifically the tax and government spending, and suggested that the effect of government spending is greater than the tax on firms' profitability.

Rehman (2020) identified a negative relationship between fiscal policy instruments on firms' leverage. The impact of a more countercyclical fiscal policy on firms' value-added growth, productivity growth, and research and development (R&D) expenditure becomes more profound in industries based on external funding or having lesser asset tangibility, according to Aghion et al. (2009). Fiscal policies can stimulate the firms' activities and consumptions, improving their cash flow status. Increasing public spending would propitiate demand inflation, positively affecting firms' cash flow and revenue (Martín and Picazo, 2002).

2.2.1.2 Internal factors

Evaluating firms' overall financial health and long-term sustainability is a complicated process. The step-by-step analysis of a firm's financial health starts with analyzing the corporate financial statements, which provide helpful information to investors and analysts. To assess a firm's financial health, financial analysis has to be conducted by evaluating the past performance of the firm using its financial statements and related information (Young and Cohen, 2018). Among all the information, financial ratios are the most common tools. Ratio analysis focuses on the relationship between two or more financial indicators. It is one of the ways of measuring and analyzing a firm's financial performance (Johnson, 1979; Gombola and Ketz, 1983; Ablanedo-Rosas et al., 2010; Islami and Rio, 2018) and is an attempt to prove the probability of financial distress occurring.

Scholars have been researching the main internal determinants of firms' financial health and carrying out empirical studies to testify various factors that contribute to firms' financial performances. Several factors were proposed by past empirical studies that have impacted firms' financial health, including liquidity (Gill and Mathur, 2011; Vijayakumar, 2011; Yazdanfar and Öhman, 2014; Bala et al., 2016), solvency (Sharma and Cadoni, 2001; Platt and Platt, 2012; Bailey, 2021), profitability (Dewenter and Malatesta, 2001; Abor, 2005; Pervan et al., 2018), operating efficiency (Boubakri, et al., 1998; D'souza and Megginson, 1999; Jiang et al., 2012), and financial flexibility (Lie, 2005; Bancel and Mittoo, 2011; Ang and Smedema, 2011; DeAngelo et al., 2018).

Liquidity

Liquidity is a key financial indicator for measuring corporate financial health. It refers to the ease and quickness with which assets can be converted into cash and assets that will easily convert into cash within a year from the date of the balance sheet (Hillier et al., 2014). Liquidity measures whether a company can survive in the short term rather than prosper in the long term. Gryglewicz (2011) conducted an empirical study to understand the connection between liquidity and solvency. He discovered that repeated liquidity shocks affect solvency, and as a result, solvency levels stimulated liquidity demand. He argued that as liquidity and solvency concerns are linked to cash flow uncertainty, liquidity restrictions and solvency challenges cause short-term cash flow shocks. If firms are uncertain about future profitability and financial leverage, it will generate solvency concerns. If a firm continues being financially unhealthy, it will eventually become financially distressed. Financial difficulty occurs when a firm cannot satisfy its financial obligations (Brealey, Myers, & Marcus, 2009). A notable gap between the financial features of bankrupt and non-bankrupt enterprises was observed by Altman (1968), Deakin (1972), Moyer (1977), Dambolena and Khoury (1980), and Zhang et al. (1999). Compared to non-bankrupt enterprises, firms preceding bankruptcy have weaker liquidity, lower turnover ratios, decreased profits, and higher financial leverage.

a) Source of liquidity, credit, and cash

Various firms' internal features determine liquidity. Mihajlov and Malenović (2015) indicated that the assets' features, such as market conditions, price stability, and cost of sales, determined the extent of liquidity. Lins et al. (2010) surveyed 29 regions and discovered that companies use lines of credit and non-operational cash to manage their corporate liquidity and hedge against various risks. Non-operating cash flow protects the business from future cash flow shocks in tough times. In contrast, a line of credit helps the company take advantage of future business prospects when the situation reverses. Trinh and Mai (2016) tested the influence of company size, profitability, cash flows, investment opportunities, leverage, and capital expenditure on corporate liquidity in the real estate industry. They found that profitability and capital expenditure are the most important determinants. Liquidity is also affected by external factors such as macroeconomic factors like GDP growth, inflation, real short-term interest rate, government budget deficit, credit spread, private credits, and corporate taxes (Chen and Mahajan, 2010).

Cash and cash equivalent is the primary source of liquidity. In the balance sheet, current assets are more easily turned into cash than fixed assets (Ross et al., 2014). Cash represents the absolute liquid, while account receivables and inventories can be converted into cash within days. Liquidity is one of the most important features that maintain business health; the more liquid the business is, the less likely the firm will experience financial distress. According to Lancaster and Stevens (1998), corporate liquidity can be expanded to include both static liquidity (measured by current and quick ratios) and dynamic liquidity (measured by CCC). Cash flow from operating is significantly related to current and quick ratios, while the CCC is associated with incremental accrual income. The relationship between the CCC and the level of liquidity has also been proven by Ebben and Johnson (2011). With an investigation of 879 small manufacturing firms and 833 small firms in the U.S., the CCC was significant. In other words, the more efficient the CCC, the more liquid the firm is.

Credit line serves as another source of firms' liquidity. Based on the views of Nikolov et al. (2019), by comparing with cash holding as liquidity, credit line offers firms financial flexibility by providing liquidity contingent on realized funding needs; however, they are often limited by collateral value and covenants. May (2014) found that firms with more financial constraints and lost access to large amounts of committed credit incurred significant costs and simultaneously hoarded more cash. As external funding is of limited maturity, the credit line source of liquidity appears more sensitive to credit cycles (variation in cost and credit availability). The inability of the financial system to guarantee funding at the same condition for the entire duration of the firm's life, makes the firm fragile. Acharya et al. (2014) studied the consequences of violated covenants associated with bank lines of credit to firms. The result showed that firms violated a covenant and had access to their credit lines revoked, which made them perform worse than similar firms with covenants waived.

The measure of liquidity forms an integral part of financial analysis, particularly for credit evaluation purposes. One of the measurements is working capital, which involves dealing with current assets and current liabilities and is very important for corporate finance as it affects the liquidity and profitability of corporate directly (Raheman and Nasr, 2007). Working capital is important for many reasons. First, current assets are a major component of the total assets. Firms with insufficient current assets may incur shortages and difficulties ensuring daily operations (Van and Wachowicz, 2000). The company needs to determine its short-term financial position. A significant change in working capital provides important information to various stakeholders of firms as it is one way to evaluate firms' creditability and help to better understand the firms' normal business cycle (Richards and Laughlin, 1980). Secondly, financial analysts traditionally view the current ratio as a key indicator of a firm's liquidity position. The current ratio (current assets divided by current liabilities) is an important variable widely understood by investors and has more intuitive appeal than other measures (Logue and Merville, 1972). Basic liquidity is evaluated with the amount and timing of operating cash inflows and outflows by a firm's cash reserve investment (Richards and Laughlin, 1980). Lastly, the CCC is also a liquidity indicator as its key components are the inventory turnover period (i.e., inventory days), the receivable turnover period (i.e., receivable days), and the payment turnover period (i.e., payable days).

Firms that have more liquidity are more likely to succeed. According to Fang et al. (2009), enterprises with liquid stocks perform better when assessed by market-to-book value. This is because the market pricing reflects the available information, and performance-link management incentives increase as liquidity rises. There are also links between equity liquidity and firms' investments (Muñoz, 2013), where firms can issue equities and invest the proceeds to take advantage of the low cost of capital. Cheung et al. (2015) testified the relationship between stock liquidity and firms' value. The results suggested that stock liquidity has a feedback effect on firms' value by lowering the cost of capital. Stock liquidity also decreased default risks (Brogaard et al., 2017). This is contributed by the stock liquidity price information efficiency and facilitating corporate governance by stakeholders. Lian and Peng (2010) examined both the static and dynamic effects of financial constraints on liquidity management. They found that the value of multi-period investment options increases when the firm's liquidity increases. The findings of Fagiolo and Luzzi (2006), who used panel-data regressions and distribution analyzes to see if liquidity constraints affect firm size and growth, demonstrate that (i) liquidity constraints diminish growth once the size is controlled; (ii) small firms grow more after reversing liquidity constraints; and (iii) the greater the liquidity constraints, the more size adversely impacts firm growth. Quader (2017) constructed a general method of moments (GMM) to estimate the differentiative quantitative effects of cash flow on firms' growth under different financial constraints. The results confirmed a substantial growth sensitivity to cash flow within the financial constraints categories.

b) Cash and cash equivalents

Cash and cash equivalents are one of a company's most liquid assets. Firms' ability to operate, finance new projects, service debt obligations, and offer investors a return depends on cash (Maynard, 2017). Firms would have been in serious problems and maybe bankrupt if they did not have sufficient cash on hand. Businesses need cash on hand for various reasons, and cash flow is frequently recognized as a critical aspect of a company's long-term success. Firms hold cash for various reasons, and this issue has been discussed repeatedly as early as Keyne (1936). According to Keynes, money is treated as a store of value; therefore, money is held as a safe asset other than risky assets, such as bonds. As bonds have a fixed stream of interest rate income, the interest rate is the opportunity cost of holding money. Three motives can drive the demand for cash holding. The first is the transaction demand for money, which money is needed for daily transactions to purchase consumption goods. It is highly related to income. The second is the precautionary motive, as highly liquid assets fund the new investment projects when other funding sources are expensive. Finally, speculative demand takes advantage of future interest rate changes or bond price changes. The higher the interest rate, the lower the speculative demand for cash. The three motives of cash holding then expanded in the 1960s, with continued exploration and implementation of the concept directly to optimize cash holding (Frazer, 1964; Miller and Orr, 1966; Vogel and Maddala, 1967). Holding sufficient cash saves firms from suffering cash shortages or raising expensive capital from the external market (Le et al., 2018). Holding cash has several advantages, including lowering transaction costs (Opler et al., 1999; Ozkan & Ozkan, 2004; and Ferreira & Vilela, 2004), avoiding underinvestment concerns (Chang & Noorbakhsh, 2009), and effectively affording firms' daily activities, as well as protecting them from the detrimental consequences of the recession (Bates et al., 2009).

Cash flow is the difference between the amount of cash and cash equivalents transferred in and out of business. There are three sources of cash flows. Operating cash flow, defined as earnings before interest, depreciation, and taxes, is a measure of the cash generated from operations that excludes capital expenditures and working capital requirements (Ross et al., 2014).

In most cases, operating cash flow is positive. If a company's operating cash flow is negative for an extended period, it is in danger because it does not earn sufficient cash to cover its operating costs. Cash from investment activities is connected to cash from long-term asset acquisition and disposal and other investment operations (excluded from the cash equivalent). Changes in the size and content of the company's contributed equity and borrowings generate cash flow (IAS 7, 2019). Haggins (2011) highlighted that the source of cash can be driven in two ways: by decreasing assets or increasing liabilities. The decrease in assets can mean a firm generates cash by selling its used equipment, liquidating inventories, or reducing account receivables. An increase in liability can mean an increase in bank loans or sales of common stock. The cash generated later becomes the source for daily operation expenses, investing in new projects, and repaying debt. In summary, cash flow plays a significant role

in maintaining daily transactions, securing upcoming payments, and allowing firms to grow as their acquisition and investment activities are ensured.

Financial flexibility

According to Ang and Smedema (2011), financial flexibility is a company's ability to manage negative income shocks and restricted external funding to take advantage of beneficial investment opportunities. According to Bancel and Mittoo (2011), financial flexibility refers to a company's ability to respond efficiently to unanticipated changes in cash flows or investment prospects. It also entails retaining the ability to fund projects with a positive net present value (Bonaimé et al., 2014). Financial flexibility also emphasizes firms' ability to mobilize their financial resources to react to uncertain future cash flows with aims to maximize firm value (Byoun, 2008), the ability to access and restructure its financing with low transaction cost (Gamba and Harvey, 2007), or preserve debt capacity to make future expansion or acquisition （Marchica and Mura, 2006).

Financial flexibility can be viewed from debt financing and cash holding (Arslan-Ayaydin et al., 2013). Byoun (2008) suggested that the demand for financial flexibility is characterized by firms' growth opportunities, level of future financial constraints, and expected cash flows. Cash and cash equivalent are the major factors that determine the level of financial flexibility; therefore, the determinants of cash holdings are the same as the determinants of financial flexibility (Ang & Smedema, 2011). Firms' financial flexibility regarding the cash position is positively connected to growth prospects and risk, but adversely related to firm size, according to Miller and Orr (1966) and Opler et al. (1999). The cost of external financing, variable cash flow, and development prospects jointly affect cash holding, which is one of the most important factors of financial flexibility (Kim et al., 1998). Debt levels, investment opportunities, and cash flows impact cash reserves, as per Ozkan and Ozkan (2004). The explanatory determinants of a firm's cash holding are size, risk, profitability, debt level, research and development concentration, growth potential, and costs of external finance (Wang et al., 2020). A non-cash determinant, debt capacity could be another major determinant for financial flexibility. In particular, firms may rely on bank lines of credit rather than internal cash holdings (Sufi, 2009). Lines of credit are directly related to the firm's debt capacity unused by the firm (Ang & Smedema, 2011). A conservative leverage policy to maintain financial flexibility can enhance investment ability (Marchica and Mura, 2010). Unused debt capacities depict the temporal access to external debt funds and measure a firm's financial flexibility (Hess and Immenkötter, 2014). They further reveal that firms make larger capital expenditures and increase abnormal investment during a period of low leverage.

External financing costs, which may reflect firm characteristics such as size, are also a result of strategic decisions about a firm's capital structure, liquidity, and investment (Gamba and Triantis, 2008), and the presence of debt issuance costs provokes firms to retain cash even while having debt outstanding. They claimed that a firm's financial flexibility is influenced not only by the cost of external financing but

also by corporate and personal tax rates and the capital liquidation value. Financial flexibility, measured by the amount of cash held, appears to be a trade-off between the costs and benefits of having a stronger liquidity position (Miller & Orr, 1966).

The decisions of firms to preserve financial flexibility rely on the level of future cash flow relative to investment opportunities and financial constraints (Byoun, 2008). Byoun (2008) suggested that small and growing firms with limited earnings and operating cash flows, and no credit rating tend to issue debt to relieve their lack of financial flexibility, while large and mature firms with high turnovers and operating cash flows, and good credit ratings rely more on their internal funding to provide financial flexibility. Gamba and Triantis (2008) believed that growth opportunities affect the value of financial flexibility. Higher growth opportunities are expected to increase the value of financial flexibility as they are correlated with unexpected cash flow shocks.

A firm's profitability can also affect its financial flexibility. High volatility in the firm's profitability magnifies the value of financial flexibility (Gamba and Triantis, 2008). Positive incomes reveal that firms can easily raise external funds and thus preserve less financial flexibility (Islam et al., 2020). It is a dominant predictive factor of flexibility as positive earnings reveal that firms can easily generate external funds and thus preserve less financial flexibility. Similarly, Rapp et al. (2014) argued that firms with higher profitability tend to have a lower value of financial flexibility because they can better rely on internally generated cash.

Financial flexibility and financial health of firms

A strong relationship exists between financial flexibility, investment, and financial health (Denis and McKeon, 2009; Jong, Verbeek and Verwijmeren, 2012; Marchica and Mura, 2010). The primary link between financial flexibility and corporate performance is investment. Firms with greater financial flexibility spend more in the future than firms with limited financial flexibility, and their financial flexibility strengthens with time (Marchica and Mura 2010; Jong, Verbeek, and Verwijmeren 2012; Arslan-Ayaydin et al. 2014).

Kaplan and Zingale (1997) stated that firms with less liquid assets (which is less financially flexible as cash and liquidity assets are considered the key elements for financial flexibility) are more sensitive to internal cash flow, while unconstrained firms are not. This means that financially flexible firms will have more internal sources to finance their investment projects and less reliance on external finance. According to Denis (2011), firms with sufficient internal resources are more likely to invest at the first-best level without relying on external funding. When financial friction exists and the cost of external financing outweighs the cost of internal financing, firms will prefer internal financing over external financing. If a company's internal resources are adequate, it can invest in the projects with the best prospects. However, when financial friction increases, the investment equilibrium reduces if the firm's internal resources are insufficient. Denis (2011) established a model that considers investment

distortions and cash management policies as a function of the likelihood of future financial constraints. The results show that if future constraints are required, firms will select projects with shorter paybacks, fewer risks, and those utilizing more liquid assets.

Ma and Jin (2016) confirmed that financial flexibility helps to improve a firm's performance. That means financially flexible firms can avoid financial distress in the face of negative shocks and readily fund investments when profitable opportunities arise. They studied how financial flexibility affects a firm's performance and constructed a new financial flexibility index to measure financial flexibility suitable for Chinese corporations. A causal link between financial flexibility, investment, and firm performance has been found, proving a significant and positive effect of financial flexibility on investment, with both investment scale and investment efficiency playing a partial mediation role in improving financial performance.

Financial flexibility considerations are most important for firms' financial policy decisions (Brounen et al., 2006; Graham and Harvey, 2001; Pinegar and Wilbricht, 1989). Obtaining and maintaining financial flexibility is driven by corporate structure decisions. It represents the ability of a firm to access and restructure its financing at a low cost. Also, financially flexible firms can avoid financial distress in the face of a negative shock and have sufficient funds to invest when profitable opportunities appear.

The effect of financial flexibility on a firm's value can be quite large. It is also said that more flexible capital can partially compensate for costly external financing, indicating that financial flexibility and investment are substitutes to some extent (Gamba and Triantis, 2008). Rapp et al. (2013) explored how financial flexibility has impacted decision-making. They found that firms that consider financial flexibility more valuable tend to have a lower payout ratio, preferred share purchase to dividend, and lower leverage ratio. Firms with higher value of financial flexibility tend to have lower dividends, become more likely to omit dividends, prefer share repurchase to dividend, and have lower leverage and accumulate more cash.

There are positive relations between financial flexibility and a firm's liquidity. Firms must maintain their financial flexibility to react and adapt to changing financial conditions. More liquidity is required to maintain financial flexibility. Boileau and Moyen (2016) suggested that holding cash (and credit lines) can have greater flexibility than other financial instruments (e.g., selling off assets, taking back distributed dividends, or raising new debts) for firms that will have immediate liquidity to deal with any changing financial condition. Their analysis highlights the lower cost of using liquidity. Ang and Smedema (2011) hypothesize that during a recession, other sources of flexibility, such as lines of credit, cash flows, asset sales, and debt capacity, dry up. Therefore, cash holdings should be more important when a recession is anticipated.

Solvency

As discussed in the previous sections, financial leverage enhances the return on invested capital by generating a higher return with the tax benefits of borrowing. Wahlen et al. (2022) state that shareholders benefit from increasing proportions of debt in the capital structure as long as firms maintain a return on assets more than the after-tax cost of debt. However, increasing the proportion of debt in the capital structure increases the risk that the firm cannot pay interest and repay the principal on the amount borrowed. As credit and bankruptcy risks increase, the incremental cost of borrowing is also likely to increase. The three most direct measures of long-term solvency are 1) debt ratios, 2) interest coverage ratios, and 3) operating cash flow to total liabilities ratios.

Solvency indicates a firm's ability to meet its long-term obligations (Ross et al., 2014). The most common solvency ratios are debt to equity (D/E) and interest coverage ratios. The D/E ratio is generally a solid indicator of a firm's long-term sustainability. Solvency ratios calculate long-term debt in relation to assets or equity. A lower D/E ratio means more of the company's operations were financed by shareholders instead of creditors.

Insolvency is one of the most concerning problems affecting firms' overall financial health and is being investigated by many scholars. There are different types of insolvencies defined in different disciplines. Balance sheet insolvency signifies the book value of assets is less than liabilities (Belcher, 1997). Cash flow insolvency indicates that a firm fails to repay its debt by the due date. The most common definition of insolvency by the financial economist is called "financial distress," which refers to a condition experienced by firms having difficulties in paying a debt to its creditors (Armour, 2001) or a low cash flow state in which a firm incurs financial distress without being insolvent (Purnanandam, 2008). Financial distress is recognized as a key force behind firms' solvency status (Gryglewicz, 2011). It interacts with liquidity and solvency that help to establish the cash and dividend policy, capital structure, valuation, and credit spread.

Risk applications in financial distress and default related to property areas vary. The most significant impact is that it is used to detect and model default risk for a mortgage (Copeland et al., 2008; Elul et al., 2010; Elul, 2016; Yang et al., 2011; Campbell and Cocco, 2015). Few researchers have focused on the probability of default in property investments regarding the relationship between risk premiums and returns (Naranjo and Ling, 1997; Karolyi et al., 1998; Huffman, 2003; Ewing and Payne, 2005). There are also studies on hedging or decreasing default risk by diversified portfolios in property investment (Montgomery et al., 1984; Jarrow et al., 2005; Duffie and Pedersen, 2007).

Financial distress can have direct and indirect costs, which generally impact corporate valuation and capital structure concerns (Almeida and Philippon, 2007). Garlappi and Yan (2011) suggested that financially distressed stock will generate lower returns and increased default probabilities. Financial distress costs (part of firms' financial costs) suffered by a firm partially depend on the likelihood of

financial distress (Keasey et al., 2015). Opler and Titman (1994) argued that market value decline in financially distressed firms.

Costs or risks associated with financial distress have been assessed by scholars, which provides solid evidence that financially distressed firms will lose customers, valuable suppliers, and significant market shares in an industry downturn (Opler and Titman, 1994). Some scholars consider that firms became distressed due to unexpected macroeconomic and regulatory developments (Denis and Dennis, 1994; Pálinkó and Svoób, 2016). Dirman (2020) researched the cause of financial distress with corporate profitability, liquidity, leverage, firm size, and cash flow variables. A combination of analysis techniques of the normality test, multicollinearity test, heteroskedasticity test, and autocorrelated test was applied. The results suggested that profitability positively impacts financial distress, while liquidity, leverage, and FCF do not show any impacts on causing financial distress. Widhiadnyana and Ratnadi (2018) studied the effect of managerial ownership, institutional ownership, the proportion of independent commissioner boards, and intellectual capital on financial distress. The results suggested that managerial ownership and intellectual capital negatively impacted financial distress. In contrast, the proportion of independent commissioners positively impacted financial distress.

Chevalier (1995a&b) indicates that debt will weaken a firm's competitive position. There is also evidence that financially distressed firms are more likely to violate their debt covenants and miss coupon/principal payments without being insolvent. These violations impose deadweight losses in the form of financial penalties, accelerated debt repayment, operational inflexibility, and managerial time and resources spent on negotiations with the lenders (Purnanandam, 2008). Finally, a financially distressed firm may have to forgo positive net present value projects due to costly external financing (Froot, Scharfstein, and Stein, 1993).

Operating efficiency and profitability

Operating efficiency primarily measures the efficiency of the profit earned as a function of operating costs. It measures the proportion of costs incurred during economic or financial activities. Profitability is a key measurement of operating efficiency, which highlights the ability of a business to produce a return on an investment based on its resources while comparing its other investment alternatives (Seelos and Mair, 2007). Efficient firms allocate resources to activities that enjoy a comparative advantage (Yang and Chen, 2009). Yasir et al. (2014) found a positive relationship between firms' CCC and their performance by investigating 16 firms selected from the cement industry in Pakistan from 2007–2012.

A significant number of studies are involved in uncovering the determinants of profitability. Brush et al. (2000) provided empirical evidence that sales growth in firms with free cash flow and without strong governance) is less profitable than those without FCF. Credit availability is one of the determinants of a firm's profitability. Rizov (2004) analyzed firms facing dramatic credit constraints during the period of economic transition to directly measure credit rationing and its impact on profitability in Bulgaria.

Asimakopoulos et al. (2009) suggested that firm profitability was positively affected by size, sales growth, and investment and negatively by leverage and current assets. Raheman and Nasr (2007) showed a strong relationship between firms' working capital and profitability.

A firm with lower profitability and a higher debt ratio is more likely to be in financial distress (Lian, 2017). Lian (2017) used the option pricing model developed by Merton (1974) to measure financial distress by computing the expected default rate (EDF), which is used by KMV corporation, a subsidy of Moody's. The result indicated that the ratio of net income to total assets positively relates to financial distress because profitable firms are less likely to experience financial distress in the future. To seek the early warning signs of financial distress, Gyarteng (2019) used paired sample *t*-test to obtain Altman's Z-score and found that profitability is one of the significant variables when bankruptcy becomes imminent. He hypothesized that there is a significant difference in the profitability of firms 2 years and 1 year before bankruptcy, based on the evidence of the *t-t*est. The hypothesis is supported as there is a statistically significant profitability change as the firm approaches bankruptcy.

2.3 Property Development Process and Financial risks

Property development contributes significantly to the property industry and economies. The major stages of the development process consist of feasibility analysis and land acquisition, design and development approval, construction, and leasing or disposal (Reed and Sims, 2015). Property development's main characteristics include high entry barriers, capital intensive, and slow payback period. As a result, inherent risks are involved in property development (Newell and Steglick, 2006), particularly financial risks.

2.3.1 Stage of feasibility analysis and land acquisition

For a development project, developers must find land that suits the purpose of development. Site selection is crucial as each site is unique with distinctive features, such as demographics (e.g., local economic, income, population, and population density), market features (e.g., existing demand and supply), proximity relationship (e.g., road map system), physiography (e.g., topography, slope, elevations, and soil drainage). Fenker (1995) defined site selection evaluation as the process of comparing information with other real estate with available objective or subjective information. McDonagh (2010) emphasized the importance of selecting the appropriate parcel of land and further explained that the market demand and supply, urban growth pattern, regulatory and zoning considerations, and the physical aspect of the location together create the demand for residential areas and trigger residential activities. A good location is essential for development success (West, 1994). No subsequent developer actions, such as design or promotion strategies, can compensate for poor land selection (Wilkinson and Reed, 2008).

After identifying the development site but before land acquisition, developers must conduct investigations on legal, land use, development possibility, and potential risks involving the proposed development project. Ghyoot (2008) and Bakar and Jaafar (2018) stated that feasibility studies and due diligence give the developer insight into market features and help them determine the viability or likely success of the proposed development project. It could be a sunk cost for the feasibility analysis when it turns out to be an unviable development.

After the feasibility study, developers need to prepare to bid. The acquisition price is equal to the maximum bidding price for the specific land in a competitive market. Many land valuation methods estimate the price to be paid on the development land. Residual valuation (Equation 2.10) is the common method of development appraisal, which is a method used to obtain the maximum bid for the site, including acquisition cost, professional fee, and finance of land purchase from the pre-estimate value of the completed site (Atherton et al., 2005).

$$\text{Land} = \text{GDV} - (\text{Construction} + \text{Fees} + \text{Profit}) \qquad (2.10)$$

where

- Land = Purchase price of land/site acquisition
- GDV = Gross Development Value
- Construction = Building and construction costs
- Fees = Fees and transaction costs
- Profit = Developer's profit required

With the scarcity of land, land acquisition requires a large amount of capital to pay not only for the land cost but also for conveyance and legal costs. Developers must use their cash or borrow from financial institutions and deal with time and capital spending uncertainties on the acquired land. Most developers rely on long-term loans to pay the land's cost. Costs are associated with servicing the financed loan, which is a major bearing on the overall viability of the property development (Reed and Sims, 2015).

In summary, the land acquisition stage is one of the crucial development processes. Developers need to conduct feasibility analysis, value the land cost, prepare to bid, and most importantly, prepare a proportion of cash and get finance approval from financial institutions to ensure sufficient funds are available to purchase the land.

2.3.2 Stage of design and development approval

At the pre-construction stage, developers need to obtain development approval from the planning authorities. To gain approval, developers need to outline detailed information about the property's design, external appearance, and landscaping. The design must meet the government's zoning requirements, one of the regulations restricting land use. It often comes in three broad categories:

residential, commercial, and industrial. When zoning regulations go beyond health, safety, and general welfare, a court may strike down the zoning regulation as excessive, too broad, or overreaching. The developers often attempt to seek zoning variance in a community when zoning is "overreaching." However, there are exceptions for property types that continue to be used in their current state. Exceptions, such as nonconforming use, conditional use permit, or variance, may be placed on properties. Other restrictions include local and state building codes, planning boards, public restrictions on land use, private restrictions as restrictive covenants, and deed restrictions (Peca, 2009). Negotiating with regulatory agencies is time- and money-consuming and requires expertise, often resulting in project delay and cost overrun (Nachem, 2007).

Design is one of the costs for developers who commit to paying for architects' and engineers' fees. The design of each development is based on the developer's and the public perception of architectural styles and development profit. It includes architectural drawings and site plans of the main elevations focusing on the material selection, development of technical specifications for detailed engineering and construction, project layout, and detailed structure arrangement, roadways, and footpaths (Syms, 2010). The development design must be submitted for development approval. Planning approval must be received promptly before the start of construction; otherwise, the developer may incur additional costs, and the scheme evaluation may be affected (Cadman and Topping, 1995). Failure to gain development approval in time causes project delay and cost overrun, further delaying sales, sales cash inflow, and profits for the developers. The cost of design and development approval can vary from project to project in different areas. However, developers have to use their funds before carrying out this stage of development activities.

2.3.3 Stage of construction

A construction certificate is required before the development project is formally started. Compared with previous development stages, the construction stage is more complicated. It involves project budgeting, scheduling, and project management. The developers must work closely with the architect and contractor in the construction stage. According to Peca (2009), developers are responsible for providing adequate project funding, ensuring the site is ready for construction, and providing sufficient construction documents for the contractors to complete their work. The architect is responsible for completing the design of the building and ensuring the drawings meet all the relevant building codes and other regulatory requirements. The contractor is responsible for performing the work, which includes completing the work following the time and budget constraints included in the contract. Though the contractor takes sole responsibility for constructing a project, there are risks of contracts and contractors' issues. The risks related to contractors range from an inflated contract in terms of pricing to poor professional techniques, inferior materials, contractor negligence, and contractor bankruptcy. These problems can all result in claims, lawsuits, and unexpected costs for the developer (Bova, 1995).

Apart from the contractor risks, the construction process includes various risks studied by scholars in the field. Samarghandi and Mousavi (2010) stated that pricing, design, quality, and possible delay are the most common risks in construction. Loizou and French (2012) explained that construction represents the highest outlay of the entire development period. Within the construction stage, the physical characteristics of the land, sustainability issues, and changes to the construction plan can all lead to delays, exposing the developer to financial risk. Timing can be a crucial issue. For instance, delays at any stage of the development process can lead to higher finance costs for the developers.

2.3.4 Stage of leasing and disposal

Developers can only receive cash inflow once the development is completed, and the government grants an occupation certificate. Though developers can conduct presale agreements for incomplete residential properties, deposits from potential buyers cannot be used to pay for developments. The presale contract is a hedge for both developers and purchasers against future housing price uncertainty. There is an increasing practice of presale for property transactions worldwide. During the US economic downturn of subprime crises, the lender became more cautious, and the presale contracts gave the lender more confidence (Bardhan et al., 2012). However, there is a risk that the developers may not disclose negative aspects of the presale property (Leung, 2008).

Depending on the developers' business strategies, the developed properties could be for sale or for lease. The source of a developer's revenue is generated through the sale or lease of their developed properties. The demand from potential buyers determines property sales. Developers could risk sale price volatility due to changes in various conditions, such as the market, economy, consumer preference, and demand (Buttimer and Clark, 2008). Price reflects the equilibrium of demand and supply. According to past studies, property demand is affected by economic growth (Marcin, 1978; Deep and Domanski, 2002; Miller and Peng, 2006; Belsky, 2009), income （Mayo, 1981; Haurin, 1991; Tse and Raftery, 1999), demographic factors (Hill et al., 1994; Kalwij and Salverda, 2007; Hashimoto et al., 2020), inflation (Kearl, 1979; Manchester, 1987; Demary, 2010), interest rate (Harris, 1989; Taylor, 2007; Fontenla and Gonzalez, 2009; Landvoigt, 2017), credit availability (Landvoigt, 2017; Chauvin and Muellbauer, 2018; Byrne, 2020), and taxation (Ihlanfeldt, 1984; Yang, 2018; McMillen and Singh, 2020). The supply is determined by geography (Saiz, 2010; Meen and Nygaard, 2011; Bangura and Lee, 2019; Baum-Snow and Han, 2019), interest rate (Blackley, 1999; DiPasquale, 1999; Levin, 2009; Owusu-Ansah, 2019; Murray, 2021), and land supply and land use restriction (Ellickson et al., 2009; Albouy, 2018). In addition to market conditions, sale prices fluctuate with the economy and business cycle. The price and sales movement of the property will eventually affect the revenue and cash inflow of the underlying project (Graaskamp, 1992; Issac and Issac, 1998; Benefield, 2009).

The acquired land is commonly pledged to the bank as collateral for financing. Furthermore, when land values depreciate due to market downturns, banks will reduce the loan-to-value (LTV) ratio to

developers to reduce lending risks by decreasing the loan outstanding level of developers (Greive et al., 2005).

2.3.5 Capital required in property development and finance

A development's capital needs purely depend on its cost structure and budget. In a typical development project, the cost includes land cost, site development cost, labor cost, design fee (architect and engineering), permission cost, financing cost (loan fee and interest), marketing cost (promotion and advertisement), and broker's fee. Table 2.1 lists the main costs involved in a typical property development project. Among all the project expenses, construction spending constitutes the largest proportion of the costs, followed by sales commission and financing costs (Peca, 2009). Land cost also takes up a significant proportion as well, which is approximately 20-30% of the total development cost.

Table 2.1 Cost structure for a typical real estate development project (Peca, 2009)

Development cost	Description
Land cost:	Land acquisition cost
Site Development cost:	Site work
Design fee:	Architect, engineering: The expenses involved in building or improving the physical property, e.g., construction cost; labor and materials; demolition; landscaping
Financing cost:	Loan fee and interest payments
Marketing cost:	Promotion and advertisement, leasing commissions, broker's fee
Other costs:	Preopening operating cost; real estate taxes; insurance; legal fee; accounting cost; field supervision (inspection) cost; development fees; contingencies

As cash inflow can only be realized through the sale of properties at the presale and sale stages, the capital required for property development is sourced from financial institutions to support the development process.

Property development finance generally requires a certain proportion of initial capital injection. The

balance forms construction loans and permanent loans from the lender (Bayster, 2005), based solely on predictable cash flow (Eisenbach et al., 2014). The lender ascertains the developers' ability to service interest and principal payments. The methods to assess repayment ability are not limited to the single project's cash flow prospect but also to the borrower's credentials. The five "Cs" of credit, which refer to character, capacity, cash flow, capital, and collateral, are widely applied to address the risk in underwriting a construction loan (Nachem, 2007). Chan et al. (2016) established a risk-identified framework for construction loans. The first risk is loss when a construction loan defaults. The second risk is the borrowers' default. The loan interest rate charged is a function of the expected loss ratio of a borrower's default. The third risk factor is the loan-to-value (LVR) ratio. The higher the LVR ratio, the more likely a borrower will default.

Construction loans are considered risky for lenders due to a lack of physical collateral and uncertain cash flows during development. Many developments are initially financed by construction loans during the construction period as short-term loans (Schmudde, 2004) and then refinanced by long-term loans after completion. Construction loans generally apply floating interest rates, depending on the market conditions, with the loan amount fixed between 70 to 75 percent of the LVR. This is done to ensure sufficient equity for the project and incentivize the developers to complete the development project. Construction loans are closely supervised to ensure the released loan is appropriately used, while the undrawn loan will be released according to the expected future expenses (Chen, 2006).

Capital intensive is one of the unique characteristics of property developments. A large amount of loans from lenders provides additional costs to the development projects on top of other risks such as construction and market risks. Thus, cash flow and financial flexibility are crucial to ensure the success of property developments.

2.4 Summary of the Chapter

This chapter reviewed the financial economics framework and the main determinants that affect the financial health of property development firms to understand the mechanism of financial risk in the property development process. The development process and the capital-intensive nature of property development projects have also been reviewed. The next chapter discusses the research design and methodology used to study the financial health of property development firms caused by external and internal factors.

Chapter 3 Research Methodology and Methods

3.0 Introduction

This chapter aims to establish a research framework and introduces the research methodology and methods for analyzing the financial health of real estate development enterprises. This research follows a deductive approach starting with identifying the theories, formulating a hypothesis/assumption, testing the hypothesis, and finally deciding whether to accept or reject the result. The research methods were developed based on the research aim, objectives, and research questions set earlier. The literature review has suggested many factors affect the financial health of firms. As there are unique characteristics of property development firms compared with other types of businesses, such as investment, whether the same set of determinants affects the financial health of property development firms needs to be investigated. Thus, multiple regression analysis (MRA) is applied to provide insight into the relationship between the internal financial health of property development firms and their determinants. The value and sign of the determinant coefficient derived from the MRA model will be interpreted as the magnitude of the effects of these determinants on the financial health of property development firms. It shows the relative importance of each determinant (independent variable) to financial health (dependent variable).

The difference-in-differences (DID) model is applied to assess the effects of economic policy on the property development firm's financial health. The test applies to the entire sample data of property development firms. It also used to further investigate the policy effects on firms with different characteristics, larger and smaller sizes, higher and lower liquidity, state-owned and private firms, different solvency level firms, and higher and lower debt-equity structure firms. Evaluating the effects of policy on the different types of property development firms allows a deeper understanding of risks on firms and developing strategies to manage the risks.

The following section focuses on developing the research methodology and methods to achieve the research aim and objectives. It is organized as follows. Section 3.1 introduces the general design that guides the entire research and explains why and how this approach is applied. Section 3.2 proposes the research method used to answer the research questions. Section 3.3 explains the multiple regression model used to identify the main determinants of development firms' financial health. Section 3.4 introduces the DID model to study how economic policies affect the financial health of property development firms. Section 3.5 develops a hypothesis to test the impact of economic policies on the financial status of different property development firms. Section 3.6 summarizes the chapter.

3.1 Research Design

Firms aim to maximize shareholders' wealth (Baumol, 1962). To achieve this business objective, a firm's financial health is crucial to ensure ongoing business success. Financial performance, such as

profitability, liquidity, solvency, and operating efficiency (i.e., four areas), are commonly applied to evaluate a firm's overall financial health and judge the likelihood of continuing as a viable business. In the real world, a firm's financial status can be reviewed through financial statements, balance sheets, profit and loss, cash flows, and retained earnings statements. It is generally agreed that a healthier firm generates better profits, has sufficient cash flows to seek growth and ensure sustainability from financial constraints, and has an optimal capital structure that lowers financing costs. Simultaneously, such firms maintain limited risks by controlling debt financing safely.

Today, financial ratios are frequently applied to measure a company's financial position (Beaver, 1966; Lewellen, 2004; Hosaka, 2019). This is because a single financial indicator, such as net profit or total asset, is less pronounced in explaining a firm's financial performance. On the contrary, financial ratios are the key indicators of a firm's performance that can be obtained from its financial statements. The general trend of financial ratios can also explain a company's financial status variations over time. The long-term sustainability of firms or future bankruptcy can be combined, evaluated, or predicted through several financial metrics.

As per empirical studies, the indicators from the four areas of financial performance can be evaluated as signals of firms' superiority or inferiority (Friedlob and Schleifer, 2003). The principle is that if a firm's ratios outperform the overall industry's average outcome during the same period, the firm is regarded as financially healthier, and vice versa. Aside from the soundness of internal financial indicators, external factors such as the business cycle, the global and national economy, and government policies have proven to contribute to the financial viability of firms (Arslan-Ayaydin et al., 2014; Beck et al., 2012). For instance, strong economic fundamentals and expanded government policies lessen the likelihood of a firm's insolvency or bankruptcy. When the government introduces expansion economic policies, firms may benefit from cheaper borrowing costs for capital investment and less tax payable, thus to increase profit margins. (Ma and Jin, 2016).

The ontology of this study is adapted from existing terminologies and the demonstrated relationship between external economic policies, financial flexibility, and financial health. This research utilizes the principle of positivism philosophy as epistemology in conducting this research, obtaining information through empirical evidence throughout the literature review and financial performances from real-life firms, which means that quantitative data is used to test previously established knowledge.

Therefore, a deductive approach is used, which commences with an established theory (Gabriel, 2013) and develops it using gathered data (Creswell and Creswell, 2016). As this quantitative approach is closely linked and aligned with the research methodology chosen, the findings tend to be conclusive. According to Wilson (2014), the deductive approach focuses on formulating hypotheses based on the current theory, followed by the descriptive research design to testify these hypotheses. The deductive approach ties with the thinking process move from the general to the specific (Dudovskiy, 2018). The

developed theory helps to explain a causal relationship and be applied in a broader context (Gulati, 2009).

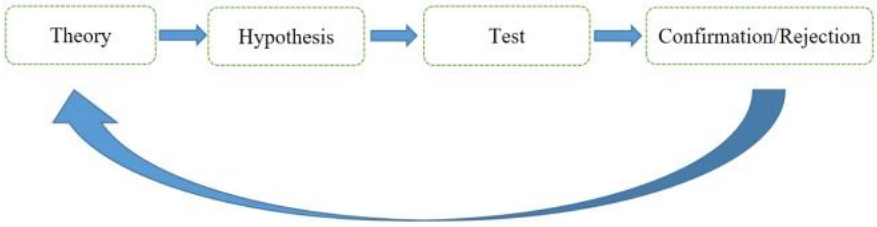

Figure 3.1 Deductive approach (Dudovskiy, 2018)

Four typical steps are designed based on the deductive approach, as shown in Figure 3.1. It begins with a literature study to form a theoretical framework and subsequently continues to formulate hypotheses to identify a relationship between financial health and influential factors. It then employs quantitative approaches like regression or correlation analysis to test the hypotheses. A rejection or confirmation judgment is made based on the test results. The modifying theory is needed when the hypotheses are not confirmed (Dudovskiy, 2018).

Based on the deductive approach, the framework of this research is designed from general scenarios to specific industries and firms. It begins by building the theoretical framework based on the literature review, defining the research gap, and formulating research questions. To address the research questions, empirical tests are conducted in the first stage to address the determinants that affect the financial health of property development firms, followed by applying the DID method in assessing the effects of policy impacts on their financial health. The data used in this research ranges from the economic data collected from the China Statistics Bureau and sector information to financial ratios of listed real estate development firms that are publicly available information on the Shanghai and Shenzhen stock exchanges in China. To fulfill the ethics requirement, ethics approval was obtained from the University of Technology Sydney ethics committee in 2020 with the approved number: ETH20-4906. Figure 3.2 depicts the research design applied to this research.

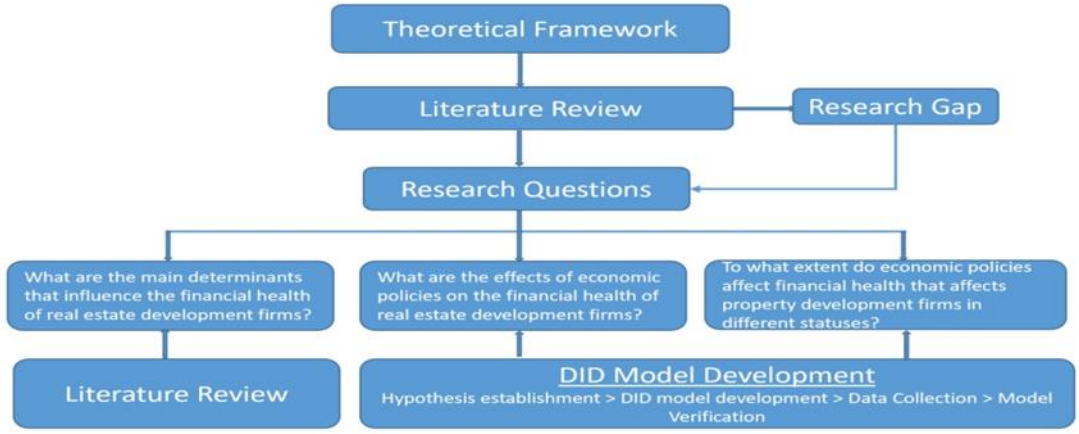

Figure 3.2 Research Design
(designed by the author)

3.2 Research Methods

The research methods are applied following the research questions stated earlier.

With the research aim and objective identified, the three main research questions are:

1) What are the main determinants influencing the financial health of real estate development firms?
2) What are the effects of economic policies on the financial health of real estate development firms?
3) To what extent do economic policies affect the financial health of real estate development firms with different financial status?

An in-depth literature review has been conducted to answer the question about the main determinants of financial health and the policy impacts on firms' financial health. The findings were discussed in the literature review chapter. A firm's financial health is externally affected by the economic environment, such as economic indicators like gross domestic product (GDP), consumer price index (CPI), and other indicators, the business cycles, economic policy, and credit availability. Internally, a firm's financial health is affected by its financial status, such as liquidity, solvency, profitability, size, capital structure, and financial flexibility. Comparatively, the literature has not addressed the main determinants of property development firms. In addition, the literature has paid less attention to the role of financial flexibility in a firm's financial health and how the external economic policy interacts with firms with different financial flexibility that eventually alter the firms' financial health. On the other hand, how an economic policy would affect a property development firm's financial status in China was barely observed.

The following hypotheses were developed to test these findings.

H_1) Economic policies and internal financial performance determine property development firms' financial health;

H_2) The effects on firms' financial health can be different before and after introducing economic policies;

H_3) Property development firms with different financial statuses (e.g., size, capital structure, profitability, solvency, ownership structure) respond to the economic policy differently.

Accordingly, a multiple regression model (MRA) is applied to test H_1. For H_2 and H_3, the DID model was introduced. The following section presents the details and approaches of these two models.

3.3 Development of the Financial Health Determinant Model

The financial health of firms can be analyzed by applying the financial economics framework, which explains how scarce resources are allocated through time by weighing the costs and benefits of economic decisions (Campbell and Brown, 2003). The external factors affecting firms' financial health include changes in the macroeconomic environments (e.g., periodic financial meltdown and business cycles) and variables (e.g., GDP, government budgets, money market rates, and tax) that affect firm's operations. Economic policies include monetary policies that adjust the interest rate or credit availability (i.e., borrowing) to promote sustained economic growth and fiscal policies that alter government spending and tax to influence the economy. Internal factors are relatively more direct indications of how firms perform. This is evidenced by an evaluation of their financial statements and measured by financial ratios.

3.3.1 Model development

The financial health of firms can be expressed as

$$FH = f(IF, EF, t) \qquad (t = 1, 2, 3, \ldots k) \qquad (3.1)$$

Where *FH* denotes financial health and is measured by Altman Z-score (Altman, 1968) as a dependent variable in the model. *IF* and *EF* are the internal and external factors, respectively, as the explanatory variables. *t* is the time series by estimating period.

The determinants of internal and external factors can be expressed as

$$IF = f(x_1, x_2, x_3, \ldots x_n, t) \qquad (t = 1, 2, 3, \ldots k) \qquad (3.2)$$

$$EF = f(y_1, y_2, y_3, \ldots y_m, t) \qquad (t = 1, 2, 3, \ldots k) \qquad (3.3)$$

Where *IF* denotes *1* to *n* internal factors, such as financial ratios, derived from financial statements, whereas *EF* refers to *1* to *m* external factors, such as GDP, CPI, and government policies. By combining equations of (3.2) and (3.3) into (3.4), firms' financial health can be expressed as

$$FH = f(x_1, x_2, x_3, \ldots x_n; y_1, y_2, y_3, \ldots y_m, t) \quad (t = 1, 2, 3, \ldots k) \quad (3.4)$$

To study the *financial health of firms*, i.e., the external factors and value of financial ratios (internal factors) determine firms' financial health, the functional form in equation (3.4) can be converted into a linear equation suitable for estimation by standard multiple regression techniques expressed in mathematical form. Thus, the multiple regression equation for firms' financial health is

$$FH_{it} = \alpha_{0i} + \alpha_{1i}x_{1i} + \alpha_{2i}x_{2i} + \alpha_{3i}x_{3i} + \ldots\alpha_{ni}x_{ni} + \beta_{1i}y_{1i} + \beta_{2i}y_{2i} + \beta_{3i}y_{3i} + \ldots\beta_{mi}y_{mi} + \varepsilon_{it} \quad (3.5)$$

Where α_0 is the constant term of the model, $\alpha_{1, 2, 3, \ldots n}$, and $\beta_{1, 2, 3, \ldots m}$ represent the coefficients associated with the corresponding explanatory internal and external variables of the financial health of firms, respectively. ε_{it} signifies the random errors or residuals of estimation, or a disturbance term for time period *t*, where), i.e., a normal distribution with zero mean and constant variance.

The developed models are tested on the gathered panel data and verified with statistical evaluation criteria. Only the statistically significant models are selected for further analysis, and the effects of stated hypothesis H1 are discussed in the next section.

3.3.2 Key variables

This section describes the dependent variables that measure a firm's financial performance and some of the key explanatory factors that contribute to it.

3.3.2.1 Dependent variable: financial health

As per the discussion, internal and external factors jointly contribute to a firm's financial soundness. The financial health of real estate developers is vital to their long-term success.

Financial health is a significant indicator for firms to make decisions regarding their growth prospects and avoid financial distress. On the one hand, the past literature has proven that external factors like expanding economic policies and positive signs in internal financial performance would improve firms' financial health and encourage development (Denziana et al., 2014; Hassan & Halbouni, 2013; Becchetti and Trovato, 2002; Kimani, 2023; Padachi, 2006). On the other hand, contrast policies and a decline in internal financial performance diminish growth and risk of financial distress. The hypothesis can be stated as follows:

H_1) Economic policies and internal financial performance determine firms' financial health.

Financial health is measured by financial ratios, which serve various purposes. One principal objective is to predict firms' failure (Beaver, 1966). Financial ratio analysis has the following advantages: a) it quickly provides essential information in a simple format; b) the source of information comes from financial statements that are easily obtainable; c) the calculated ratios are straightforward to comprehend and demonstrate firms' financial performances; d) the standardization of ratios can be used to compare firms of variety of sizes; and e) the ratios can also be used to perform trend analysis over the period (Gibson, 1987; Ashraf, 2019; Kliestik, 2020). Despite its usefulness, there are certain limitations: a) different ratios' derivation approaches are not consistent; b) assessing a firm's financial health requires assessing multiple ratios; c) due to different financial reporting systems, the same ratio could have multiple interpretations; d) the ratios can only be compared to different firms within the same industry, and e) the financial ratios reflect the firms' internal factors on financial conditions only. External factors are not included in this analysis method.

To eliminate the shortfall of financial ratios. Altman (1968) introduced the Altman Z-score to fill the gap between traditional ratio "analysis" and a more robust empirical technique to optimize traditional ratio analysis. The Z-score was developed by generating 22 typical financial metrics and then applying multiple discrimination analyzes to evaluate which of those ratios can best distinguish between an insolvency firm and a healthy enterprise. Calculating a firm's financial distress level can be easily used to anticipate its defaults and financial position. A few efforts have been made to verify which ratios would be advisable to detect potential risks in companies and how much weight should be assigned to the selected ratios.

The first approach is to arrange an observation into one of the several categories based on its features. Subsequently, a linear combination of features was constructed to best distinguish between the groups and determine a set of discriminatory coefficients. In this case, the two categories were bankruptcy firms and non-bankruptcy firms. The final step is to sum the values of each variable into a single discriminant score.

$$Z = \partial_1 X_1 + \partial_2 X_2 + \ldots \partial_n X_n \qquad (3.6)$$

Where α is the discriminant coefficient, and *1…n* represents *1* to *n* independent variables.

The final discriminant function of Altman's Z score is as follows:

$$Z = 0.012X_1 + 0.014X_2 + 0.033X_3 + 0.006X_4 + 0.999X_5 \qquad (3.7)$$

Table 3.1 illustrates the variables in calculating the Altman Z-score, which will be used to assess a company's financial health.

Table 3.1 The Altman Z-score variables

Variables	Symbols	Definition
Overall Z-Score	Z	It measures firms' financial health.
Working capital/Total assets	X1	It measures a firm's net liquid assets to its total capitalization. The difference between current assets and liabilities is defined as working capital. This ratio considers the business size and liquidity, with working capital marked and total assets representative of firm size.
Retained earnings/Total assets	X2	The ratio is the sum of a firm's reinvested earnings and/or losses over its life. It calculates a firm's accumulated profitability for its existence. It also assesses the level of leverage, with a high score of retained earnings to total assets ratio indicating that firms have not fully utilized their debt capacity. The age of the firm is implicitly considered in this ratio.
Earnings before interests and taxes/Total assets	X3	The ratio measures the productivity of a firm's assets, independent of any tax and interest. However, Altman et al. (1977) and Altman (1978) proved that this ratio performance is consistent as predictive as cash flow measures.
Market value of equity / Book value of total liabilities	X4	The ratio demonstrates how much a firm's assets can decrease in value (as measured by the market value of equity + debt) before the liabilities outweigh the assets and the company becomes insolvent.
Sales/Total assets	X5	The ratio indicates the ability of a firm's asset to generate sales. This was chosen as it improves the model's overall discriminating capacity.

Altman (2012) re-evaluated his Z-score several times throughout the years. Altman studied 86 companies in distress from 1969 to 1975, 110 from 1976 to 1995, and 120 from 1996 to 1999. He observed that the Z-score was accurate between 82 and 94 percent. He renewed the model and released Altman Z-score Plus in 2012, which may be used to compare public and private, manufacturing and non-manufacturing, and US and non-US businesses (refer to equation 3.8).

$$Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 0.9X_5 \qquad (3.8)$$

The Altman Z-score was selected to measure financial health in this study after weighing the benefits and disadvantages of several other measurements. The first reason is that Altman's Z-score formula is based on five basic financial metrics and seven pieces of financial information that reflect a firm's profitability, working capital, value, and activity capability. This also aligns with previous findings on the primary financial health determinants (Young and Cohen, 2013; Bala et al., 2016; Dewenter and Malatesta, 2001; Jiang et al., 2018; DeAngelo et al., 2018). The data required for calculating ratios are easily available from a firm's financial statements. Moreover, the Z-score ratio can be widely applied to different industries or sectors. Lastly, according to the findings of other experts (Mushafiq et al., 2021), the Z-score's accuracy can reach 72 percent 2 years before a firm fails. Therefore, evaluating the effects of economic policy on a firm's financial health can assist in generating a valid measure of the financial health of real estate enterprises in this research.

All five ratios imply higher values for non-bankrupt firms on a strictly univariate level, with the discriminant coefficients appearing as positive signs. Therefore, the lower a firm's discriminant score is, the higher its distress probability. Table 3.2 presents three discriminating levels that can be used to measure financial stability. If the Altman Z-score is near or below 3, appropriate due diligence should be conducted before the business decision (Chotalia, 2012). The collected data from the financial statements of real estate development firms will be converted to ratios. The value obtained from the Altman Z-score formula will be used as the dependent variable.

Table 3.2 Altman Z-score definition

Financial health	**Z-score**	**Implication**	**Measurement**
Safe Zone	Z-score > 2.99	A firm is considered "safe" based on the financial figures only.	1
Grey Zone	1.8 < Z-score <2.99	There is a significant likelihood that the corporation will go bankrupt in the next 2 years.	2
Distressed Zone	Z < 1.8	There is a high probability of distress within this period.	3

3.3.2.2 Independent variable – economic policies

An economic policy refers to governments' actions in influencing economic performances. Monetary and fiscal policies are the two main instruments (Afonso et al., 2016, Labonte and Markinen, 2008; Bowdler and Radia, 2012; Friedman, 2015). The different types of economic policies have been reviewed in the previous chapter. Monetary and fiscal policies are the main instruments governments use to manipulate the expansion or contraction of the economic environment (Afonso et al., 2016; Labonte and Markinen, 2008; Bowdler and Radia, 2012; Friedman, 2015). Previous literature mainly focuses on the relationship of economic policies with the overall economy. Morita (2017) concluded a positive impact on both consumption and the level of GDP from fiscal stimulus packages in Japan.

Research on economic policies on the financial health of real estate development firms is scarce (Kouki, 2018). A typical example is that government decreases interest rates to stimulate investment activities by shifting cash to equities and tangible assets such as real estate (Iwata, 2014). In this case, the real estate sector has been indirectly affected by a reduction of interest rate policy as part of cash flows to the real estate sector that increases demand for and prices of real estate assets. A direct effect is shown in Chakraborty (2016), who examined the effect of government fiscal policy in terms of changes in taxes on land holdings of households and found a more significant fluctuation in asset prices occurred if the taxes were sufficiently large. He suggested a positive shock in fiscal policy in terms of decreasing taxes that lead to increasing land prices, thus land values. Jung and Lee (2017) investigated the ability of macroprudential policies to limit the excessive credit taking by households and found the policies lead to residential real estate price bubbles.

The economic policies found different effects on the real estate sector. Crowe et al. (2013) studied the real estate sector's responses to policy changes to explain the difficulty of real estate markets due to the financial crisis on the overall economy. They compared the research results from several countries and found that higher transaction taxes did not cause the asset price boom in Japan, China and Singapore. Limited effects have been found on residential real estate prices in the UK, Spain and the Netherlands. Kouki (2018) tested the hypothesis that government policies will directly affect and cause changes in the real estate sector. The results of his study suggest that economic policies, neither monetary nor fiscal policy, have minimal effect on the real estate sector, especially on property development firms. In addition, government policies indirectly affect the real estate market by altering the demand and supply for real estate rather than leading to changes within the sector directly.

Past studies with different conclusions could be seen, that expansionary economic policies could have positive, negative or no effects in affecting firms' financial health.

1) Monetary policy affects the amount of credit (borrowing) that banks issue to the firm and the cost of financing the firm (Hall, 2005). A reduced interest rate would decrease the cost of borrowing, which a

significant amount of literature has studied. Roberts and Schwert (2021) studied the response of loan rates to interest rate changes. They found that a 1 percent point decrease in the interest rate level would cause a 75-basis point (bp) decline in loan rate and vice versa. Xu (2020) examined the government economic policy uncertainty (GPE) and found that GPE affects individual firms' cost of equity, cost of debt, and the weighted average cost of capital (WACC). On the other hand, a tax rate reduction would deduct tax expenses from the firms. Lin et al. (2013) evaluated how firms reacted to a statutory tax reduction in 2008 in China and found that 8.58 percent of firms' tax expenses were saved during the year. Therefore, the short-term effects of changes in the tax rate on revenue have also been uncovered. To conclude, the expansion policy improves firms' return and profitability, which directly enhances the firm's financial health.

2) Expansion economic policy that raises the money supply increases the likelihood of firms' obtaining additional financing. Therefore, firms change their capital structure with more debts in their financing proportion. This will lead to retaining sufficient cash flow and liquidity, and firms will be more viable to face shocks (Oliner and Rudebusch, 1994; Jiménez et al., 2012; Filardo, 2000). These are the direct impacts on firms' financial health. Expansionary economic policies also indirectly benefit firms. As an expansionary policy encourages investment in both property and equity markets, as more people rush into the above markets and increase the prices of assets, it eventually increases firms' returns and values. A considerable amount of literature has supported this. Bernanke and Kuttner (2005) showed that a surprise 25-basis-point cut in the federal funds' target rate is associated with an increase of about 1 percent in broad stock indexes. Bordo and Landon-lane (2013) employed panel data from 18 OCED countries from 1920 to 2011 to estimate the effects of loose monetary policies on asset pricing. A positive relationship between loose policies and asset pricing has been identified.

Contractionary measures involve increasing the interest rate, decreasing the monetary supply, and raising the tax rate. The financial status of firms can be indirectly impacted through monetary shocks and considerable volatility in stock market returns (Cooley and Quadrini, 1999). They also suggested that small firms (measured by the equity amount) are more sensitive in response to monetary shock as they usually have higher debt-to-equity ratios than larger ones. The direct impact, on the other hand, is that cash flow and liquidity will decrease if the policy suppresses borrowing and limits funding availability (when the money supply in the economy is dropped) (Schoenmaker and Kremers, 2014; Van Cauwenberge et al., 2016). These will eventually worsen firms' financial status. Barraza and Civelli (2020) stated that banks would restrict their supply of spot funds and reduce the amount of new credit during economic policy uncertainty. Financial constraints do harm the firms' financial performance. Sagan (1955) emphasizes the need for working capital for a firm as it vitally affects its financial health.

Accordingly, hypothesis H_{1a} can be derived.

H_{1a}: Economic policies can directly and indirectly impact the financial health of the firm.

3.3.2.3 Independent variable – financial flexibility

Financial flexibility is one of the most important goals in firms' financial decisions (Graham and Harvey, 2001; Bancel and Mittoo, 2004). However, financial flexibility is the "critical missing link for an empirically viable theory of capital structure" (DeAngelo and DeAngelo, 2007) and a relatively new concept in the finance literature (Yousefi and Yung, 2022). Some practitioners and scholars have recognized the importance of financial flexibility in capital structure decisions (Clark, 2010; Denis, 2012; Lambrinoudakis and Skiadopoulos, 2019). The empirical evidence of the effect of financial flexibility on firms' financial health is relatively scarce.

According to the literature review, financial flexibility in firms is defined in the form of unused debt capacity (Graham and Harvey, 2001; DeAngelo and DeAngelo, 2007; Gamba and Triantis, 2008; Marchica and Mura, 2010; de Jong et al., 2012). Compared with other factors, financial flexibility affects firms' financial health in multiple ways. On the one hand, it is considered the most important factor that impacts a firm's capital structure as it focuses on the ability of a firm to access and restructure financing to lower its financial costs (Gamba and Triantis, 2008). On the other hand, financial flexibility can be applied to maintaining debt capacity to seize future development opportunities while minimizing debt and avoiding financial distress. It is influenced by both internal and external variables, such as cash and liquidity position, debt capacity, external financing costs, corporate or personal tax, and profitability (Maness and Zietlow, 1998; Denis, 2011; Nikolov et al., 2019; Hess and Immenkötter, 2014; Denis and Mckeon, 2012; Chen and Harfold, 2017; Gamba and Triantis, 2008; Singh and Hodder, 2000). Financially flexible firms would have greater advantages of maintaining financial health, such as capital structures with safe leverage levels (Brounen et al., 2006; Graham and Harvey, 2001; Pinegar and Wilbricht, 1989), sufficient cash flow (Kaplan and Zingale; 2000; Haghighat and Bashiri, 2012), more profitable (Nanda and Panda, 2018) and capable of investing in better projects (De Jong et al., 2012; Arslan-Ayaydin et al., 2014). Based on the analysis, the hypothesis can be stated as follows:

H_{1b}) Financial flexibility affects the financial health of firms directly.

As suggested by the literature, financial flexibility is concerned with the level of cash holding (Arslan-Ayaydin et al., 20144), cash flows (Byoun, 2008), and finance costs (Miller & Orr, 1966; Shin et al., 2018). Chang and Ma (2019) examined listed companies in China and developed an index measuring financial flexibility, including three identified factors: cash holding, potential cash inflow, and financing cost. The weight of these three factors is assigned by applying the analytic hierarchy process (AHP), first introduced by Saaty (2008) to measure intangibles by assigning priority scales through pairwise comparison and relies mainly on experts' judgment. In this context, the judgment is based on the relative

importance of each contributed factor. By assigning the weights and following the exact instructions of Chang and Ma (2019), the financial flexibility index (*FF*) has been derived and expressed as

$$FF_j = 0.44A_j + 0.49P_j + 0.07L_j \quad (3.9)$$

Where FF_j is the financial flexibility for the j^{th}firm, A_j is the basic cash holding, P_j is potential cash inflows, and L_j is financing costs.

Basic cash holdings (A_j)

Basic cash holding generally consists of a firm's cash deposit in a bank and a short-term investment whose purpose is to receive a higher return than a deposit. This variable is calculated as the sum of cash and short-term investment divided by total assets.

Potential cash inflows (P_j)

The potential cash flows were estimated from three sources: external spared debt capacity, external equity financing capacity, and internal equity financing capacity (refer to Figure 3.3). On the contrary, computing the weights for these three factors is based on their coefficients. For simplification, the weights of these three components were assigned equally and added up in this research.

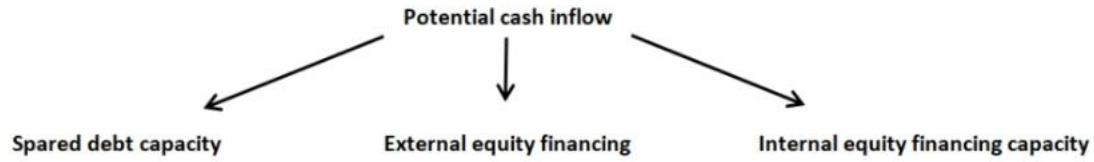

Figure 3.3 Components of potential cash inflow

The first component of potential cash inflow is spared debt capacity. Spared debt capacity usually refers to the amount of debt a business can incur and repay according to the terms of the debt agreement. Its future cash obligation is made on a legal basis (Donaldson, 2000). Real estate developments rely heavily on external debt and typically maintain a high leverage ratio than other industries. The value of this variable is measured by calculating the ratio of (*1-Debt*) to total assets.

$$Spared\ debt\ capacity = \frac{(1-Debt)}{Total\ Assets} \quad (3.10)$$

Internal equity financing capacity is measured by retained earnings, which is the source internally provided by incrementing operating income. A negative earning then shows the inability of a firm to

generate more cash for investment projects. This is then adjusted by setting the value as *0* if its retained earnings are negative. Internal equity financing is calculated as retained earnings to total assets.

External equity financing capacity reflects that a firm can attract investors and generate cash inflow. As stated in the previous chapter, under the pecking order theory, firms prefer financing from internal financing, followed by external debt and equity owing to information asymmetry, making external equity financing the most costly. Whether a Chinese-listed firm is qualified to pay dividends and issue seasoned offerings ascertains its capability to attract more investors. The most substantial criterion is that firms must have a minimum of 6 percent weighted average rates of return on net assets for the last three fiscal years. However, according to data, there are barely any property-listed firms with a return on assets of over 6 percent that lasted for three years consecutively. Therefore, based on this sample, *1* is assigned to a firm whose returns on asset (ROA) are above the mean value, representing firms with higher external equity financing capacity and *0* otherwise.

Financing costs (L_j)

According to Gamba and Triantis (2008), the value of financial flexibility depends on the cost of external financing and the effective cost of holding cash (this is equivalent to the level of corporate and personal tax). In this research, the cost of financing is derived by adding firms' annual financing cost and corporate tax rate.

In this research, financial flexibility is constructed following the basic principles of Chang and Ma (2019). The literature supports the financial flexibility index they developed and is applicable in practice. The second reason for using the method is that it is "tailored to fit the contemporary Chinese stock market." China's stock market is subject to unique financial reporting regulations; thus, this measurement matrix is more reliable and fits the Chinese business context. From this perspective, the measurement from Chang and Ma's approach will be more suitable to practice in this research than other available measurements.

Cash flow versus potential cash flow

The potential cash flow applied in obtaining financial flexibility differs from the traditional cash flow definition. In accounting, cash flow means cash moving in and out in the current period. The potential cash flow consists of potential cash flow that may drive the debt capacity, future investment, and internal financing capability measured by firms' retained earnings.

3.3.2.4 Control variables

Past empirical studies discovered significant relationships that liquidity, solvency, financial flexibility, profitability, and operating efficiency have on the firm's financial health. Financial ratios are commonly used. Internal and external control variables were included in the model development of this study. Table 3.3 lists the types of control variables included in estimating a firm's financial health.

Table 3.3 Control variables in estimating a firm's financial health

Type	Variables	Definition
IF	Liquidity ratios (x_1)	Liquidity ratios measure a firm's ability to pay its debt obligations. It is typically measured using the current ratio and quick ratio.
	Solvency ratios (x_3)	A solvency ratio is a key metric used to measure an enterprise's ability to meet its long-term debt obligations. An unfavorable ratio can indicate the likelihood that a company will default on its debt obligations. It is measured using the long-term debt-to-equity ratio, equity ratio, and debt ratio.
	Operation efficiency (x_4)	Operation efficiency measures the efficiency of the profit earned as a function of operating costs. Four ratios are used to evaluate the firms' operation efficiency, including inventory turnover ratio, accounts receivable turnover, accounts payable turnover, and assets turnover ratio.
	Profitability ratios (x_5)	Profitability ratios measure a firm's profit relative to its expenses. It is measured using gross profit margin, net profit margin, and EBITDA margin.
EF	GDP (y_1)	GDP denotes the gross domestic product. It is the standard measure of the value-added created through producing goods and services in a country during a period.
	Money market rate (y_2)	As the money market depends on highly liquid assets, these investments are comparatively safe and have low risks. The money market rate is characterized by a reasonably low-interest rate compared to other investments.
	Tax (y_3)	A corporate tax is a tax on the profits of a corporation. Taxes are paid on a company's taxable income, which includes revenue minus the cost of goods sold, general and administrative expenses, selling and marketing, research and development, depreciation, and other operating costs.
	Government policy (y_4)	Four-trillion economic stimulus package introduced in 2008 is used in this study.

Based on the analysis of the relationships between economic policies and financial flexibility on a firm's financial health above, equation 3.5 can be converted as follows:

$$FH_{it} = \alpha_{0i} + \alpha_{1i}EP_{(t-1)} + \alpha_{2i}FF_i + \alpha_{3i}EP_{(t-1)} * FF_i + \alpha_{ni}C_{ni} + \varepsilon_{it} \quad (3.11)$$

Where FH_{it} presents the financial health of firms at time t measured by 1, 2, or 3 depending on the development firms are in the safe, grey, or distressed zone, respectively. $EP_{(t-1)}$ indicates economic policy in the previous period measured by a dummy variable (*0, 1*). FF_i measures financial flexibility that will be derived as described in the independent variable section 3.2.2.3. C_{ni} represents the control variables, including firm size, state-owned firms, and ratios from each firm. The measurement of each control variable is explained in the next chapter.

3.3.3 Multiple regression analysis

Regression analysis is a frequently used technique used to test the hypothesis of the existence of causal effects (Imai & Kim, 2016), parameter estimation (Burnham et al., 2001; García-Martín et al., 2019), and study the relationship between dependent and independent variables (Irwin & McClelland, 2001). Several researchers have applied the multiple regression equation in analyzing different relationships (Stangierski et al., 2019; Asghar et al., 2019; Zhang, 2021). Equation 3.11 will apply multiple regression techniques for modelling. Ordinary least squares (OLS) regression estimates and derives regression parameters, which analyzes and obtains the linear regression equation coefficient that expresses the relationship between one or more independent quantitative variables and a dependent variable (simple or multiple linear regression) (Bro et al., 2002; Pohlman and Dennis, 2003; Sheffet, 2017). The principle of least squares regression is to choose the estimates to minimize the sum of squared residuals (Wooldridge, 2015; Dismuke and Lindrooth, 2006;), or in other words, to find a line (or curve) that best fits a set of data points (Abdi, 2007). It is essential to minimize $\sum_{i=1}^{n}(y_i - \alpha - \beta x_i)^2$.

Following are the eight main assumptions for the OLS regression model: 1) Linearity (the regression model is linear in the coefficients and the error term), 2) The error term has a population mean of zero, 3) Homoskedasticity (a condition in which the variance of the residual, or error term should be the same across the independent variables), 4) Observations of the error term are uncorrelated, 5) All independent variables are uncorrelated with the error term, 6) Independence of all independent variables, 7) Normality (the error term is normally distributed), and 8) No multicollinearity (i.e., the independent variables should not be highly correlated) (Allen, 1997; Osborne, 2002; Dismuke and Lindrooth, 2006; Williams et al., 2013).

The OLS model consists of the following three stages:

1) Analyzing the correlation and directionality of the data. When two (or more) quantitative variables are associated or related, this is called correlation (Senthilnathan, 2019). A straight-line relationship between the variables is the foundation for the analysis and quantifies the "strength" or "extent" of

an association between the variables and their directions. A correlation analysis returns a correlation coefficient with a value between -1 to +1 (Gogtay and Thatte, 2017).

2) Estimating the model (i.e., fitting the line). Mathematically, least square estimation minimizes the unexplained residual (Wooldridge, 2015; Dismuke and Lindrooth, 2006).

$$\sum e_i^2 = \sum (y_i - \hat{y}_i)^2 = \sum (y_i - b_0 - b_i x_i)^2 \Rightarrow \min \Rightarrow y_i = b_0 - b_i x_i \qquad (3.12)$$

3) Evaluating the validity and usefulness of the model. *p*-value, *F* test, *R*-square, and *t*-test are commonly used to evaluate the regression performance.

p-value shows the statistical significance of the relationship between two groups for specific variables (Thiese et al., 2016). It defines the largest significance level at which one could carry out the test and still fail to reject the null hypothesis (Wooldridge, 2015), or as the probability under the assumption of no effect or no difference (null hypothesis) (Dahiru, 2008). It is used to test the null hypothesis and whether there exists a relationship between the dependent and independent variables.

F-value tests how the developed model fits with the original data sets (Frost, 2017). *F-value* tests are typically used to determine which statistical model better reflects the population from which the data were sampled when comparing models previously fitted to the data sets. There is sufficient evidence to conclude that the regression model fits the data more accurately than the model with no predictor variables, provided that the *p*-value is lower than the significance level (Sureiman and Mangera, 2020).

R-squared (R^2) or adjusted R^2 shows the fitness of the regression model. In a linear regression model, the *R*-squared value indicates the variation percentage of the dependent variable that the independent variables can explain. Adjusted R-squared adjusts the statistic based on the number of independent variables in the model. This value can vary between 0 to 1, with an outcome of 1 denoting the best possible model fit and a rate of 0 indicating a lack of any linear fit. The adjusted *R*-squared considers the number of predictors, as *R*-squared always rises when more variables are added to the model (Harel, 2009; Saeed, 2014; Mollalo et al., 2020).

t-statistics of one or more parameters measures how far an estimated value of a parameter deviates from its hypothesized value compared to its standard error. The *t*-statistic determines whether to accept or reject the null hypothesis.

Residual analysis assesses individual observations to determine if the dependent variable's actual value is higher or lower than the predicted value (Wooldridge, 2015). It examines the impact of deviations

from any given model. Ideally, the residuals should be randomly scattered around zero and have constant variance.

3.3.4 Application of the regression model

The application of the linear regression model can be found in the financial and economic fields. Nataraja et al. (2018) applied multiple regression techniques to detect how bank sizes, credit risks, assets management, operational efficiency, and debt ratio affect private bank performance measured by return on assets, Tobin Q, and return on equity in India. The results prove a positive relationship between ROA, bank size, and assets management and a negative relation between ROA, credit risks, operational efficiency, and management. Tobin's Q has a positive correlation with operational efficiency and asset management and a negative correlation with the other three variables. The profitability ratio (ROE) is highly impacted by credit risk and bank size, indicating that a higher credit risk and bank size negatively impact ROE. In comparison, operational efficiency and asset management are positively related to ROE.

By applying the multiple regression model, Hassan et al. (2021) evaluated the extent of the impact of change in lifestyle (activities, interests, and opinions), financial literacy (management, knowledge, and payment activities), and social demographics (age, gender, and income) on consumer behaviors (organizing behavior, expenditure behavior, saving behavior, and wasteful behavior). Using questionnaires, this research collected 230 student data who registered for entrepreneurship courses. The results show that lifestyle, financial literacy, and social demographic variables have positive relations with student consumptive behavior. These suggest that reducing the hedonic lifestyle could eventually discourage the consumptive behaviors of students.

3.4 Development of Difference-in-Differences (DID) Models

The previous section discussed the estimation of financial health determinants, the steps of the model development approach, and how dependent and independent variables are measured. This section focuses on the research method for understanding the impact of economic policies on the financial health of firms and test the second hypothesis:

> ***H_2) The effects on firms' financial health can be differentiated before and after introducing economic policies.***

The Difference-in-Difference (DID) approach is one of the most widely applied methods for estimating the causal effects of policy on firms. For example, it is common in empirical economics to estimate the effects of certain policy interventions or shock, economic environment change, and treatment effects that may only have effects on a small number of individuals (Angrist and Krueger, 1999; Athey and Imbens, 2006; Votsis and Perrels, 2016; Goodman-Bacon, 2018). The average outcomes for the treated and control groups would have followed parallel trends over time (Donald & Lang, 2007).

3.4.1 Modeling of the DID approach

Generally, a regression model implements DID as an interaction term between time and treatment group dummy variables. The outcome *Y* is modeled by the following equation (Albouy, 2004):

$$y_i = \alpha + \beta * T_i + \gamma t_i + \delta(T_i * t_i) + \varepsilon_i \qquad (3.13)$$

The Greek letters α, β, γ, a, and δ denote the unknown parameters, while ε represents the random, unobserved error term that contains all determinants of y_i that the model has omitted. Further,

T_i=*Treatment/Policy*

t_i= Time

$\alpha = constant\ term$

$\beta = treatment\ group\ specific\ effects$

$\gamma = time\ trend\ common\ to\ both\ control\ and\ treatment\ group$

$\delta = true\ effect\ of\ the\ treatments$

3.4.2 Standard set-up

The simplest DID set-up describes a two-period setting that serves as a useful baseline for understanding recent innovations in the DID literature. A standard DID calculate the effect of a treatment on a "treatment group" versus a "control group" by comparing the change over time in the outcome, shown in the table 3.4 below.

Table 3.4 Difference-in-differences approach

	Pre-treatment/policy	Post-treatment/policy	Difference
Treatment group	$\alpha_0+\alpha_1$	$\alpha_0+\alpha_1+\alpha_2+\alpha_3$	$\alpha_2+\alpha_3$
Control group	α_0	$\alpha_0+\alpha_2$	α_2
Difference	α_1	$\alpha_1+\alpha_3$	α_3

Figure 3.4 illustrates the changes between the control and treatment groups over time. The DID approach aims to identify the value of the treatment effect shown in the graph, which compares the treatment group after treatment against what the treatment group would have been without treatment. Constant differences exist between the treatment and control groups over time if there is no treatment/policy intervention.

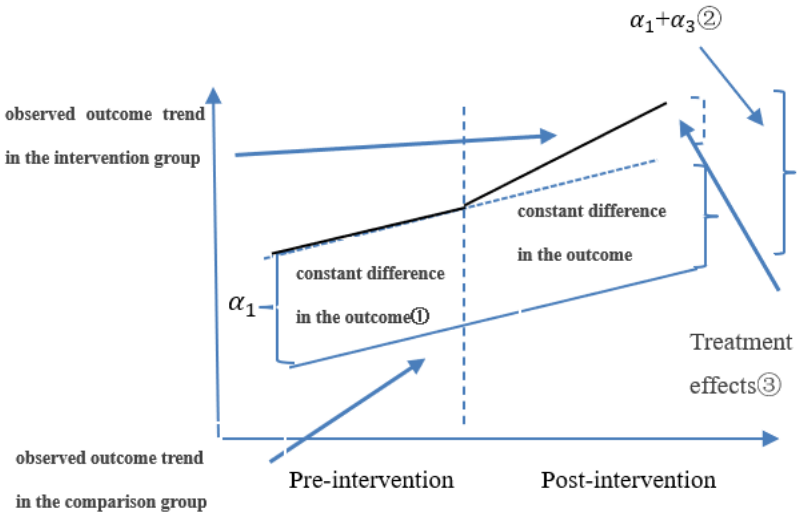

Figure 3.4 Difference-in-difference estimation, graph explanation (Designed by the author)

① The parallel trend assumption: the constant difference in the outcome suggests that if the event never happened, the differences between the treatment and control groups would be unchanged.
② $\alpha_1+\alpha_3$ denotes the differences in the outcome between the treatment and control groups after the event.

3.4.3 Assumption of the DID model

The DID model is based on the assumption of a parallel trend, which means that in the absence of the treatment, the average outcome of the treatment and control groups would have followed the parallel path over time (Abadie, 2005). The "treatment group" and "control group" should differ (change) by a fixed amount t over time, with or without the treatment (Kahn-Lang and Lang, 2020). Based on the parallel assumptions, one can identify, estimate, and infer the causal effects (Marcus and Sant'Anna, 2021). This assumption allows the averages of the time-invariant unobserved variables to differ between treated and control groups because their effects do not change over time (O'Neill et al., 2016). The expected outcome by group and time is plotted, and the time series graph should look like a set of parallel lines. The parallel line can be nonlinear when a fixed time trend allows a flexible time trend that moves up and down from one period to another (Wing et al., 2018). Failing to fulfill the parallel trend assumption will eventually lead to estimation bias on casual effect. The results can be considered robust if they do not violate the parallel trend assumption.

3.4.4 Verification of the DID approach

Two methods could be applied to verify the developed DID model: parallel trend testing and placebo test.

1) Parallel trend analysis

As stated in the previous section, the parallel trend assumption implies that the difference between the treatment and control groups must be constant without the treatment and follow the same trend over time. The purpose of running the test is to determine if the pre-and post- policy intervention groups

behave the same or differently, ensuring the outcome of a post-policy intervention is valid. To show whether the parallel trend assumption is not violated, a visual inspection is conducted.

Visual inspection is the most direct and typical way of verifying parallel trends for the control and treatment groups. This verification is more straightforward and can directly interpret the trends between the control and treatment groups. However, it does not provide solid statistical evidence for reasonably verifying the result (Fisch, 2001; Gibson and Zimmerman, 2021; Bossler and Gerner, 2020; Autio and Rannikko, 2016). The parallel trend assumption refers to the control group experiencing the same magnitude and moving towards the same direction of time-varying impact as the treated unit if there is no treatment or intervention. Therefore, if the underlying trends between treatment and control units are not the same in the pre-treatment period, then the impact of unobserved confounders would be erroneously attributed to the treatment effect, which suggests that there is a bias of unknown magnitude and often unknown direction (Gibson and Zimmerman, 2021).

2）Placebo test

A second way to test the validity of a DID model is to perform the "Placebo test." In the context of economic and social science, the "placebo test" is conducted to assist in verifying if the result is valid, where the treatment (like the placebo in a drug trial) should not or cannot have an effect, and finding apparent effects could indicate an important flaw of the study (Eggers et al., 2021). The idea of a placebo test could be to generate a "fake" treatment group, as proposed by Egger et al. (2021), or "fake" treatment timing different from the actual treatment time, and apply the exact counterfactual estimates of average treatment effects for the treated (ATT) (Liu et al., 2022). Everything else is held the same between the two groups, and any difference in their outcome can be attributed to the treatment group. The placebo test is a more formal approach to support the parallel trends' assumption, which applies in the DID method to the pre-intervention data itself and diagnoses problems with research designs in observational studies. When running such placebo regressions, one option is to exclude all post-treatment observations and analyze the pre-intervention periods only (Fredriksson and Oliveira, 2019). Slusky (2017) used this technique to show that significant changes in health insurance coverage among people aged 19–25 relative to those 16–18 or 27–29 (two possible comparison groups) occurred several times before the intervention was implemented.

3.4.5 Variation form of the DID model

Traditional DID is a non-experimental statistical technique used to estimate treatment effects by comparing the difference between two groups: first, the changes in outcomes between pre-treatment to post-treatment; second, the changes in outcomes between treatment and control groups. Methodological extensions of DID methods often focus on this standard two periods, two groups set-up. For example, see Heckman et al. (1997), Heckman et al. (1998), Abadie (2005), Athey and Imbens (2006), Qin and Zhang (2008), Bonhomme and Sauder (2011), de Chaisemartin and D'Haultfœuille (2017), Botosaru

and Gutierrez (2018), Callaway et al. (2018), and Sant'Anna and Zhao (2020).

The simplest set-up of DID involves observing the outcome of two groups for two time periods.

1. The treatment group is exposed to treatment in the second period but not in the first.
2. The control group is not exposed to the treatment (policy) in both period.

Under this circumstance, the treatment effects can be estimated by subtracting the average change in the control group from the average change in the treatment group. In this practice, the unobserved and fixed biases in the second-period comparison can be avoided.

In practice, DID approaches can be flexible and allow variations based on circumstances. The detail of different variations of DID is below.

DID with multivariate periods: Individual treatment variables can be treated at different points in time. For instance, policies/treatments may become effective at multiple periods and vary in treatment timing for different individual/geographic locations. This is when multi-period DID is more suitable. The standard two-way fixed effect model applied in the standard DID was replaced by obtaining and aggregating average treatment effects in multiple periods (Callaway and Sant 'Anna, 2021). Since a two-way fixed effects estimator with a weighted average of all the 2*2 DID (Two time and two quantity differences) estimators that compared different timing groups, which suggests that the two-way effect model should be cautious about summarizing treatment effects.

DID with cross-sectional data: The standard DID model applies with panel data. However, when observations varied at different times, these types of DID applications used cross-sectional data. Kiel and McClain (1993) applied cross-sectional data to investigate the impact of undesirable land use on housing prices. The effect of price response to undesirable land use in terms of incinerators has been detected.

DDD approach: The difference in difference in differences (DDD) is regarded as the extension of the DID model and can be computed as the difference between two DID models (Olden & Moen, 2022). Zhang and Lu (2022) applied the DDD approach in assessing how green finance intervenes in the investment behavior of heavy pollution firms. The triple differences are that are the daylight differences between pollution with small particles 2.5 micrometers or less in diameter. The second difference is between firms in the green finance pilot zone (GFPZ) and not. The third difference is the time before and after the GFPZ pilot projects.

DID with continuous treatment variable: This is referred to as DID with a continuous treatment variable/generalized DID. In some circumstances, all individuals are exposed to the policy/treatment, or receive the same treatment in different doses. Setting up a control group contrary to the treatment

group is challenging. Therefore, the treatment/policy effect is considered with varying intensity, not only the binary effect (treated/untreated) (Callaway et al., 2021). According to Callaway et al. (2021), the benefit of using continuous treatment variables is that the "dose-response" relationship can be observed more explicitly, allowing for a more straightforward causal interpretation and evaluating treatment effects when there is a lack of untreated variables. This type of DID is more commonly applied in economic fields. For instance, Adorno et al. (2007) evaluated the subsidies to private firms with the continuous treatment variable to "explore the difference in treatment level on policy outcome." The result is consistent with previous research using binary treatments that the subsidies positively affect employment, fixed assets, and turnover of private firms. In studying the effect of introducing potatoes on the increase in population and urbanization, Nunn and Qian (2011) applied the continuous treatment measure (the total amount of land that is suitable for potato cultivation) instead of the binary treatment group/control group (countries that grow/not grow potatoes) to capture more variation of the data. Milone et al. (2019) applied generalized DID to study the effect of COVID-19 on changing Airbnb pricing. As COVID-19 spread globally, there was no way to identify countries unaffected by the pandemic and could be selected as the control group. Instead, they used the continuous treatment variable COVID-19 Stringency Index, which is a composition daily measure based on the following: policy response, school closure, workplace closure, cancellation of public events, restriction on gathering size, stay-at-home policies, restriction on within-country movements, restriction on international travel, and intensity of public information campaigns. This index value is between 0 and 100.

3.4.6 Selection of the DID approach in this research

As this research attempts to investigate how the policy impacts firms' financial health with different financial flexibility levels, the independent variable is not a binary but a continuous variable. Based on this, DID with a continuous treatment variable is selected as the empirical strategy for this research.

DID with continuous treatment variables follows approaches similar to standard DIDs. The only difference between this type of estimation and a standard DID is that this research uses a continuous treatment variable rather than a binary treatment variable, which is the different financial flexibility level. A two-way fixed-effects (TWFE) DID design with continuous group-level (i.e., corporate financial flexibility-level) treatment is applied (Callaway et al., 2021; Kandrac, 2020; Wooldridge, 2007). The process of model development is shown below in Figure 3.5.

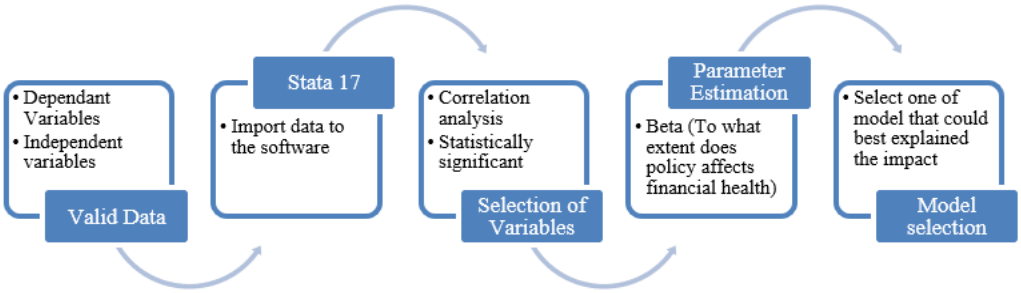

Figure 3.5 Model development process (Designed by the author)

3.4.7 Selection of economic policy on the DID model

Governments introduced many policies to either loosen or tighten the business environment. Sometimes, a policy package that included monetary and fiscal policy measurements was introduced. In 2008, to prevent the further spread of the financial crisis and maintain national economic growth, a series of economic policies were released to stimulate economic activities in China. For example, these policies included banks requiring a smaller loan down payment and expanding credit to support property development by reducing the loan base rate (State Council of China, 2008). The increased money supply in the marketplaces had prospered the real estate development industry. The interest rate reduction reduced firms' finance costs and financial risk. The smaller loan down payment freed up firms' cash flows and made some developments accessible when otherwise impossible.

Care must be taken in policy selection to accurately analyze the effects of a policy on the financial health of firms. For a period of time, several policies could be introduced. It may take time for a policy to be effective, usually with lag. The criteria for selecting a policy on the DID model are a) a policy or a series of policies that introduce and last for a period; b) the effects of policies with the same direction, such as expansion or contraction policies, if several policies are introduced; and c) the policies have been implemented for a period so that the effects can be analyzed.

Steps will be taken to test whether the selected policies affect firms' financial health. It includes a) analyzing the policy aim, the background of the policy introduced, and the expected effects; b) observing the effects through visual graphics; c) conducting a correlation coefficient test between the policy and the financial health of firms; and d) running a parallel trend test to check whether the policy

is statistically significant against the statistical criteria, such as *R*-square and *p*-value. The details of which policy is selected for this research are described in the next chapter.

3.4.8 Key variables in the DID model

The main variables in the DID model are economic policy, financial flexibility, and other control variables such as firms' profitability and operating efficiency indicators.

The selected ratio that measures the firms' profitability includes the return on assets, return on equity, gross profit margin, EBITDA (earnings before interests, taxes, depreciation, and amortization) margin, and net profit margin. The days' sales outstanding (DSO) were chosen to indicate the firm's operating efficiency. These ratios are calculated using the formula provided in Table 3.5.

Table 3.5 Ratio of profitability

Ratios	Measures
Return on assets	Net income/Total assets
Return on equity	Net income / Shareholders' equity
Gross profit margin	(Revenue - cost of goods sold) / Revenue
EBITDA margin	EBITDA / total revenue
Net profit margin	(Revenue - cost of goods sold - Operating expenses - Other expenses - Interest - Taxes) / Revenue * 100%
Return on Invested Capital (ROIC)	NOPAT*/Invested capital
Days sales outstanding (DSO)	(Account receivable/Total credit sale)* Number of days

*NOPAT = Net operating profit after tax

Liquidity indicators

Liquidity indicators measure if the firms' cash and liquid assets sufficiently cover the upcoming financial liabilities. The ratios calculated under this category are the current ratio, quick ratios, cash flow margin, CFOTA (cash flow from operating to total assets; refer to Table 3.6).

Table 3.6 Ratio of liquidity

Ratios	Measures
Current Ratio	Current Assets / Current Liabilities
Quick Ratio	(Current Assets - Cash) / Current liabilities
Operating cash flow ratio	Cash flow from operating/Current liability
CFOTA	Cash flow from operation / Total Assets

Solvency indicators

Solvency measures a firm's financial ability to meet long-term liabilities. Several ratios were calculated, including the total debt-to-equity ratio, debt ratio, equity multiplier, degree of financial leverage, and interest coverage ratio (Refer to Table 3.7).

Table 3.7 Ratio of solvency

Ratios	**Measures**
Total debt to equity	Total debt / Equity
Debt ratio	Total liability / Total assets
Equity multiplier	Total assets / Equity
Degree of financial leverage	EBIT / (EBIT - 1)
Interest coverage ratio	EBIT/Interest expenses

3.5 Studying Financial Health Based on Firms' Status

The previous section developed a baseline DID model for analyzing the effects of economic policies on firms' financial health. Introducing policies may affect some real estate development firms, but others may not. This section will apply the DID model to test the following hypothesis:

H3) Property development firms with different financial statuses (e.g., size, capital structure, profitability, solvency, and ownership structure) respond to the economic policy differently.

Several DID models were developed based on firms' status, such as firm size, capital structure, profitability, and ownership structure, as suggested by the literature and to identify how different firms react to policy shock. Chen and Wong (2004) studied insurance companies' financial health, focusing on insurers operating in the US and developed economies. Using different classification methods, they studied the solvency of general (property-liability) and life insurance companies in Asia. They found the factors that significantly affect general insurers' financial health in Asian economics are firm size,

investment performance, liquidity ratio, surplus growth, combined ratio, and operating margin. The factors that significantly affect life insurers' financial health are firm size, change in asset mix, investment performance, and change in product mix. However, the last three factors are more applicable to Japan. The financial health of insurance companies in Singapore seems to be significantly weakened by the Asian Financial Crisis. According to the literature, this research will test the effects of the financial health of firms controlled by the size of firms, capital structure, and firms' ownership.

Firm size

Firm size can be determined based on the business turnover or total assets in the balance sheet. In finance, a firm's size is usually an important and fundamental characteristic affecting empirical results (Ibhagui and Olokoyo, 2018). For instance, a firm's size may affect its leverage level (Rajan and Zingales, 1995) and alter the abnormal announcement returns when mergers and acquisitions take place (Moeller et al., 2004). Generally, a larger firm has a higher reputation and credit rating. As larger firms typically have more assets and thus a stronger borrowing capacity, when there is an external shock, a large firm is more resilient due to its financial flexibility. It can be assumed that,

H3a: The larger the firm's size, the more financially flexible the firm is.

Capital structure

The literature suggests that the higher the firm's leverage, the more likely it is that the firm will default. Hansen (1999) examined the link between firms' performance and leverage by introducing a new threshold variable, firm size. He found that the ultimate effect of leverage on firm performance is contingent on the firm's size. A firm's size is negatively related to financial leverage (Ezeoha, 2008). Mahmood et al. (2019) testified to the effects of a firm's size and leverage on working capital finance. The relationship is U-shaped for large or high-leverage firms, which means firm's size moderates the working capital finance and profitability relationship and decreases the probability of default as liabilities (borrowing) decrease.

The weighted average capital structure (WACC) suggests that the higher the leverage, the lower the cost of the capital due to tax benefits. However, higher debts increase the cost of capital and produce higher risk for firms' financial status. Saeedi and Mahmoodi (2011) measured firms' financial performances by analyzing the relationships between debts with equity returns. Their results have proven that firms' financial health is negatively related to capital structure and equity returns. Dawar

(2014) found a negative influence on leverage and financial performance. Corporate performance is negatively related to capital decisions (Dao and Ta, 2020). It is reasonable to state the following:

H3b: The higher the debt-to-equity ratio, the weaker the financial health of the firm.

Ownership structure (stated own firms versus private firms)

As discussed in the previous chapter, different types of firms (i.e., state-owned and private firms) exist in China. Evidence shows that partially privatized firms positively impact profitability, productivity, and investment (Gupta, 2005). Kang and Kim (2012) evaluated how the ownership structure affects enterprise performance in China. The result suggested that marketized state-owned enterprises outperform government-controlled firms as even partially privatized state-owned firms improved the firms' governance. Han and Suk (1998) found that the level of insider ownership is positively related to stock returns. This means as managers' equity ownership increases, their interests are more in tune with those of outside shareholders. Lauterbach and Vaninsky (1999) suggested that the modern form of business organization, namely the open corporation with dispersed ownership and non-owner managers, improved the firm's financial health. In the case of external shock, state-owned firms tend to have more financial support than private firms. Accordingly, the hypothesis is

H3c: State-owned property firms outperform private property firms.

By testing the policy effects on different types of firms, development firms can develop risk mitigation strategies based on their firms' characteristics.

3.6 Chapter Summary

This chapter has explained the research methodology and methods for answering the research questions. A deductive approach has been selected for analyzing firms' financial health. The chapter has derived a regression model of financial health according to the main determinants suggested by the literature. The dependent and independent variables used in the model, as well as control variables, have been described. The hypotheses for the analysis have also been justified and developed systematically for the research. The chapter has also explained the DID techniques used to study the impact of policy on the financial health of firms. The next chapter will present the data collection and the research findings based on the research design outlined in this chapter.

Chapter 4 Data Collection and Research Findings

4.0 Introduction

Previous chapters have established the research framework, identified the main factors influencing development firms' financial health, and set up the research methodology and methods to address the research questions. This chapter introduces the data-collecting process, mentions the data source, and details of the collected data. Then the data processing section shows how the data is selected, preprocessed, and transformed. Model development is provided in the following sections. The first model is constructed to identify the main determinants of financial health for property development firms. Multi-regression analysis (MRA) technique is used. The chosen variables were identified based on the literature review, where a certain number of external and internal factors were proven significant from the previous empirical studies. The verification criteria rely on the *p*- statistic and *R* square values. The difference-to-differences (DID) model is the second model applied in studying the policy effects on the financial health of property development enterprises; the parallel trend assumption is used in verifying the DID model. Finally, the chapter summary is provided.

4.1 Data Collection

Recall that this research aims to investigate the effects of policy on the financial health of property development firms. To accomplish this research aim, the objectives are to 1) understand the determinants of property development firms' financial health, 2) investigate how government policy affects the health of property development firms, and 3) understand the policy effects on different types of property development firms. To achieve the research aim and objectives, the data needed to be collected are 1) the external economic variables, 2) the internal financial performance data, and 3) the detail of economic policy. All these data are the secondary data announced annually from the government statistic department in China, the annual reports from listed firms, and the policies introduced in a specific year, with all the information that could be obtained from the specialized database. The collected secondary data will be preprocessed and transformed before being used in model development.

4.1.1 Data source and collection

The data used in this research were the corporate and country-level economic data taken from two sources, RESSET Data Tech Co., Ltd (RESSET) and the Census and Economic Information Centre (CEIC). Both RESSET and CEIC databases are widely used by academics, practicians, and research centers to collect different levels of data, including financial and economic variables (Ju, 2019; Wang 2021; Wan, 2018).

The corporate-level financial data of the listed property companies were collected from RESSET. Based in China, RESSET established and developed a financial and financial-related database that meets the need for China's economic analysis. It provides detailed information and data ranging from listed firms' economic and financial data to daily stock trading information. The RESSET data has been used by education, academic research, and industry consultants. RESSET has become one of the major database providers with over 1,400 academic, corporate, and individual users. These include Tsinghua University, Renmin University of China, UIBE, and Central University of Finance and Economics. Ju (2019) studied the herding phenomena and spill-over effects of all the stocks listed in the Shanghai and Shenzhen security exchanges using data on financial variables and stock prices from RESSET. Wang et al. (2021) developed a principal-agent model of moral hazard using longitudinal data on firms and managerial compensation data collected from RESSET. Wan (2018) collected the Fama-French-Carhart four factors from RESSET to analyze IVOL and MAX effects in the Chinese stock market.

The economic variables and industry-level data were obtained from the CEIC Database, which covers economic data from developed and developing countries. CEIC provides various data insights into 213 economies and has been relied on by economists, analysts, investors, corporations, and universities. Li and Wu (2020) collected macroeconomic data of China from CEIC to analyze economic policy impacts on real estate development activities. Quarterly macroeconomic data were collected by Ghuzini et al. (2020) to study the relationship between structural shocks and macroeconomic weakening.

All 69 property firms (please refer to appendix I) listed on the Shanghai and Shenzhen stock exchanges were selected to study how economic policy affects the financial health of property development firms in mainland China. Compared with unlisted firms, more accurate and reliable data can be obtained from all the firms that went public, as all the financial information must be disclosed and audited in every financial year. The sample dataset includes data from the firm's financial statement reflecting the firm's business performance and financial status. The data include capital structure, profit and loss conditions, cash flow information, solvency, liquidity, and annual stock return information. The data covered the period from 2001 to 2016. The corporate data were taken in renminbi (RMB). Corporate characteristics such as firm size and ownership structure were also considered to reflect the financial health position of different types of property firms. Table 4.1 shows the data measurement of the two databases and the collected data.

Table 4.1 Data source and description

Database	Type of data collected	Measurement	Number of raw data collected
RESSET	Financial variables from the annual report (profit and loss, source of financing, cash flow, etc.)	Actual value, ratios	69 property firms' financial data were derived, which is the entire number of listed property development firms. This dataset contains over 224,752 data points in total from 2001–2016.
CEIC	Economic variables (GDP, property climate, interest rate, M2)	Actual value	Annual economic variables over 20 years

Corporate types by size

According to the National Bureau of Statistics of China (2011), later revised in 2017, when a development firm's annual total revenue is over 20 billion, the firm is considered a large firm; otherwise, it is classified as a small to medium-sized firm. Based on this, 45 of the 69 property development firms, or 65% in the studied sample, are considered large firms. The remaining 25 development firms are small to medium-sized, which make up 35% of the total sample. atio

Corporate types by ownership structure

State-owned, private, or Chinese-foreign equity joint ventures are the three types of corporate structures of property development firms in China. State-owned enterprises (SOEs) maintain a significant role in China's economy. 40 out of the 69 firms (58%) are SOEs, while 42% are non-state-owned firms, of which 25 are private firms and 2 are Chinese-foreign joint ventures.

Based on the literature review, the main variables are collected, including financial data from financial reports of the development firms and the macroeconomic variables that indicate economic environments. The 69 property development firms' financial data from 2001 to 2016 were collected from RESSET, mainly derived from the financial reports. From the profit and loss statement, firms' annual revenue, cost, and profit were obtained. Data from firms' balance sheets, such as firms' assets, liability, and equity structure at the end of each financial year, have also been analyzed. The cash flow status driven by the investment, financing, and operating activities was sourced from the cash flow statement.

External variables include gross domestic product (GDP), property climate index, loan benchmark interest rate, and money supply (M_2) based on the previous literature. As the literature indicated, GDP is the guide for strategic decision-making, and loan benchmark interest rate is highly associated with the cost of financing and eventually impacts firms' profitability. Money supply from the central banks determines the availability of extra loans for firms to fund their projects, influencing firms' growth

prospects. The property climate index (PCI) reflects whether the property sector is in its upturn or downturn trend annually. It was developed following the business cycle and based on the fundamental indicators of property investment, capital, location, and sales-related indicators selected as the components. The PCI base year 2012 is used, where PCI equals 100. Annual economic variables, including GDP, property climate, and money supply for 15 years, from 2001 to 2016, were collected for the analysis.

Table 4.2 Summary statistics of variables

Variable	Obs	Mean	Std. dev.	Min	Max
Levels of financial health	1,073	1.26	0.57	1.00	3.00
VOFF	1,073	0.59	0.72	-13.15	1.30
Total assets (log)	1,073	9.62	0.66	7.25	11.87
Total sales(log)	1,073	9.00	0.74	0.00	11.39
Return on assets	1,073	0.04	0.18	-2.99	4.10
Return on equity	1,073	0.01	1.02	-21.22	14.98
Gross profit margin	1,073	0.32	0.17	-1.08	1.15
EBITDA margin	1,073	0.16	4.07	-109.24	44.34
Net profit margin	1,073	-0.01	3.99	-109.59	42.58
Return on invested capital	1,073	5.01	15.92	-172.93	230.15
Total debt to equity	1,073	0.59	51.59	-1671.43	79.77
Total debt to total assets	1,073	0.68	1.31	0.02	27.92
Equity multiplier	1,073	1.59	51.59	-1670.43	80.77
Degree of financial leverage	1,073	1.07	1.04	-6.13	31.24
Interest rate coverage	1,073	-0.19	325.13	-7184.56	3984.72
CFOTA	1,073	0.00	0.14	-2.61	0.49
Cash flow to net assets	1,073	0.81	17.03	-16.01	500.14
Operating cash flow to capital expenditure	1,073	34.04	937.42	-8540.59	15001.94
Tobin Q	1,073	1.00	0.03	0.48	1.17
Days of sales outstanding	1,073	92.52	1400.03	0.00	45569.62
Operating cash flow to current liability	1,073	0.02	0.57	-10.11	6.53
Operating cash flow to total assets	1,073	0.00	0.14	-2.61	0.49
Current ratio	1,073	1.94	1.82	0.00	31.86
Quick ratio	1,073	0.58	1.20	0.00	25.88
GDP(%)	1,073	9.50	1.99	6.85	14.23
Property climate index	1,073	100.76	4.45	93.13	107.14
CPI(log)	1,073	2.01	0.01	2.00	0.02
Money supply(log)	1,073	4.70	0.32	4.16	5.17

VOFF: Value of Financial Flexibility

EBITDA: Earnings before Interest, Tax, Depreciation and Amortization

CFOTA: Cash flow of Operation to Total Assets

GDP: Gross Domestic Production

CPI: Consumer price index

A total of 1,073 data points (i.e., data from 69 property development firms from 2001 to 2016) were used. These variables were adopted by previous researchers from the financial-economic discipline and

introduced earlier before in the literature review chapter. Table 4.2 shows the mean, standard deviation, minimum and max values of the collected data (Some of the companies ceased operation; there are no income/return data recorded in some years. Therefore, only 1066 data instead). The symbol *VOFF* represents financial flexibility, and how the variable is derived is described in section 4.2.3. The variables of interest rate coverage, operating cash flow to capital expenditure, and days of sales outstanding show a higher standard deviation, implying the financial performance of the development firms is not the same.

4.1.2 Data preparation

Data accuracy and quality can ensure meaningful results from the developed models. Collecting relevant and accurate data based on the literature review is crucial. Data preparation is required after the collected data. It involves deleting unnecessary data, consolidating different data fields, transforming data to a meaningful format, and manipulating missing and incorrect data. Data preparation is needed when data are collected from multiple sources to have them arranged to practically benefit the collected data. The collected data need to be stored, sorted, filtered, analyzed, and presented and even required data transforming for further analysis.

Data preprocessing is a process of converting raw data to a useful analytics form. The collected data is preprocessed to clean data and organize it by checking for errors, eliminating useless data, or generating quality data. The collected dataset for this study is the panel data, which can be viewed as the three-dimensional structure variables by corporate types. The vertical dimension is time, and the horizontal dimension is the multiple observations or variables of firms' financial data and macroeconomic data.

Structured or tabular data is required for model development. However, there was some missing data from some firms, such as Beijing Huaye Capital Holdings, as it discontinued being listed on the stock exchange market. The missing data has made the panel data unbalanced (in a balanced panel, the number of time periods T is the same for all individuals; otherwise, unbalanced data). To solve this problem, fill in the missing data as zero to balance the dataset.

4.1.3 Data transformation

Literature has revealed that ratio analysis is most applied in evaluating firms' financial performance. Four types of ratios, namely liquidity (Gill and Mathur, 2011; Bala et al., 2016), solvency (Sharma and Cadoni, 2001; Bailey, 2021), profitability (Dewerter and Malatesta, 2001), and operational efficiency (Bonbakri et al., 1998), are commonly used to assess firms' financial performance. Several financial ratios were chosen and converted from the raw data to observe internal factors influencing firms' financial health. The selected financial ratio includes firms' profitability ratios, such as return on assets (ROA), return on equity (ROE), gross profit margin, earnings before interest, tax, depreciation, and

amortization (EBITDA) margin, net profit margin, and return on invested capital (ROIC), that are used as the financial metrics to assess firms' ability to generate earnings relative to its revenue. The solvency ratios include the total debt-to-equity ratio, debt ratio, equity multiplier, and degree of financial leverage that reflect a firm's ability to meet its long-term debt obligations. The valuation ratio of Tobin's Q, which explained the relationship between the market value and its intrinsic value (it reflects whether the individual firm's stock is undervalued or overvalued), was calculated. The total assets and revenues of the firms were acquired directly from the database to classify the firms' size. Liquidity ratios, including current and quick ratios, were calculated to demonstrate firms' ability to repay their short-term obligations. Cash flow ratios include cash flow margin, cash flow to total assets ratio, and cash flow to operating expenditure ratio, reflecting whether the cash generated from the operation is sufficient to pay off its obligations. Some data were converted into logarithm scales to mitigate heteroskedasticity; for instance, total assets, total sales, external economic variables, and money supply (M_2). Data conversion has been applied to prepare the data into the most suitable form to gain valuable insight and increase model accuracy. Total assets, total sales, money supply, and CPI were transformed into log format, and others were in ratio form.

4.2 Model for Evaluating the Determinants of Firms' Financial Health and the Policy Impacts

Multiple regression analysis is applied to develop a statistical model identifying the main determinants of the financial health of development firms. The reasons for understanding the main determinants of the financial health of development firms are that a) the identified determinants for general firms may not be applied to the property development firms, and b) to what extent the policy change affects firms' financial health is unclear. The dependent variable and independent variables for the model development are explained below.

4.2.1 Dependent variable

As discussed in the previous chapter, Altman's Z-score was chosen to measure and reflect the level of financial health of firms (*FH*), which is the function of firms' working capital to total assets, retained earnings to total assets, EBIT (Earning before Interests and Tax) to total assets, market value of the firm's equity to book value of total liabilities, and sales to total assets. As explained in the previous chapter, Altman's z-score is calculated for each of the firms every year and used as the dependent variable to indicate the financial health of the development firms. A numerical number 1, 2, or 3 is applied to measure the level of the financial health of firms, namely

1 = The firm is highly likely to distress within this period.

2 = A significant likelihood that the corporation will go bankrupt in the next 2 years, or

3 = The firm is in a financial safe zone,

As the results show, 72 out of the 1,073 observations (69 listed property development firms from 2001 to 2016) accounted for 6.7% and can be considered financially healthy. The other 93.3% of the property development firms' data have the potential risk of becoming financially distressed, among which 80.3% of the property development firms may have the immediate risk of bankruptcy if they cannot gain access to new sources of financing. This has provided empirical evidence that property development is a capital-intensive sector and requires investing a large amount of money from the land acquisition to the construction stage. Revenue can only be realized at the sale stage.

4.2.2 Independent variables

According to the literature, the independent variables include firms' financial data and external factors that affect the financial health of firms. Financial flexibility (VOFF) is an independent variable that measures the firm's ability to adopt changes. It is derived from various factors, such as cash and liquidity position, debt capacity, external financing costs, and profitability. The measurement of financial flexibility follows Chang and Ma (2019), which is derived by calculating the firms' cash holding, potential cash inflow, and financing cost of the firms. They can derive better criteria with slight adjustments to the nature of property development firms.

$$FF_j = 0.44A_j + 0.49P_j + 0.07L_j \qquad (4.1)$$

Where FF_j is the financial flexibility for the firm, A_J is the basic cash holding, P_j is potential cash inflows, and L_j is financing costs.

a) Basic cash holding = (Firms' cash + short-term investment) / Total Assets (4.2)

b) Potential cash inflow = External spared debt capacity + external equity financing + internal equity financing (4.3)

Where

- External spared debt capacity = (1- debt ratio) / Total assets
- External equity financing capacity is based on Return on Assets (ROA), setting the value as *0* when ROA is less than the mean. If the value of ROA is higher than the mean, set the value as 1.
- Internal equity financing is then calculated as retained earnings to total assets.

c) Financing cost (L) = yearly interest cost for firms

Other independent variables for the model development are indicated in Table 4.3. Each variable's definition is also provided in Appendix 4.1.

Table 4.3 Dependent and independent variables for model development

Dependent variable	Independent variables
Financial health: Z-scores when 1 = high probability of distress within this time period, 2 = significant likelihood that the corporation will go bankrupt in the next 2 years, and 3 = financially safe zone.	1) Firms size: Total sales, Total assets 2) Profitability: Return on Assets, Return on equity, Gross Profit margin, EBITDA margin, Net profit margin, Return on invested capital. 3) Capital structure: Total debt to equity, Total debt to total assets, Total assets to total equity, Equity multiplier, Degree of financial leverage 4) Cash flow ratio: Operating cash flow to total assets, Cash flow to net assets, Operating cash flow to capital expenditure, Operating cash flow to current liability 5) Valuation: Tobin's Q 6) Operating efficiency: Days of sales outstanding 7) Liquidity: Current ratio and Quick ratio 8) Solvency: Interest coverage 9) Macro-economic indicator: GDP, CPI, Property Index 10) Economic policy: Money supply, Interest rate adjust.

4.2.3 Model selection

The statistical software Stata is applied to develop a model for identifying the main determinants of the financial health of property development firms. The procedure used for developing the model was described in the chapter on research methodology and methods in section 3.2.1. Akaike information criteria (AIC) (Akaike, 1974) is a frequently used technique to test the model of fit. It is used based on in-sample fit to estimate the likelihood of a model to predict/estimate the future value. Bayesian information criterion (BIC) is a similar technique to AIC but more focused on measuring the trade-off between the fit and complexity of the model. A lower AIC or BIC model indicated a better fit. Stepwise selection is also a popular method applied in model selection. With the preset *p*-value, explanatory variables are forward or backwards added/removed until only relevant and statistically significant variables are in the model. The measuring criteria highlight the importance of the estimate parameters. The statistical significance of the model is examined by the *p*-value, *F* statistic, *R*-square/adjusted *R*-square, and *t*-test. The detailed explanation for each of the above values is described in Chapter 3. Models were selected when the criteria were met. The model of financial health determinants is finally

constructed by excluding all the multi-collinearity variables. The final regression model and empirical results are presented in the next section.

4.2.4 Empirical results

The correlation between dependent and independent variables is tested before developing the model. The correlation analysis was conducted to check if there are multi-collinearity independent variables that inflate the standard errors of some or all the regression errors. It is challenging to distinguish the effects of one variable and the others (Siegel and Wagner, 20). As indicated in Table 4.4, financial flexibility (VOFF) is positively related to the financial health of property development firms. This implies that the more flexible the sourcing finance, the healthier the firms. The *M2* money supply is a leading economic indicator to influence unemployment and inflation used by the government. A little more *M2* may be good for stimulating the economic environment, but a lot more *M2* may lead to inflation. Also, an increase in the money supply would encourage firms' lending activities, which would cause over debt burden and increase the probability of default. This research uses *M2* as a proxy for policy factor that negatively correlates with a firm's financial health. This means that the increased money supply may not directly benefit the property development firms.

Table 4.4 Results of the correlation analysis

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Financial health	1																
2	VOFF	0.1934***	1															
3	Total assets (log)	-0.3024***	0.1619***	1														
4	Return on equity	0.0801***	0.0833***	0.1007***	1													
5	Net profit margin	0.0531*	0.4814***	0.0913***	0.2219***	1												
6	Return on invested capital	0.114***	0.3497***	0.1255***	0.3567***	0.3545***	1											
7	Debt to equity	0.0003	0.0198	0.0184	-0.051**	0.009	0.0877***	1										
8	Degree of Financial Leverage	-0.0403	-0.0238	-0.0218	0.0062	0.0119	0.2717***	0.0005	1									
9	Interest rate coverage	-0.0066	0.055**	0.0236	-0.2129**	-0.1115***	0.0219	-0.0042	0.002	1								
10	Days of sales outstanding	-0.0141	-0.4284***	-0.0877***	-0.0242	-0.8401***	-0.1522***	-0.0003	-0.0007	-0.0559*	1							
11	Tobin Q	0.026	-0.0287	0.0778**	0.0293	-0.0065	-0.0363	-0.0016	0.0051	-0.0033	0.0054	1						
12	Cash flow to total assets	0.074**	0.4979***	0.0643**	0.0904***	0.8694***	0.6918***	0.0197	0.0071	0.0057	-0.9205***	-0.0098	1					
13	Current ratio	0.4957***	0.1561***	-0.1083***	0.0282	0.0354	-0.0162	0.0181	-0.0308	0.0295	-0.0368	0.0029	0.0344	1				
14	GDP(%)	0.0619**	0.0025	-0.3411**	-0.0355	-0.0046	-0.0272	-0.0494	-0.0092	0.0322	0.008	0.0301	-0.0054	-0.0385	1			
15	M2(log)	-0.1955***	-0.0417	0.5700***	0.0652**	0.0105	0.0354	0.0288	0.0295	-0.0311	-0.0204	0.0759**	0.0063	-0.0182	-0.5183***	1		
16	CPI(log)	-0.0665**	-0.0218	0.0933***	0.0191	-0.0338	0.0726**	0.0231	0.0458	0.0099	0.0482	0.0800***	-0.0242	-0.0518*	0.2652***	0.2214***	1	
17	Interest rate	-0.0069	-0.003	-0.0643**	0.0338	-0.0273	0.103***	-0.0034	0.0569*	-0.0405	0.0577*	0.017	-0.0304	-0.0519*	0.3552***	-0.0311	0.6302***	1

VOFF: Value of financial flexibility

Total assets, Monetary supply, as well as CPI are significantly negatively related to financial health. They indicate that the higher the above indicators, the poorer the firms' financial health. Financial flexibility, return on equity, net profit margin, cash flow, current ratio, and external determinants, such as GDP, were positively related to the financial health of property development firms. A higher profit margin, more cash flows, and a good economic environment benefit firms and make them healthier. The total assets of the firms measured the firms' size. It is assumed that larger firms are expected to have higher total assets. The negative sign indicates that larger firms may not necessarily be financially healthier. For property development firms, sufficient cash to support their project development and day-to-day operating activities is of priority. If not utilized sufficiently, increased size in total assets is a burden to firms. On the other hand, an increase in total assets, if not financed by the shareholders' equity

(internal financing), the remaining is financed by long-term or short-term obligations. Therefore, an increase in liabilities will be a burden for firms, which will create a negative effect on the firm's financial health.

Five developed models, using 1,073 data sets from property development firms in China, were found statistically significant, and all the significant variables have the expected sign. As shown in Table 4.5, every predictor added to a model increases the *R*-squared. As a result, the model with more variables may seem to have a better fit as it has more variables. Therefore, the adjusted *R*-squared compensates for adding the variables and only increases if new variables enhance the model, and vice versa. The five models have presented similar results. The *R*-squared and adjusted *R*-squared range from 0.25 to 0.31, implying that around 25–31% of the variance of the financial health variable being studied is explained by the variance of the independent variables. The adjusted *R*-squared value confirms that the significant independent variables derived in the model influence the model performance.

The variables of financial flexibility, M_2, current ratio, cash flows to total assets, and the rate of return on assets were significant for all models. The results indicate that the financial health of property development firms is mainly determined by financial flexibility, cash flows of the firms, profitability, and policy. The results have further confirmed the theory and previous findings (Fowowe, 2017; Ali et al., 2019; Ang & Smedema, 2011; Gryglewicz, 2011; Opler et al., 1999; Bates et al., 2009). However, the efficiency variable, such as cash flow to total assets ratio, also shows statistical significance in the derived models.

Based on the result, model 4 in Table 4.5 has been selected. Based on model 4, the *R*-squared value indicates the proportion of variance explained by the estimated regression line; in other words, how well the regression model explains the observed data. The *R*-squared of this model is 0.305, meaning that the regression model explains 30.5% of the variability in the target variable. However, it is not always the case that a higher *R*-squared is better for a regression model. Hawkins (2004) argues that high *R*-squared can be an overfitting problem of the model, that is, using more predictors than are necessary or more complicated approaches. Therefore, the overfitting model reduces its generalizability outside the original dataset. In an overfitting condition, an incorrectly high *R*-square value is obtained, even when the model has a decreased ability to predict.

Table 4.5 Regression results

	Model 1	Model 2	Model 3	Model 4	Model 5
VOFF				0.057	0.079
t-test				2.550	3.219
Current Ratio	0.156	0.155	0.155	0.152	0.151
t-test	18.854	19.163	19.347	18.707	18.650
M2 (log)		-0.333	-0.341	-0.335	-0.332
t-test		-7.218	-7.487	-7.345	-7.308
Rate of Return on Assets			0.411	0.326	0.367
t-test			5.041	3.698	4.070
Cashflow to Total Assets Ratio					-0.058
t-test					-2.100
(Constant)	0.959	2.523	2.547	2.492	2.469
t-test	43.383	11.588	11.828	11.546	11.438
Sample Size	1073	1073	1073	1073	1073
***R*-squared**	0.249	0.284	0.301	0.305	0.308
Adjusted *R*-squared	0.249	0.283	0.299	0.303	0.305
***F*-test**	355.463	212.271	153.217	117.130	94.886
Significance	<.001	<.001	<.001	<.001	<.001

p-values in parentheses. * p<0.05, ** p<0.01, *** p<0.001

The results are consistent with the hypothesis one that economic policies and internal financial performance determine property development firms' financial health. Therefore, hypothesis one should be accepted. Compared with other variables, a firm's profitability, indicated by the rate of return on assets, is one of the most significant variables contributing to the financial health of property development firms. A 1% increase in profit level would improve the firm's financial health by 32.6%. Profit generation of a development firm occurs at the end of the development period as sales are realized when the property is sold, and profit is generated. Unless uncertain circumstances like the global financial crises occur, development profits are predictable as development firms conduct feasibility studies before the development and revenues cover various expenses (pre-development cost, construction cost, sales, and other administration costs) and liabilities such as the principal borrowing and interest rate associated with financing. Unexpected risks such as economic, pandemic, or policy changes are detrimental problems. Thus, financial flexibility is crucial for development firms to manage risks. As mentioned earlier, property development firms are capital-intensive. Due to the nature of the industry, an increased profit margin must compensate for the unstable cash flow and risk that the development firm has taken.

Policy changes, as measured by M_2, also plays a vital role in influencing a development firm's financial health. The result shows that financial health is sensitive to the monetary supply; with a 1 unit increase in M_2, it is 33.5% riskier for firms to be in financial distress. This result implies that a policy change

affects property development firms. The result of a negative sign indicates that property development firms did not benefit from the stimulus package provided by the government during that time. This result could be because 1) a property development project takes 3 to 10 years to complete depending on the size of the development. The source of funds and credit facility were usually pre-committed for property development projects. The arrived positive policy could not directly affect some development firms with the development of a progressing project; 2) The stimulus policy aimed to expand the internal consumer demand by expanding infrastructure development, such as rail and public transportation, in a pessimistic market affected by the global financial crisis. Most of the development firms of the sample studied were in developing residential and commercial properties; thus, the firms could not benefit from the policy. However, whether there is a direct or indirect positive or negative effect is based on the economic environment and the nature of the firms. The question of how a policy change affects firms' financial health is further explored in the next section.

Financial flexibility is one of the most significant variables affecting the financial health of property development firms. The results show that financial flexibility is significantly and positively related to firms' financial health. A 1-unit improvement in financial flexibility would result in a 5.7% positive change in financial health. This explains why firms should manage their financial flexibility before external shocks (Ang & Smedema, 2011). Financial flexibility enhances firms' ability to utilize financing sources to fund future investments, manifest growth, and hedge for external (Miller & Orr, 1966; Kim et al., 1998; Marchica and Mura, 2010).

Measuring the cash position variable, the current ratio depicts the firm's short-term ability to meet its upcoming liabilities. Improving 1% of the firm's current ratio would bring 15.1% positive change financially for the development firms. The results further demonstrate the importance of cash flows of property development firms. However, the cash flow to total assets ratio has indicated a negative effect, where a 1% increase in the cash flow to total assets ratio would decline a firm's financial health by 5.8%. The cash flow to total assets ratio measures the amount of operating cash flow a firm generates for every dollar of assets the firm owns. The higher the ratio, the more efficiently the firm uses its assets. The statistical result of this study indicates that the development firms could not use their assets efficiently. The implication is that the developed properties might not be able to sell very quickly during the period.

Other internal variables, such as interest coverage, and days of sales outstanding, and external variables, such as GDP and CPI, have been tested as insignificant in changing firms' financial health. This has confirmed that compared with firms operating in other sectors, property development firms are more exposed to the risk of funding sources and costs to determine the capital structure by optimizing its debt proportion, stabilizing cash flow, and, most importantly, maintaining the financial flexibility level.

According to the developed model, the main determinants of financial health in property development firms in China have been identified as internally affected by financial flexibility, profitability, cash flow, and policy, but the capital structure has not shown a statistically significant impact on firms. This is explainable as capital structure, such as debt to equity or debt to asset ratio, has been partially reflected in the financial flexibility variable. According to the MM theory, debt has tax benefits while bearing more risk of default with increasing debt financing. However, the property development sector is capital-intensive, with most financing sources obtained via bank loans. Considering that cash will not flow in until the sale is realized, the earlier and the more sufficient the funding sources, the better for the property developer to manage risk and ensure that the development will be complete.

In summary, the developed regression models suggest that the main determinants of the financial health of property development firms are profitability, financial flexibility, short-term cash flow, and rate of return on assets, which play a vital role in the property development firms due to capital intensive nature. External factors also impact property development firms, which encourages further studies about how the economic policy works on individual property development firms and their decision-making. The next section investigates how the policy affects the financial performance of development firms.

4.3 Difference-in-Differences (DID) Model Development and Verification

The DID model assesses how economic policy influences the financial health of development firms in China. Many policies were introduced in China to influence economic activities, regulate the property market, guide property development firms regarding their strategies, and remind them to maintain financial soundness. The policies that the government applied were not limited to housing regulation, such as the housing restriction policies that aimed at suppressing the over-heated housing market, but also included a series of economic policies by changing the interest rate or supply of money that stimulated or cooled down the economic and housing market. Among these policies, some have worked rather well. The policy or package that affects firms' financial health should be ascertained. The next section discusses the policy selection criteria for the model development. The independent and control variables applied to the DID model and the model development will then be described. The model verification and results from the model will be explained.

4.3.1 Policy selection for modeling

The policies that could affect the property market and property developers were not only limited to housing regulation policies such as the housing purchase restriction, sales restrictions, or the down payment requirement for second home buyers. The property developers operating in the markets are subject to a more direct impact from the changes in economic policies regarding the entry of the property development market, the available funding of the market, or sometimes there is property development

loan restriction required by the central bank and regulatory authority, or the interest rate adjustments by the government from time to time that alters the cost of financing (Abdul and Yap, 2008; Gambacorta, 2008). Economic policies usually appear at a critical time when the government needs to boost or cool down the economy to maintain stability. Therefore, property development firms should investigate the economic policies and how the developers can maintain financial stability under these policies to avoid failure.

The Chinese government has formulated stimulate or constraint policies over the years to manage business activities in all sectors to sustain economic growth. The most influential policies over the last two decades included a) a series of proactive policies to maintain financial and economic stability in the 1997 Asian financial crisis; b) a stimulus package against economic recession in the 2008 global financial crisis; and c) a tightened policy to cool down the overheating real estate market in 2020.

Once a policy is introduced, it takes time to be effective. A timeframe is required to study the causal effects of government policy on firms' financial health (Friedman, 1961). Not sufficient data is available to study the recent real estate market cool-down policy produced in 2020. Thus, the 2008 stimulus package has been chosen to study the impact of economic policy on the financial health of property development firms. There are reasons for choosing this economic policy.

The subprime crisis in 2008, which originated from the burst of the housing bubble of the United States with combined effects of excessive risk-taking by the financial institutions as well as irresponsible credit rating, caused the values of securities tied to the US real estate to slump (ABS, 2008) and eventually damaged the global economic (Dodd, 2007; Longstaff, 2010). This raised the awareness of the central bank to reconsider the links between monetary policies, the property market, and the economy.

During 2008, many countries ran out of conventional monetary policies as there was a floor limit of interest rates that could not be negative. Therefore, many countries used unconventional measures, such as a shift from price-based instruments (the price of money, i.e., interest rate) to quantitative instruments, such as a change in bank reserve ratio and assets through the transaction of government bonds, buying back injecting money directly to the economy by the central banks. The quantitative easing policies were first introduced by Japan in 2001. The Quantitative Easing Policy is a form of unconventional policy where the central bank purchases long-term securities via open market operation to increase the money supply and encourage lending and investment. By buying back assets (national debt), money is injected into the economy, interest rate is lowered, and fixed-income security is bid up, eventually expanding the monetary base.

Contrary to the developed countries, monetary policy plays different roles in China. Quantitative measures, open market operations, and changes in reserved rates are extensively used by the central

bank of China (PBOC) to alter the liquidity level in the banking sector by issuing central bank bills and/or adjusting the required reserved ratio. The PBOC relies less on money market interest rates but sets the benchmark deposit rates and lending rates (with different durations) to intervene in private savings and bank lending (Sun, 2013).

The 2008 fiscal stimulus package was an expansion economic policy aimed at avoiding the damage from the global financial crisis and stimulating China's economic growth. It influenced the world economy, manifesting via both monetary and fiscal policies. The last stimulus was from September 2008 to December 2009. The fiscal stimulus package benefits property development firms in two major aspects. It increased the money supply in the economy by over 37% of the 4 trillion (equivalent to 486 billion USD) packages directed to infrastructure, which improved the availability of extra funding for the property development sector. Also, the central bank reduced the interest rate five times, intending to encourage lending and reduce the cost of finance for property development firms. From the developers' perspective, increased money supply means cash holding and the potential external financing can be promised, with reducing interest rate easing the financial cost burden, which ultimately enhances the financial flexibility of the firms, lessening the risk of financial distress. The immediate and direct policy effects can be seen from the historical data announced by the China Statistics Bureau, where the housing price jumped by 17.5% during the whole policy period, and the price-raising cycle did not end until July 2011.

The effects of how the 2008 monetary policies impacted the property market have attracted the attention of many scholars (Deng et al., 2011; Wong, 2011; Liu & Xiong, 2018). Based on their studies, the 2008 stimulus package caused financial consequences for real estate development firms in China as the by-product of the policy. The easy credit fueled the assets bubble, which accelerated the growth of land and housing prices. The dramatic increase in investment also increased the worry about rising local government debt. Recall that from the financial health model, policies have merely a direct impact on financial health, but via the change in the firm's financial flexibility level (financial flexibility can be improved by adjusting money supply growth and interest rate to change the cash holding, as well as the potential financing, available credit, and funding prospects, and the cost of financing), the effects become significant (Yousefi and Yung, 2022). Table 4.6 shows the test results of correlations of the policies implemented over the years (2001–2016) with different levels of financial flexibility. The independent variable is the interactive term of the time dummy variable from the year 2001 to 2016 (P2001 – P2016), conjoining with firms of different levels of financial flexibility (VOFF), and used to testify which year has implemented the most effective policy on property firms' financial health via firms with different level of financial flexibility. The term FFp2001–FFp2016, meaning the policies from 2001–2016, impacts the level of financial flexibility firms have on their financial health. Altman's Z-score measures the overall financial health of development firms. It is indicated that policies from 2008 have shown statistical significance represented by *p*-value ($p < 0.000$), compared with the other

years. The policy in 2008 were trying to stimulate general economic, the negative outcome in 2008 indicated the following: 1) The policy was targeted to general economic not only the real estate sector; 2) It can be told that the economic crisis in 2008 has negative impact on economic, combining the results in table 4.9, the stimulus package (policy) seperately has significant positive impact. This means policy realized in 2008 can only help to decrease the negative impact to a certain level but could not reverse it immediately; 3) The policy effects have helped the real estate market revitalized and in later years fuel the real estate prices and improved the performance of property development firms (relecting in the improve in coefficient of financial health in the later years in both 2009 and 2010); 4) The improvement in the financial health coefficient was not related to any policy or changes later in 2009 or 2010, since there's no significant relationship that can be seen during these two years.

Table 4.6 Impacts of policies with different levels of financial flexibility on financial health over the years (2001–2016)

	Financial health (Altman's z-score)	
	Coefficient	p-value
VOFF*p2001	0.695017***	0.0000
VOFF*P2002	-0.0122112	0.9072
VOFF*p2003	0.00845557	0.938
VOFF*p2004	-0.102149	0.3724
VOFF*p2005	-0.105312	0.3815
VOFF*p2006	0.0590626	0.6226
VOFF*p2007	-0.0597476	0.5975
VOFF*p2008	-0.325275***	0.0000
VOFF*p2009	-0.0836964	0.1079
VOFF*p2010	0.0407633	0.4584
VOFF*p2011	-0.00500753	0.9371
VOFF*p2012	0.0683837	0.4693
VOFF*p2013	0.0663008	0.554
VOFF*p2014	0.107644	0.3579
VOFF*p2015	-0.142893	0.2549
VOFF*p2016	0.0665822	0.5937
_cons	1.038368***	0.0000
N	1073	
R-sq	0.1712	
adj.R-sq	0.1017	

p-values in parentheses
*p<0.05,**p<0.01,***p<0.001

Generally, one event's influence on another is typically effective instantly (He et al., 2020). Jovanovski and Muric (2011) suggested that monetary and fiscal policies face lag. Lags appear in policy action and its effects on the aggregate economy. However, there was no general agreement on the length of the lag. No effects can be seen for up to 2 years but generally between 9 to 12 months. The chosen 2008 policy allows a complete timeframe for observing the effects before and after economic policies became

effective.

The 2008 stimulus package provides a unique case for studying the long-term effects of government policy on the financial health of property development firms. As a result, this study will test the effects of the 2008 stimulus package on the financial health of property development firms. The data period prior (2001–2007) and after (2010–2016) the 2008–2009 stimulus package have been selected in the model development.

4.3.2 Difference-in-differences model development

The DID model constitutes a common identification strategy in empirical economics. It is often implemented using an interactive term between time and group indicators whose coefficient describes the difference over time in the outcome variable between two groups. The simplest model with two groups and two time periods.

The DID model was introduced in the methodology and methods chapter. It can be expressed as

$$FH_{it} = \alpha_{0i} + \alpha_{1i}EP_{(t-1)} + \alpha_{2i}FF_i + \alpha_{3i}EP_{(t-1)} * FF_i + \alpha_{ni}C_{ni} + \varepsilon_{it} \quad (4.7)$$

Where FH_{it} presents the financial health of firms at time *t*. $EP_{(t-1)}$ indicates economic policy in the previous time period measured by a dummy variable (0, 1). FF_i represents financial flexibility as calculated from the previous section 4.2.1. C_{ni} represents the control variables, including firm size, profitability, operation efficiency, liquidity, economic policy, industry factor, GDP, and CPI.

4.3.2.1 Variables in the DID model

An independent variable and control variables are required to develop the DID model to test policy impact on the financial health of property development firms. The policy variable measured by M_2 has not shown to be statistically significant in the multiple regression model above. This implies an indirect impact on property development firms.

Independent variable

The results of the financial health model previously revealed that financial flexibility has a profound impact on the firm's financial health. The selection of financial flexibility as the independent variable is based on the following reason. The economic policies show a merely direct impact on firms; however, policies that adjust money supply and interest rates are prompt to change the cash holding, and the potential financing, available credit, extra funding prospects, and the cost of financing (Teng et al., 2021). These ultimately change the financial flexibility of property development firms. As financial flexibility is the major factor influencing firms' success or failure based on the literature and the empirical results from the FH model, it can be concluded that policies impact financial flexibility that

eventually changes firms' financial health.

As testified, financial flexibility can profoundly affect the financial health of property development firms. In this study, the interactive term of financial flexibility and financial policy shows the indirect effects of the financial policy on firms' performance by altering firms' level of financial flexibility and is used as an independent variable, which is denoted as

Independent variable = VOFF*policy (4.8)

The statistical results of the interaction of financial flexibility and policy are shown in Table 4.7.

Table 4.7 Summary statistics of the financial flexibility and policy dummy by year

Variable	Obs	Mean	Std. dev.	Min	Max
VOFFp2001	1,073	0.5891834	0.7203259	-13.1532	1.300259
VOFFp2002	1,073	0.5457671	0.7290799	-13.1532	1.300259
VOFFp2003	1,073	0.5041239	0.7350531	-13.1532	1.288995
VOFFp2004	1,073	0.4649297	0.7392637	-13.1532	1.288995
VOFFp2005	1,073	0.4280857	0.7424344	-13.1532	1.288995
VOFFp2006	1,073	0.3936459	0.7439855	-13.1532	1.288995
VOFFp2007	1,073	0.3574495	0.7429086	-13.1532	1.288995
VOFFp2008	1,073	0.3178341	0.7388085	-13.1532	1.288995
VOFFp2009	1,073	0.2858741	0.6708789	-13.1532	1.288995
VOFFp2010	1,073	0.2542638	0.5194952	-8.2888	1.288995
VOFFp2011	1,073	0.2189461	0.4341025	-8.2416	1.288995
VOFFp2012	1,073	0.1845767	0.3249329	0.0000	1.288995
VOFFp2013	1,073	0.1443511	0.2960202	0.0000	1.288995
VOFFp2014	1,073	0.1050059	0.2570851	0.0000	1.288995
VOFFp2015	1,073	0.0698578	0.2140789	0.0000	1.259638
VOFFp2016	1,073	0.0364787	0.1602836	0.0000	1.238398

Control variables

From section 4.2, it is confirmed that besides the financial flexibility factors, profitability, cash flows, and efficiency have a significant impact on financial health. In the DID model, the control variables consist of the following categories: a) profitability variables; b) liquidity; c) solvency; and d) efficiency. The literature suggests the inclusion of those variables in the DID model. The results of the multiple regression analysis above have also identified those variables as the main determinants of the financial health of property development firms.

4.3.2.2 Categorizing the treatment and control group using generalized DID

Several previous research applies the DID method to explain the effects of an action (e.g., a policy) that affects the behaviors of two groups of objectives that are exposed and not exposed to policy (Abadie, 2005; Bertrand et al., 2004). The two groups in two time periods are the most straightforward setup for DID observation. However, the DID approach could be flexible in a way that allows variation from, for example, without a strictly defined treatment group and a control group when sometimes the policy covers each individual with a different degree or level. For instance, Huang and Yuan (2019) evaluated how political corruption affects a firm's innovation using a generalized approach, as defining a control group in a corruption-free environment is challenging. It is the different levels of local corruption that the firm faces. Bossler and Gerner (2020) studied Germany's new statutory minimum wage. They identified the employment effects from variations in how establishments are affected by the minimum wages. When this minimum wage scheme was introduced Germany-wide, they defined the treated establishments based on the intensive margin bite. Li et al. (2021) investigated how the sharing economy has changed the work patterns of individuals. They used the DID method by using publicly available data of Uber rollout at various time points in different cities to examine Uber's effect on the US labor market. There was no classification of a treatment and control group.

This research investigates how the 2008 stimulus package affects the financial health of different property firms by influencing the financial flexibility level. Each firm was subject to the same economic event and reacted differently, reflecting on the change in their financial health as having different financial flexibility levels. Therefore, the generalized DID approach is a more appropriate method than the traditional DID in this research, i.e., no categorized treatment and control groups.

4.3.2.3 Model verification

There are a few ways to verify the significance of the developed DID model, such as statistical measurement, parallel trend analysis, and placebo test. The DID model is an extensive study based on regression analysis results. Thus, the evaluation variables, such as *R*-squared, *t*-test, and *p*-value, are used to assess whether the model is valid.

Parallel trend analysis

The parallel trend analysis is an alternative way to test the validity of the developed model (Abadie, 2005; O'Neill et al., 2016; Wing et al., 2018). The parallel trend looks at the coefficient of financial healthiness of development firms with the timeframe. The higher the coefficient, the stronger the policy effect on firms' financial health. Figure 4.2 is the parallel trend derived by using the Stata 17 software. The result suggests that a significant negative coefficient in 2008 indicated the policy effects on the development firms' financial performances.

The parallel trend analysis was applied, and the verified results can be seen in Figure 4.2. It shows the trends of different levels of financial flexibility before and after the policy was implemented in 2008, overlapping into one line below. The y-axis is the coefficient between the impact on the financial health of policy and different levels of financial flexibility, whereas the x-axis shows the year. Different levels of financial flexibility follow the same trend and overlap into one line. The effect was visible in 2008, and it changed to negative in 2008 and lasted for 1 period. This result demonstrates that the parallel trend assumption is valid.

Figure 4. 2 Economic policy effects on firms' financial health (Parallel trend analysis)

Placebo test

A placebo test was conducted to test if the impact was only a response to the 2008 4 trillion stimulus package and if there were no other policies implemented that year that would impact the financial health of the firms. The steps start with lagging the policy (effective year dummy for one period) and applying regression. The results show (in Table 4.8) that when the policy lags one year, it is still effective, and the others are not significant, indicating that the 2008 stimulus package was the only policy that year effective on property development firms.

Table 4.8 Result of placebo analysis

Placebo test	Financial health (Altman's Z-score)	
Interaction term (lag 1 period)	Coefficient	p-value
lVOFFp2001	0.543739***	0.0000
lVOFFp2002	-0.0147776	0.9037
lVOFFp2003	-0.0347458	0.7837
lVOFFp2004	-0.101074	0.4495
lVOFFp2005	0.0420573	0.7646
lVOFFp2006	-0.0483111	0.7296
lVOFFp2007	-0.0650846	0.6217
lVOFFp2008	-0.284724**	0.0069
lVOFFp2009	-0.00228501	0.9700
lVOFFp2010	0.0129079	0.8403
lVOFFp2011	-0.179807*	0.0153
lVOFFp2012	0.317530**	0.0038
lVOFFp2013	0.0668889	0.6088
lVOFFp2014	-0.107029	0.4330
lVOFFp2015	0.106353	0.4671
_cons	1.085955***	0.0000
N	1005	
R-sq	0.0968	

4.3.3 Results of the DID model

From the previous financial health model, the variables that affect the financial health of property development firms have been recognized and testified, and a detailed description of each variable are provided in Table 4.2. The DID model has been applied to further testify to the effects of the policy (2008 stimulus package) and the mechanism of the policy to affect property development firms. According to the DID models, similar results have been yielded with random and fixed effects. Fixed effects indicate that a statistical regression model allows the intercept to vary freely across individuals or groups. The fixed effects are often applied to panel data to control for individual-specific attributes that do not vary over time. This study uses panel data from property development firms in China, fixes the time of study, and assumes variables with similar distributions. The random effects study the clustered data. In this case, every individual firm might perform differently. The random effects model can be applied to reflect different characteristics of firms. The processed data have been applied to Stata software, and the results of the DID models are shown in Table 4.9(a).

Table 4.9 (a) The results of the DID models

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
VOFFp2008	-0.829					-0.398		-0.552	-0.557
t-test	-10.856					-6.867		-8.470	-8.04
VOFF	0.898				0.057	0.423	-0.392	0.625	0.570
t-test	12.369				2.550	7.342	-10.175	9.730	8.410
P2008	0.330								0.318
t-test	5.747								4.430
Current Ratio		0.156	0.155	0.155	0.152	0.143	0.143		0.138
t-test		18.854	19.163	19.347	18.707	17.756	17.896		17.060
M2 (Log)			-0.333	-0.341	-0.335	0.009	0.282	0.133	-0.285
t-test			-7.218	-7.487	-7.345	0.129	3.276	1.760	-3.090
Rate of Return on Assets				0.411	0.326	0.281	0.418	0.219	0.290
t-test				5.041	3.698	3.248	10.238	2.250	3.380
(Constant)	0.812	0.959	2.523	2.547	2.492	0.810	0.852	0.436	1.986
t-test	15.724	43.383	11.588	11.828	11.546	2.505	35.900	1.180	4.850
Sample Size	1073	1073	1073	1073	1073	1073	1073	1073	1073
***R*-squared**	0.156	0.249	0.284	0.301	0.305	0.335	0.335	0.137	0.343
Adjusted *R*-squared	0.153	0.249	0.283	0.299	0.303	0.331	0.332	0.133	0.340
***F*-test**	65.660	355.463	212.271	153.217	117.130	107.188	134.105	42.26	93.04
Significance	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001

The results have confirmed that the 2008 policy has profound effects on property development firms, therefore, the hypothesis that the financial health can be different before and after introducing economic policies should be accpected. Nine statistically significant models were derived. The adjusted *R*-squared ranges from 15% to 35%, in which Model 9 has the highest adjusted *R*-squared. Model 1 shows only the independent variables, and Model 2 to Model 9 include the control variables. The interactive variable, financial flexibility, and policy introduced in 2008 were statistically significant. There is a negative relationship between the development firms' financial health and the policy introduced via the change in financial flexibility level. The coefficient of -0.829 (82.9%) in Model 1 reflects that the firm was in financial distress during the financial crisis of 2008. The stimulus package helped to boost the economy and reflected in the coefficient results in the later years in 2009 and 2010.This implies that a policy can affect firms' financial health, but the policy effect can be amplified when the policy restricts financial flexibility by limiting borrowing, increasing the cost of financing, and restricting the flow of funds.

The result has complied with the assumption that the stimulus package impacts property development firms' financial health indirectly via a change in the firm's financial flexibility. However, the stimulus package may benefit property development firms in two ways. The first is that the increase in money supply (4 trillion stimulus package) in the economy grants the firms opportunities to access new financing sources that improve the firms' financial flexibility via the increasing cash flow and the potential external borrowing. The second is that during this period, as part of the stimulus policy, the central bank decreased interest rates five times, which also could be a way that improves firms' financial flexibility level by decreasing financing costs. However, firms with different financial characteristics may be different in accessing these increased credits, and the interest rate may differ, which requires further investigation in the following section.

The interactive term of the time/policy impact with different levels of financial flexibility is negatively related to financial health. However, financial flexibility and the event in P2008 are statistically significant. The results suggest that the stimulus policy in 2008 and financial flexibility had very strong positive effects on the financial health of the property development firms, where the financial health could be improved by 55.7% with a 1% positive change in financial flexibility (refer to Model 9). There is a strong positive effect of the 2008 stimulus policy on firms at 31.8%. The negative interactive term may originate from the shocks from the 2008 global crisis and suggested that both policy and financial flexibility have helped to offset the shocks from the global crisis. The negative interactive term may originate from the shocks from the 2008 global crisis and suggested that both policy and financial flexibility have helped to offset the shocks from the global crisis but the effects delay.

Referring to Model 9, the control variables, current ratio, M_2, and rate of return on assets are also statistically significant. A 1% change in the current ratio results in a 13.8% positive impact on firms' financial health. Property development firms' financial health benefits by 29% when a 1% change in profitability is represented by the rate of return on assets. The policy measured by M2 reports the same negative result, where property development firms were 28.5% worse when the stimulus policy was introduced. The other table in Table 4.9(b) shows model 9 in random effects, fixed effect and fixed effect without control variables, and given similar results.

Table 4.9 (b) Random effect, fixed effects and fixed effects without control variables

	RE	FE	Fix effect without control variables
	Financial Health	Financial Health	Financial Health
VOFF*p2008	-0.557***	-0.595***	-0.809***
	(-8.04)	(-8.63)	(-11.07)
VOFF	0.570***	0.627***	0.908***
	-8.41	-9.12	-12.88
P2008	0.318***	0.341***	0.324***
	-4.43	-5.16	-6.08
M2(log)	-0.286**	-0.280***	
	(-3.09)	(-3.40)	
Current ratio	0.138***	0.115***	
	-17.06	-12.98	
Rate of return on assets	0.290***	0.289***	
	-3.38	-3.62	
_cons	1.986***	1.968***	0.804***
	-4.85	-5.39	-16.46
N	1073	1073	1073
R squared	0.3437	0.4227	0.0873

p-values in parentheses

*p<0.05,**p<0.01,***p<0.001

RE: Random effects

FE: Fixed effects

4.4 Effects of the Stimulus Package on Individual Firms

The DID model in the previous section found that the stimulus policy affects development firms by changing the financial flexibility of the firms. However, the effects of firms vary regarding different features such as sizes, capital structure, earning capability, and ownership structure. This section applies the same approach from the previous section to analyze the effects of firm size, capital structure, profitability, and ownership. The results comply with the hypothesis that different financial statuses (e.g., size, capital structure, profitability, solvency, ownership structure) respond to the economic policy differently, therefore, this hypothesis should be accepted.

4.4.1 Effects of different firm sizes

Firm size is important for several reasons. Larger firms can have advantages in the quantity and quality of assets they own, have better creditability as assets can be pledged to the bank as collaterals, and enjoy greater opportunities in accessing new borrowing. Therefore, when a new policy is introduced, the nature of the firms' size can enhance or weaken the policy impact and maintain the firms' financial stability. Due to this, it is worth investigating how firms classified as small to medium and firms of larger size behave differently with the same policy introduced in their financial health status.

China Statistics Bureaus (2011) have officially applied the definition of categorizing the size of firms with different sectors. Therefore, the distinction between large-, small-, and intermediate-size firms for the property development sector in this research strictly complies with the Bureaus' definition. According to China Statistics Bureaus, property development firms can be considered large when the annual sales revenue reaches two billion or the value of the total assets meets one hundred million. Past studies have also applied total assets, total sales, or both as indicators of firm size (Doğan, 2013; Dang et al., 2018). In contrast, medium to small firms gained a sales revenue below two billion or total assets below one hundred million. The selection of firm size proxy should be based on the theoretical or empirical question. As this study highlights the impacts of 2008 policies on firms possessing diverse sources or different earning capabilities, total assets and sales were employed when categorizing the firm's size and comparing the results.

Table 4.10 DID analysis by firm size (sales)

DID analysis by different sizes	**Small size**		**Large**	
（Classified by Sales）	**Financial health**		**Financial health**	
	coefficient	p-value	coefficient	p-value
VOFFp2008	-.0563414	0.607	-0.444307**	0.001
VOFF	0.5685197***	0.000	0.5123284***	0.000
P2008	-0.0330791	0.757	0.0254375	0.839
Total debt to equity	-0.0002671	0.332	0.0096073	0.196
Cash flow to total assets	.3192959**	0.001	4.388108***	0.000
Return on equity	-.0129367	0.430	-.5059345**	0.001
Net profit margin	-.0138246	0.155	-0.8410996***	0.000
Current ratio	0.1103917***	0.000	0.1758184***	0.000
ROIC	-0.0006431	0.657	0.0195422***	0.000
M2(log)	-0.0739774	0.520	-0.2340658*	0.023
GDP (%)	-0.0161082	0.184	-0.0533588***	0.000
CPI (log)	0.4938378	0.838	3.361185	0.083
_cons	0.2876741	0.952	-4.593991	0.231
N	*702*		*364*	
R-sq	*0.4911*		*0.6034*	

p-values in parentheses
*p<0.05, **p<0.01,***p<0.001

Table 4.10 illustrates the result by differentiating firm size according to their sales revenue, while Table

4.11 shows the results of different sizes of firms based on their total assets. Both Table 4.10 and 4.11 yield similar results: development firms with different sizes perform differently to the implemented policies. The stimulus policy shows significant negative impacts on larger-size firms, and no significant effects are shown on small- to medium-sized firms, even though this policy has improved their financial flexibility. Smaller firms have financial constraints, limited access to external financing, and a higher probability of bankruptcy, which is based on previous studies mentioned earlier in this chapter. Therefore, increasing the money supply or reducing the cost of lending would not affect the small to medium firms' chance of accessing new funding that is still limited. Comparatively, larger property firms already have more advantages in gaining new borrowing when a stimulus policy is implemented. It has not changed the financing perspective for the larger size property development firms. Also, the stimulus package does not directly target the property development sector; instead, the money flows to the infrastructure and other industries. Both large and small to medium size firms have significant positive relations with the financial flexibility status. The stimulus package was targeted at the infrastructure sector, hence causing an increased demand for labour and construction materials. And eventually, had put upward pressures on the prices of materials, labor and other related development costs. These have diminished profits for the property development firms. However, no significant relationship can be seen between firms' financial health and the 2008 stimulus package for small firms.

Table 4.11 Sub-group by firm size (total assets)

DID analysis by different size	**Small size**		**Large**	
(classified by total assets)	**Financial health**		**Financial health**	
	Coefficient	p-value	Coefficient	p-value
VOFFp2008	0.4158153	0.141	-0.37898***	0.000
VOFF	0.7511232***	0.000	0.4838874***	0.000
P2008	0.2006996	0.422	0.0521086	0.542
Total debt to equity	-0.0019975	0.499	-0.0005062*	0.019
Cash flow to total assets	0.2518579*	0.030	2.633708***	0.000
Return on equity	0.0087953	0.807	-0.0492742**	0.005
Net profit margin	-0.0309369	0.277	-0.0231121**	0.006
Current ratio	0.0755519***	0.000	0.189006	0.000
ROIC	-0.0008008	0.692	-0.003432	0.269
M2(log)	-0.4031335	0.234	-0.1009785	0.193
GDP (%)	0.0412271	0.204	-0.0209141*	0.017
CPI (log)	0.9397041	0.873	2.234267	0.196
_cons	*0.2855744*	*0.981*	-3.206087	0.350
N	*197*		*869*	
R-sq	0.4925		0.4937	

p-values in parentheses
*p<0.05, **p<0.01,***p<0.001

4.4.2 Firm's capital structure

The 2008 stimulus package encouraged borrowing by decreasing interest rates; however, both firms with more debts and lower debts did not show any significant relation with financial health when introducing the stimulus package.

Firms are classified as having more debt or less to test the effects of policy on development firms with different capital structures. This is to investigate how the policies impacted the firms with different debt levels. Table 4.12 shows the modeling results that the financial health of firms with more debt reacts negatively with the stimulus packages. This shows that the debt burden has harmed the liquidity and solvency of firms. This unhealthy capital structure has restricted firms from accessing new funding or borrowing although the stimulus policy encourages funding flow into the property sector. On the other hand, these firms suffered more during the financial crisis than firms with less debt burden. Therefore, the negative relation has been identified.

Comparatively, financial flexibility has a more profound impact on firms with less debt than firms with more debt, showing that firms with less debt require higher financial flexibility to compensate for the inability to access funding in time of uncertainty. Profitability indicators, both the net profit margin and return on equity, are significant with the less debt proportion firms' financial health. Cash flow ratios significantly impact firms with high debt than less debt burdens. The current ratio is positively related to firms with less debt.

The return on invested capital (ROIC) is more significantly related to firms with less debt. Firms with less debt have a higher proportion of equity. Therefore, they have a higher weighted average cost as the cost of equity is usually higher than the cost of debt (the risk the shareholders take is higher than the debt holders; therefore, the required return rate/cost of equity is higher). This explains why the sensitivity of changes in ROIC on financial health is higher with less debt proportion development firms.

Table 4.12 Firm's capital structure (debt to total assets)

DID analysis on firms with different capital structure	Financial health (more debt)		Financial health (less debt)	
	Coefficient	p-value	Coefficient	p-value
VOFFp2008	-0.1252567**	0.005	-0.1454621	0.247
VOFF	0.1325144**	0.001	0.3644733***	0.000
P2008	0.0502995	0.160	0.015312	0.900
Total debt to equity	-0.0000453	0.495	-0.5594347***	0.000
Cash flow to total assets	0.2901583***	0.000	2.99449**	0.001
Return on equity	-0.0004226	0.919	-0.92041*	0.027
Net profit margin	-0.0197963**	0.001	0.0788672	0.049
Current ratio	-0.0152707	0.320	0.0093768***	0.000
ROIC	-0.0001214	0.765	0.048631*	0.017
M2(log)	-0.0376217	0.351	0.048631	0.647
GDP (%)	-0.0025371	0.575	-0.0082438	0.479
CPI (log)	-0.8217359	0.337	2.559589	0.273
_cons	2.848945	0.091	-3.761847	0.418
N	393		673	
R-sq	0.1676		0.6811	

p-values in parentheses
*p<0.05, **p<0.01, ***p<0.001

4.4.3 Firm's retained earnings

Firms' retained earnings have a significant impact on their financial health. The accumulated net income the firm generates is retained at a particular point in time. At the end of an accounting period, the net income (or net loss) is transferred from the profit loss account to the retained earnings account. Profit gives room for business owners to utilize their surplus money earned. It can be paid to shareholders or reinvested into the company for growth. If a company uses up all its retained earnings to pay dividends and not reinvest it into new projects, then the company might be a restraint for growth. On the contrary, if the company does not use retained earnings efficiently, there will be an increased likelihood of taking on additional debt or issuing new equity. If the retained earnings account is negative, it is represented as an accumulated loss. The retention ratio is higher for growth companies that are experiencing rapid increases in revenues and profits. As investigated in the literature review, retained earnings reflect both the dividend policy that the firms employed and the strategies whether they save the retained earnings later for new projects or investments. These different strategies may change the impacts of external policy on firms' financial health, which is worth investigating. To model the effects of policy on holding different levels of retained earnings by firms, firms were grouped into two; one with higher retained earnings and the other with lower retained earnings. The results are shown in Table 4.13

Table 4.13 Analysis by firms retained earnings

DID analysis of firms with different retained earnings	Financial health (More RE)		Financial health (Less RE)	
	Coefficient	p-value	Coefficient	p-value
VOFFp2008	-3.43224***	0.000	-0.2163901*	0.030
VOFF	3.457786***	0.000	0.5894013***	0.000
P2008	2.897089***	0.000	0.0168822	0.866
Total debt to equity	0.0299451	0.113	-0.0002341	0.366
Cash flow to total assets	13.83151***	0.000	0.2815077**	0.001
Return on equity	-2.132861***	0.000	-0.0148906	0.350
Net profit margin	-0.8373994***	0.000	-0.0161588	0.085
Current ratio	0.1597187***	0.000	0.1097436***	0.000
ROIC	0.0178396**	0.001	0.000303	0.824
M2(log)	0.4371495*	0.015	-0.1023451	0.320
GDP (%)	-0.0051133	0.816	-0.0188255	0.081
CPI (log)	2.714101	0.244	0.6048139	0.774
_cons	-10.03479*	0.031	0.2154021	0.959
N	227		839	
R-sq	0.6915		0.4961	

RE: Retained earning

p-values in parentheses

*p<0.05, **p<0.01, ***p<0.001

The collected sample has 227 observations belonging to the category of higher retained earnings. With the higher retained earning groups, the stimulus package has a significant negative impact on firms with different levels of financial flexibility. The remaining 846 observations belong to the category of less

retained earnings group. The stimulus package encourages firms to spend and invest with aims to stimulate and promote economic growth. Firms with higher retained earnings means firms rather save the net profit rather than invest or pay dividends. As such, this group of firms negatively reacts to the stimulus package. Apart from the policy impacts, retained earnings affect the financial health of development firms. Retained earnings are the firm's equity that can be used for reinvestment. The financial health of firms with higher retained earnings is affected significantly by external policy, financial flexibility, cash flows, and profitability. When firms have higher retained earnings, property development firms will take on more development projects. The financial health of firms will be exposed to internal and external factors. However, financial flexibility and cash flows mainly affect the financial health of firms with less retained earnings. This result implies that firms with less retained earnings have less opportunity for reinvestment and expanding business. The main risks the firms face are the cash flow and liquidity for firms to survive.

4.4.4 Firm's profitability (return on assets)

Profitability measures how efficiently a firm employs its assets to generate cash to meet its financial obligations. The impact of how firms with different profitability levels react to the implemented policies was tested, with two groups classified as one with higher ROA and one with less ROA. The results in Table 4.14 illustrate that both groups were impact by the policy. P2008 represent the policy. It is a dummy variable that 0 means before 2008 that the policy was not yet implemented, and 1 means after 2008 that the policy has become effective. This has also been mentioned in the methodology chapter.

Table 4.14 Impacts of firm's return on assets

Firms with different ROA	Financial health (More ROA)		Financial health (Less ROA)	
	Coefficient	p-value	Coefficient	p-value
VOFFp2008	-0.7984439***	0.000	-0.3606482*	0.023
VOFF	0.9785054***	0.000	0.7245757***	0.000
P2008	0.3647203*	0.024	0.2464987*	0.031
Total debt to equity	-0.0518953***	0.000	-0.0001442	0.574
Cash flow to total assets	0.2091329*	0.028	0.3848899	0.240
Return on equity	0.6938824**	0.002	0.0006512	0.968
Net profit margin	-0.0220013*	0.015	-0.0157427	0.426
Current ratio	0.2454414***	0.000	0.098896***	0.000
ROIC	0.0043626	0.051	-0.0025779	0.271
M2(log)	0.0474071	0.632	-0.3995782**	0.002
GDP (%)	-0.028901**	0.009	0.0013797	0.925
CPI (log)	2.505402	0.252	0.1208777	0.968
_cons	-4.813906	0.267	2.293975	0.697
N	576		490	
R-sq	0.5641		0.5603	

p-values in parentheses

*p<0.05,**p<0.01,***p<0.001

Apart from the policy, the ROIC, liquidity, and cash flow also positively affect the group's financial status with a higher ROA. Totally, 576 observations are firms with higher ROA，while 490 observations fell into the group with lower return on assets. Negative effects of policy on firms' financial performance have also been found within these group. Apart from the policy effects, capital structure has a negative impact. Profitability, cash flow, and liquidity show strong positive effects on improving firms' financial status with higher ROA.

4.4.5 Firm's cash flow

The firm's cash flow to total assets indicates the sufficiency of its total cash flow to cover its day-to-day operating activities. Firms with higher cash flows would have more flexibility in investment options; therefore, it is assumed to be less likely to become financially distressed. To analyze the effects of policy impact on firms with different levels of cash flow positions, two groups, the high cash flow group and the low cash flow group, are divided. The 884 firms were identified as the higher cash flow group, and 182 firms were the lower cash flow group (refer to Table 4.15). The model results show that stimulus policy affected both groups of firms. The firms with lower cash flow react strongly compared to those with higher cash flow positions. The strong positive impact, i.e., 1.048, shows that the stimulus policy had improved the cash flow and survival of firms with lower cash flow positions. For the firms with higher cash flow positions, the stimulus policy had a negative impact (-39.35%) on firms' financial health. This could be the fact that the stimulus policy in 2008 had expanded the infrastructure and business as a whole creating inflation from 4.82% in 2007 to 5.93% in 2008. The purchasing power of the firms with higher cash flow was reduced.

Table 4.15 Modeling results of the firm's cash flow status

Firms with different cash flow	Financial health (More cash flow)		Financial health (Less cash flow)	
	Coefficient	p-value	Coefficient	p-value
VOFFp2008	-0.3935135***	0.000	1.048333***	0.000
VOFF	0.7109048***	0.000	0.3776125	0.143
P2008	0.1530518	0.139	-0.1217591	0.406
Total debt to equity	-0.0042281	0.309	-0.0000559	0.768
Cash flow to total assets	0.1768024	0.082	-0.1216026	0.624
Return on equity	-0.342938*	0.037	-0.0010261	0.930
Net profit margin	-0.0172947	0.100	-0.0090387	0.548
Current ratio	0.1170757***	0.000	0.104237***	0.000
ROIC	0.0045942*	0.038	6.39e-07	1.000
M2(log)	-0.2105677*	0.023	-0.2854665	0.071
GDP (%)	-0.007754	0.449	-0.003119	0.867
CPI (log)	0.1750914	0.933	4.404783	0.251
_cons	1.34874	0.742	-6.747771	0.379
N	884		182	
R-sq	0.4336		0.5240	

p-values in parentheses

*p<0.05,**p<0.01,***p<0.001

Totally, 884 observers belong to the higher cash flow group. A negative relationship has been found. Other variables also indicated significant relation with the firm's performance. The financial flexibility has been positively connected with firms' financial health in the higher cash flow group. The 182 samples fell into the group of lower cash flow, and benefit most as the policy has positively changed firms financial health while improving the liquidity.

4.4.6 Firm's ownership structure

Table 4.16 shows that the stimulus policy has negative effects on state-owned development firms. Compared with private companies, state-owned enterprises are familiar with resource monopolies. They can capture economies of scale, while simultaneously achieving public objectives. However, the SOEs are also known as operating inefficiently, facing agency problems as there are conflicts between their controlling shareholders and minority shareholders, and the hierarchy structure will lead to more significant information asymmetry between the decision maker and executor (Lin et al., 2020). Therefore, when reacting to new policies, the SOEs tend to be slow and less. As a result, SOEs negatively responded to the 2008 stimulus package. Non-SOEs had no effects on the interactive term indicated in this group. Liquidity shows a positive connection with financial health, no other significant relations have been found in this group.

Table 4.16 Modelling results by firm's ownership structure

Firms are stated own/non-state owned	Financial health (State-owned)		Financial health (non-State-owned)	
	Coefficient	p-value	Coefficient	p-value
VOFFp2008	-0.4602851***	0.000	-.0872697	0.569
VOFF	0.6825693***	0.000	.4429443***	0.000
P2008	0.0750331	0.448	.0240832	0.871
Total debt to equity	-0.0064259*	0.044	-.0002983	0.278
Cash flow to total assets	1.120197**	0.006	.1812495	0.113
Return on equity	-0.0633053*	0.028	-.0202904	0.338
Net profit margin	-0.0060417	0.750	-.025815	0.021
Current ratio	0.0907253**	0.000	.2189448***	0.000
ROIC	-0.003132	0.081	.0029566	0.224
M2(log)	-0.0851324	0.386	-.2980006	0.036
GDP (%)	-0.0159398	0.147	-.0079108	0.619
CPI (log)	-0.0893473	0.968	2.554708	0.435
_cons	1.485627	0.737	-3.058987	0.637
N	635		431	
R-sq	0.5343		0.5920	

p-values in parentheses

*p<0.05,**p<0.01,***p<0.001

4. 5 Chapter Summary

This chapter presented the empirical results and provided interpretations of the results of the financial health determinant models, policy impacts models applied DID techniques, and compared results with firms of different financial characteristics. The next chapter focuses on the discussion of the results.

Chapter 5 Discussions of the Research Results

5.0 Introduction

As stated previously, a financially healthy firm can control its capital to pay all expenses, meet its debt obligation, and create value for the firm. Understanding the financial health of firms can assist the firms in managing their capital and guiding their operation and investment decisions. In the previous chapter, the internal and external determinants for firms' financial health have been tested using collected data from property development firms through the database. The results indicated that internal factors, such as firm size, profitability, liquidity, solvency, capital structure, and financial flexibility, and external factors, such as monetary supply, significantly contribute to firms' financial health. The difference in difference (DID) model was used to testify to what extent and how that policy could impact property firms' financial health. This chapter discusses the research findings between the results of this research and similar empirical studies from past literature. This comparison includes the main determinants that affect property developers' financial health, and how the policy impacts the financial health of firms. Further, it considers the diverse impacts on firms with different characteristics.

The parallel trend studies from the previous chapter have indicated that among the economic policies that the government implemented during 2000–2016 in China, the 2008 stimulus package has significantly altered firms' financial conditions compared with other effective economic policies proposed in other years. It is confirmed that the 2008 stimulus package's impacts on property development firms' financial health lasted until 2009. The results suggest that although the 2008 stimulus package has effectively expanded credits and money supply, it did not directly improve developers' financial health. Instead, it changed the financial flexibility level and allowed firms to become capable of handling upcoming obligations and assessing extra credits that improve liquidity and solvency. It then resulted in more flexibility in selecting investment opportunities that strengthened the profitability perspective and eventually enhanced the financial health of firms.

Development firms are always capital intensive; therefore, development firms are impacted most by policies that change the availability of funding compared to firms from other sectors. Hence, this work studied development firms of different sizes, liquidity levels, capital structures, efficiencies, and ownership structures. The results uncovered that firms with larger sizes, higher liquidity, and cash flow became more sensitive to economic policies (benefit from the 2008 economic stimulus package). This is becauze size, liquidity and cash flow has been proven as the main determinants for firms' financial health, and this is consistent with the previous studies (Yazdanfar and Öhman, 2014; Bala et al., 2016; Le et al., 2018; Van and Wachowicz, 2000).

5.1. Determinants of Financial Health

According to the financial health determinant model developed in this research, a statistically significant correlation coefficient between the internal factors and the overall financial health of property development firms was measured using Altman's Z-score. These internal factors include financial flexibility, the firm's profitability, cash flow, liquidity, and external factors, such as monetary supply. Some of the significant factors identified in this study are consistent with the previous literature (Gamba and Triantis, 2008; Denis and Mckeon, 2012; Sang, 2018; Panda and Nanda, 2018; Gregory, 2020; Masdupi et al., 2018). However, factors such as the interest rate, industry index as property climate, and other factors, including gross domestic product (GDP) and consumer price index (CPI), did not show any significant relationship with firms' financial status, which deviated from the previous findings in the literature.

5.1.1 Important roles of financial flexibility in firms' financial health

Previous research focused more on what factors could impact financial flexibility (Bayar et al., 2017) and how to maintain a firm's financial flexibility. Relatively less research focused on the role of financial flexibility in affecting firms' financial status. This research has introduced the variable of financial flexibility, which measures the firms' capability to deal with negative income shocks and to take advantage of positive ones (Gamba and Triantis, 2008), into the financial determinants model to testify to the effects of policy impact on the financial health of development firms. When a firm has a flexible financial status, it means that the firm can source funds when needed. A positive relationship between financial flexibility and firms' financial health has been found in this research, which means it can help to hedge external economic or policy shocks. This is because when a firm's financial flexibility is improved, the sources of financing funds and the line of credit limited can be increased, and the costs of funds may be reduced. This will help the firm's cash flows for operating and investing activities. It will also help the firm to overcome unexpected events. The findings are consistent with previous empirical studies that financial flexibility affects firms' level and efficiency of investment and the speed of working capital adjustment. Therefore, firms with higher financial flexibility are less likely to be in financial distress (Denis and Mckeon, 2012; Sang, 2018; Panda and Nanda, 2018; Gregory, 2020). Scholars argued that when expecting external shocks, firms adjust their cash holding and financing (capital structure) policy to maintain a specific level of financial flexibility to handle the upcoming shocks or uncertainty (Lei, 2005; Banos-Caballero et al., 2016). Financial flexibility is crucial in property development firms due to the nature of property development firms that rely on equity and external sources of funds in the development process and where incoming cash flow is only received after the net sale proceeds. When an internal operation or external factors cause a cash flow shortage in the development, a financially flexible firm can use a line of credit or source funds from public or financial institutions to tackle the issues.

5.1.2 Improving profitability enhancing financial health

Firms' profitability, represented by return on assets, were positively related to development firms' financial health. This is true when a profitable development firm generates more income from its net sale proceeds and will have a stronger financial position to further procure development projects.

These research findings are consistent with Masdupi et al. (2018), Pindado et al. (2008), and Saputri and Asrori (2019), who also confirmed that profitability has a significant positive effect on the financial health of firms. Net income to total assets, retained earnings to total assets, earnings before interest and tax, and net income on sales, are the most common representative indicators of profitability (Theodossiou et al., 1996; Bhunia, 2011; Restianti and Agustina, 2018). Using a binary variable to measure whether the firm is in financial distress (1 means yes and 0 otherwise), Pindado et al. (2008) found that profitability denoted by return on assets is negatively related to the financial distress level of the firm. Saputri and Asrori (2019) use return on equity (ROE) to measure profitability, and a positive relationship has been found. This indicates that the more profitable the firm, the higher the ability to repay the firm's obligations and, therefore, the less likely that the firm is in financial distress.

Given the financial intensive nature of property development firms, it requires firms to understand the changes in demand and supply of property markets, in order to price the value of the developed property properly. The firms are suggested the manage the development costs and cash flows and improve uncertainty and risk management in place to improve the profitability of the development.

5.1.3 Cash flow management

The cash flow variable has been found to affect property development firms' financial health significantly. Similar results have been derived from Sayari and Mugan (2013), Karas and Režňáková (2020), and Gupta et al. (2021), reflecting that there is a positive relationship between cash flow and the financial health of Indian firms. Most of the case studies in the literature used the operating cash flow ratio as the proxy of cash flow in predicting firms' financial health (Casey and Bartczak, 1985; Putri, 2021). This is because the greater the cash flow from the operation, the more likely the enterprise is to withstand adverse changes.

In recent years, some literature has applied a different "free cash flow" measurement in analyzing a firm's financial health (Setiany, 2021). A significant and positive relationship has been found between free cash flow and a firm's financial health. However, Zhang et al. (2016) have also argued that an overflow of free cash flow is harmful based on Jensen (1986) and tested to find evidence of the overinvestment problem caused by free cash flow. Due to the nature of development firms, cash flow is always the central issue of property development, and thus, an overflow of free cash flow is a less

likely situation. However, development firms must carefully manage cash flow to meet the expenses required until the income has been generated at the end of the development stage.

5.1.4 Liquidity and financial health

When cash flow measures the amount of cash that firms can use for their operating expenses, liquidity ensures that firms can convert assets to cash quickly to meet their short-term obligations. The current ratio has been applied as the liquidity indicator in the financial health determinants model and has shown a positive relationship between liquidity and financial health. This means that the more liquid the firm is, the less likely it is to fail to pay back its short time debt and obligations as it can liquidate its assets quickly, generating cashflows. Unlike an income-producing industry, maintaining a firm's liquidity is difficult for property development firms.

This finding is consistent with Amoa-Gyarteng (2021) and Purwanti et al. (2022), who have testified that liquidity plays a positive role in enterprises' financial health to prevent distress. When the firm is in an unhealthy state, then the firm is likely to be in an illiquid position. The current ratio and working capital ratio are the most frequent measurements used by many pieces of literature when evaluating firms' likelihood of failure (Moch et al., 2019). However, different results were gained by some other researchers. Dianova and Nahumury (2019), Salehi and Abedini (2009), and Liahmad et al. (2021) found no impact of liquidity on improving firms' financial condition. The author argues that these unexpected results may be due to the sample size and other variables not included in the model.

5.1.5 Operating efficiency and financial health

Operating efficiency is negatively related to financial health. Days of sales outstanding represent operating efficiency. In this research, financial health does not have significant relation with the operating efficiency of the firms. The reason for the insignificant relation, is that, in the property sector, the days of sales outstanding depend on more complicated factors. The developers can only sell the property to individual buyers when the presale permit is granted. The presale permit is granted when all the development permissions obtained and all the requirements from the government are fullfiled. What's more, how quickly the completed property could be sold depends on the macro-economic environment, regional development, demographic structure, and the demand for housing. For the above reasons, it is not comparable to the Days of sales outstanding from housing to housing. The days of sales ratio measures how long a business takes to collect its outstanding accounts receivables. The shorter the days of sales outstanding, the more efficient the firm's operation. The previous investigation has confirmed identical results that the relationship between financial performance and operational efficiency is negatively significant. The days of sales outstanding, days of payable outstanding, and credit payment outstanding were highly associated with profitability, thus affecting its financial health (Charitou et al., 2010; Uyar, 2009; Gołaś, 2020). Comparatively, the days of sales outstanding were a

more frequently used variable compared with the other two efficiency ratios.

The reason for the insignificant relations, is that, in the property sector, the days of sales outstanding depends on more complicated factors. The developers can only sell the property to individual buyer when the presale permit is granted. The presale permitis is granted when obtained all the permissions and fullfill all the requirements from the government. What's more, how quick the completed property could be sold depends on macro-economic environment, regional development, demographic structure, and the demand for housing. For the above reasons, it is not comparable of the Days of sales outstanding from housing to housing.

5.1.6 Ownership structure and firms' financial health

As mentioned in the previous chapter, the government owns some development firms, and some are privately owned. The relationship between ownership structure and firm financial health was found insignificant in the developed model. This result is in line with the research by Demsetz (2001) that no systematic relationship between ownership structure and firm performance. However, with applied the dynamic GMM method, a significant relationship has been indicated by Udin et al. (2017) that the company became financially distressed when insiders' ownership increased. However, there is no significant relationship between the government entity and the firm's financial health. Hu and Zheng (2015) found a significant relationship that state-owned ownership helped firms to reduce their likelihood of financial failure. Compared with the previous articles mentioned above, the different results obtained from this research are that financial flexibility, liquidity, solvency, and profitability are more important factors in property development than the ownership structure.

5.1.7 Capital structure and firms' financial health

In the financial health determinant model, both the total debt to total assets ratio and interest coverage ratio has been used to measure the solvency of firms and examine their impacts on the financial health of property development firms. The results show no significant effects of these two determinants on firms. Solvency has always been a key measurement of how a company can cope with its long-term debt. Scholars have argued and testified that increases in debt would weaken the interest coverage ability and eventually cause a higher default probability (Thim et al., 2011; Mselmi et al., 2017; Kamaluddin et al., 2019). The difference in results implies that the debt structure for property development firms is different. The financial institution usually grants short-term development loans or project financing rather than long-term loans to lower the default risk. Therefore, the capital structure is constituted of short-term rather than long-term debt and does not impact as much as short-term liquidity on the financial health of the firms.

5.1.8 Economic policy and firms' financial health

The economic policy represented by monetary supply and/or interest rate on firms shows a negative relationship between money supply and financial health. In contrast, interest rate change has been found to have no significant impact on property development. Similarly, Alifiah and Tahir (2018) found a positive relationship between the money supply M_2 and the financial distress of Malaysian manufacturing companies, which indicated that a higher money supply might lead firms to financial distress. Other studies demonstrated that the higher the money supply, the less likely its for firms to fail (Tirapat, 1999).

The controversial research results implied that the relationship between economic policy and firms' financial health is complicated and not straightforward. This suggests that economic policy does not directly affect firms. However, altering their internal financial flexibility eventually changes firms' financial conditions. The policy in 2008 were trying to stimulate general economic, the negative outcome in 2008 indicated the following:

1) The policy was targeted to general economic not only the real estate sector.
2) It can be told that the economic crisis in 2008 has negative impact on economic, combining the results in table 4.9, the stimulus package (policy) seperately has significant positive impact. This means policy realized in 2008 can only help to decrease the negative impact to a certain level but could not reverse it immediately.
3) The policy effects have helped the real estate market revitalized and in later years fuel the real estate prices and improved the performance of property development firms (relecting in the improve in coefficient of financial health in the later years in both 2009 and 2010). The parallel trend analysis graph (Figure 4.2) has also identified the upward trend in the later years since 2008.
4) The improve in financial health coefficient was not related to any policy or changes later in 2009 or 2010, since there's no significant relationship can been seen during these two years.

5.1.9 Economic impact on financial health

Economic variables, such as GDP and CPI, were tested, and no statistically significant relationship was found with the financial health of property development firms. There is limited evidence of a direct link between economic policies on firms' overall financial health in this study.

Similar results were gained compared with literature that tested the macroeconomic variables. Most studies have attempted to predict firms' success or failure using firm-specific (micro) information. A limited number of researchers paid attention to the macroeconomic effects of individual firms. However, amongst those studies, past empirical evidence suggested that economic variables related to financial sectors and financing costs, such as credit spread and interest rate, have a significant relationship with

financial health; however, in this research GDP, CPI, and monetary supply did not directly impact firms. Acosta-González et al. (2016) studied the Spanish construction sector with applied macroeconomic variables such as interest rate term structure (the difference between long-term interest rate and short-term interest rate), interest rate, volatility of the stock market, annual government debt, country risk premium, CPI, GDP, credit to construction companies (total amount of debt grant by the bank to the construction sector), credit to householders (total amount of credit granted by banks to householders), annual bank arrears, and land price. The traditional economic variables, such as GDP and CPI, did not significantly alter firms' financial health in this research. However, the results show that macro-economic variables (such as credit for the housing sector, bank arrears, interest rate, and interest rate term structure) that are directly or indirectly related to the banking and financial sector were the main economic variables that affect the construction sector in Spain, given that banks are the principal financing provider for construction and also the end products (the property) is sold and financed with a proportion of mortgage loan. Alifiah (2014) tested several macroeconomic variables, such as base lending rate, CPI, GDP, and money supply (M_2), on the likelihood of firms' financial distress and bankruptcy. Only the base lending rate showed a significant relationship with firms' financial conditions. GDP and CPI do not significantly impact firms' success or failure. Tinoco and Wilson (2013) used a sample of 23,218 company-year observations of listed non-financial companies during the period 1989–2011 to develop a risk model by applying accounting, market-base, and macroeconomic variables to predict if the firms are in financial distress or have the risk of bankruptcy. The macroeconomic variable selected was the three-month UK T-bill as the representative indicator of interest rate and the Retail Price Index (RPI). Positive variables on firms' financial distress level indicated that they affect firms' financial health. The positive RPI indicated that the higher the price increase, the higher the risk of financial distress of the firm; also, a higher level of interest rate corresponds to a higher probability of the firm becoming financially distressed.

5.1.10 Summary of the section

Developing the financial health determinant model identified the determinants of the financial health of property development firms. Based on the capital-intensive nature of property development firms, the increase in money supply positively linked to the credit availability for firms is found to be significant for property development firms. However, an overflow of liquidity in the market will encourage property development firms to rush to the financial institution for financing and add leverage to the firms, which causes negative effects with increasing default risks. Internal factors such as financial flexibility, firm size, profitability, liquidity, capital structure, and cash flow ratio were testified to be statistically significant on the financial health of the firms. This is consistent with previous studies. However, corporate ownership and a series of external economic factors such as GDP, CPI, and property sector index (property climate) were found statistically insignificant, and the findings have deviated from the past literature. This phenomenon is because different sectors have unique features and are

affected or react differently to different economic variable changes. In the following section, a detailed discussion is provided on how the policy impacts firms' financial health.

5.2 Policy Impacts on Firms' Financial Health

This thesis has investigated how government economic policies affect the financial health of property development firms. Based on the results obtained from the financial health determinants model, it is indicated that policy has little direct impact on a firm's financial health. On the other hand, although some studies have shown a significant connection between financial health and interest rate adjustment, this variable has been rejected by this study's financial health determinants model. Therefore, it can be inferred that there is a missing piece that the policies will affect and eventually act on improving or deteriorating firms' financial conditions. Among all the internal determinants, financial flexibilities have a more comprehensive financial influence on firms, especially property development firms. Also, financial flexibility is more closely connected with external variables, regarding the ability to respond to external shocks, repay due financial obligations to avoid financial default and bankruptcy, and restructure its finance (both internally and externally) with lower financing costs. Firms will respond differently to external shocks with varied financial flexibility levels (Fahlenbrach et al., 2021; Islam et al., 2019; De Jong et al., 2012). In other words, the economic policy has a direct influence on financial flexibility by enhancing or decreasing the liquidity of firms' reserved for future investment or external shocks via credit channels (Uysal, 2017), encouraging or discouraging firms from accessing extra financing, and financing-related costs (Drechsler, 2017). The adjustment of interest rate works simultaneously, will increase or decrease the debt burden by altering the cost of acquiring new finance, and therefore change the financial flexibility of firms.

Property development firms have unique features that rely heavily on financial flexibility. First and one of the most important components of financial flexibility is the ability to generate funds to cover costs when required. As mentioned in the previous chapter, property development projects are capital intensive as no cash flow or income revenue is generated to cover their development cost until realized at the sales stage. Therefore, seeking funding sources at a reasonable price that covers a sufficient period with fewer restrictions is challenging for property development firms. According to Coiacetto and Bryant (2014), development financing differs from other forms of property financing, with asset pledges in which the loan is secured. At the same time, no income is generated to serve the loan. Funding must be available throughout the development process, including land acquisition, design, statutory approval, marketing, construction, and sale/leasing. Ratcliffe et al. (2021) studied the UK property development market. They advised that property development projects are usually provided by firms internally and can be financed by insurance companies, pension funds, banks, the construction industry, property companies, and governments. Property development finance costs reflect the risk level of the property developers and the development projects. The lenders are prepared to lend funds that are eventually

determined by the security offered by the projects or property developers (Brueggeman & Fisher 2011). The funding source can be grouped into equity and debt finance. When developers provide equity financing, they increase their level of risk. This is because equity financing typically costs more than debt and firms give up a portion of ownership. When the firms are insolvent, the equity shareholders are the last paid if there is any asset left thus equity financing is high risk. In comparison, debt financing is subject to credit risk linked to the property developer's ability to repay the loan or, in other words, the probability of default. It is dependent on interest fluctuation, project cost over-run, withdrawal or support by the lenders, and incorrect forecast of the future cash flow (Havard, 2008). Property development finance is complicated due to illiquidity, funds tied up with property development until sold, and a long development time span, meaning loans often need refinancing (Wilkinson et al., 2008). The following subsections discuss the alternative impacts of economic policy changes on firms with different characteristics.

5.2.1 Economic policy effects on different property firms

The results have shown a significant impact of the interactive policy variable and financial flexibility on the financial health of property firms. This thesis tested the policy variable using the 2008 economic stimulus packages, a series of policies combining monetary and fiscal measures to stabilize the economy at the critical time of the 2007–2008 financial crisis. The independent variable is the interactive term of time (before and after the policy was implemented), and firms with different levels of financial flexibility were applied in the developed models. The statistically significant results imply that although economic policies do not directly impact the financial health of firms, by altering the financial flexibility level of firms, they have combined effects on altering firms' financial status.

This result is similar to previous ones regarding the indirect impact reflected via both credit channel and balance sheet channel transmission of the monetary policy in which the credit supply and demand change the cost of finance and the firms' cash flow. This eventually affects firms' financial position, but it does not necessarily mean that firms will have an immediate risk of financial constraints or bankruptcy (Benanke and Gertler, 1995; Bernanke et al., 1999; Gertler and Karadi, 2015). The research on how economic policy uncertainty affects firms also has a similar conclusion that economic uncertainty may reflect the change in the value or returns of the firms, but there is no direct impact on the financial failure or success (Baker, Bloom and Davis, 2012; Cui et al.,2021; Kim and Yasuda, 2021).

5.2.2 Combined effects of economic policy and financial effects

The parallel trend analysis has been conducted to test the firms with different level of flexibility that share a common trend. The result shows that even without policy treatments, development firms with varying levels of financial flexibility follow the same trend. This trend can be seen in the graphic analysis from the previous chapter. The results of this study also proved that the 2008 stimulus package

became effective immediately rather than having a time lag. It impacted firms' financial performance in 2008 and lasted until 2010, with the result shown in Table 4.6 and the graph inspection from Figure 4.2. The interactive term represents the impact of time/policy and different levels of financial flexibility firms on their financial health. This indicates that economic policy work together with firms financial flexibility level and impacts firms' financial performance and it is gradually reversed the negative impact from the global financial crisis. The financial flexibility and the event in P2008 are statistically significant. The results suggest that the stimulus policy in 2008 and financial flexibility had very strong positive effects on the financial health of the property development firms, where the financial health could be improved by 55.7% with a 1% positive change in financial flexibility (refer to Model 9). There is a strong positive effect of the 2008 stimulus policy on firms at 31.8%. The negative interactive term may originate from the shocks from the 2008 global crisis and suggested that both policy and financial flexibility have helped to offset the shocks from the global crisis.

This drastic effect has confirmed the earlier assumption (*H1a*) that economic policies can directly and indirectly affect the financial health of property development firms and (H1b) that financial flexibility directly affects the financial health of property development firms. This is consistent with empirical evidence that the expansionary monetary policy increases cash flow to firms and acquires less financing cost as interest rate declines, which supplies sufficient liquidity and improves firms' financial structure. Kasahara et al. (2019) studied the effects of bank recapitalized policy on improving corporate investment, indicating that the impact of this policy on firms is significant and positive. Cai (2021) studied the 2008 stimulus package in China and compared the effects of policy on firms with a heterogeneous level of productivity. The results confirmed that the expansion of monetary policy enhanced firms' connection with funding sources and reduced financing costs, which benefits firms' financial health with increasing levels of investment and better resource allocation. Acharya et al. (2019) discussed the impact of the Outright Monetary Transaction program, which indirectly recapitalized European banks and aimed to regain financial stability and found that the increased liquidity revitalized firms through reserved cash holdings.

Comparatively, this research focuses on the effects of policy on financial health with different financial flexibility. From the previous discussion, it is certain that economic policy, especially monetary policy, played a crucial role in altering firms' financial status by increasing or suppressing the liquidity available to the firms. However, firms tend to react differently regarding different financial natures, which attracts the increasing interest of researchers. For instance, higher productivity firms would benefit less than lower productivity firms from the monetary policy due to the resource misallocating issue (Cai, 2021). Financially constrained firms respond more actively to monetary policy (Kashyap et al., 1994; Gertler and Gilchrist, 1994). Firms with different leverage levels react differently to economic policy (Ottonello and Winberry, 2018). However, for property development firms, maintaining adequate financial flexibility (the liquidity status and the potential ability to gain new funding) is essential

compared to firms within other sectors. This has been proven by the empirical result from the previous chapter (e.g., Table 4.9 a and b, model 9) that policy combined with financial flexibility has helped to reverse the negative effects of the subprime crisis on property development firms. And literature review has revealed that cash is needed from the beginning, from land acquisition and construction to the sales stages, with risk increasing steadily until development is completed and sold/leased. When they can generate sufficient cash flow to repay the loan (both land acquisition loan and construction) that they borrowed earlier.

5.3 Policy Effects on Different Development Firms

Sample firms were classified by firm size, ownership structure, and profitability to understand the effects of policy on different types of property development firms. More detailed patterns about how external policies influence financial flexibility and eventually impact different types of firms have been discovered. The empirical results have indicated that different characteristics of firms have different sensitivity to the effects of economic stimulus packages on property development firms' financial health with changing financial flexibility. The empirical results align with the previous research, although the background, geographic locations, and economic policy being studied were different. The following section discusses an in-depth analysis of the reasons behind the phenomenon.

The results shown in Table 4.10 and Table 4.11 that a 1% positive policy change combines financial flexibility and weakening firms' financial health by 44.43% (firms' size classified by sales) and 37.90% (firms' size classified by total assets) for larger firms. The negative impact of policy on large property firms can be explained by ineffective and inefficient of larger firms' operations. And it is deviate from the literatures for several reason. Large firms naturally possess relative advantages in the quantity and quality of assets they own, are relatively more liquid and solvent, and have more varied sources of funding as their creditability is better; therefore, they are less likely to be under pressure of financial constraints and enjoy more flexibility in selecting investments opportunities to generated better profits. Relatively, smaller firms have fewer comparative advantag es in the abovementioned qualities. Small to medium enterprises own fewer assets; therefore, due to the lack of collateral and the less capability of debt repaying, their creditworthiness is weaker than large-size firms. Insufficient cash flow could later become a matter. The findings confirm that large firms have more cash flow, while small firms face liquidity problems (Moss and Stine, 1993; Wahyudin, 2019).

The results are also deviate from previous studies that firms with larger sizes are more capable of obtaining new financing, and therefore improved financial health. The inconsistency of the results from the previous literature is due to the complicated cost structure (costs included land acquisition cost, construction cost, advertising cost, financing costs and sales costs, and the price is determined by the demand and supply side determinants. Therefore, firm size is not a major factor in affecting firms' profitability. A firm's size is positively related to profitability (Taani, 2001). The larger the size, the

more income the firm generates; therefore, with higher loan repaying ability. Small and medium firms are more difficult in financing than large firms (Scholtens, 1999). However, few studies indicate no effects of firm size on financial health (Setiadharma and Machali, 2017). Small-to-medium firms have difficulty obtaining new financing to enhance their financial health.

2) Firms with different retained earnings (RE) act differently when facing economic policy change. The results show that firms with higher retained earnings, have a negative relationship between policy impact and financial health; however, no significant relationships have been seen with firms with lower RE. This result differs from Restianti and Agustina (2018) that retained earnings have no significant relation to altering firms' overall financial conditions. The research indicated that firms with lower RE would face a higher risk of survival when policy changes. This is because lower RE are at the most extreme risk as they do not build up their cash/profit reserve to overcome possible shocks from external financing (Cowling et al., 2020).

3) The financial status of state-owned enterprises (SOEs) significantly differed with the external policy changes, given their different financial flexibility levels. A negative significant result has been found with the state-owned enterprises but no significant relations can been seen with the non-state owned enterprises (non-SOEs) (Please refer to Table 4.16). This finding is similar to the past studies that there is a statistically significant relationship between firms' ownership structure and firms' performance and firm values (Demsetz and Villalonga, 2001; Coles et al., 2008; Lins, 2010; Haniffa and Hudaib, 2006; Maury, 2005).

The significant relationship between non-state own firms and financial health suggests that an efficient ownership structure will assist firms in making better decisions in response to external policy. Compared with private firms, SOEs are familiar with resource monopolies. They can capture economies of scale while simultaneously achieving public objectives. However, SOEs are also known for operating inefficiently and facing agency problems as there are conflicts between their controlling and minority shareholders, and the hierarchy structure will lead to greater information asymmetry between the decision maker and the executor (Lin et al., 2020). Therefore, when reacting to new policies, SOEs tend to be slow and inefficient.

4) Firms' capital structure

The results of the policy impact model have indicated that the financial health level of both firms with higher or lower debt, does not have significant relationship with the released stimulus package.

This finding is inconsistent with previous studies that the capital structure measured by leverage has a significant positive effect on predicting financial health; that is, higher leverage means a higher probability of becoming financially distressed and facing the risks of default (Antikasari and

Djuminah,2017; Fahlevi and Marlinah, 2018; Theodossiou and Kahya., 1996). Firms should adopt an appropriate mix of capital structures to mitigate the risk of financial distress.

The insignificant results has align with some literatures. As a few studies hold a different view that the leverage level does not make a difference to a firm's financial health status (Dianova and Nahumury, 2019; Ayu et al., 2017; Cinantya and Merkusiwati, 2015; Widhiari and Merkusiwati, 2015). Dianova and Nahumury (2019) used 55 samples of telecommunication and non-construction firms listed in the Indonesia Stock Exchange during 2013–2017, indicating that the level of leverage does not affect the occurrence of financial distress. This result implies that firms or industries that do not rely on external financing will not alter firms' health by changing capital structure.

Property development firms rely heavily on external financing, especially bank lending. However, firms with lower debt indicated the ability to raise new finance is weak, compared with firms with more debt. This may be due to the credit rating criteria assessed by their debt-repaying ability. Therefore, with increasing credit or liquidity in the market driven by the stimulus package, their ability to obtain new debt is still weak and will not affect their financial health prospect.

5) Firms' profitability

The empirical result has also shown that firms, irrespective of whether they were categorized as higher or lower profitability groups measured by firms' return on assets ratio, the policy has positive impact on the financial health of different level of financial flexibility. This is consistent with Pindado et al. (2008), Ikpesu (2019), and Fitzpatrick and Ogden (2011). Firms with high profit-generating ability usually have more flexibility in obtaining external financing, generating more cash flow, and becoming more liquid. Property development firms are generally positioned to make generous profits. To minimize cost, completing the project on time and successfully selling or renting the finished property is the key.

6) Cash flow position

A positive relationship has been found with the group of higher cash flow and no significant relationship has been found with the property development firms with less cash flow. The assessment of finance for property development projects relies entirely on the cash flow in the whole project period, as there is an absence of available collateral. Similar to profitability, firms with high cash flows show a strong loan-repaying ability and, therefore, benefit more from the expansionary economic policy. On the other hand, firms with lower cash flow positions are most likely to be rejected when applying for new loans due to their loan repaying ability and become illiquid or even financial distress. This finding is similar to the previous studies on the relationship between the ability to generate cash flow and the possibility of generating new loans (Kremp and Sevestre, 2013; Drakos and Giannakopoulos, 2011; Wolfson, 1996).

5.4 Chapter Summary

This chapter discussed the similarities and differences between the results and the past research. The impacted direct factors are similar, where the financial flexibility level, cash flow, profitability, liquidity, and capital structure will affect firms' financial health. While the other factors, such as economic indicators and policy, show limited impact on firms' financial status. However, profitability and size are negatively related to the firm, which is deviated from the past literature. Financial flexibility can be considered a hedge factor that decreases the risks from external shocks.

Chapter 6 Summary, Conclusions, Limitations, and Future Studies

6.1 Introduction

This chapter summarizes the research. It specifies the significance of the findings that contributed to the body of knowledge, acknowledges the limitations of the studies, and concludes by providing recommendations for further research.

6.2 Summary of the Research

This research investigated the impacts of government economic policy on the financial health of property development firms. Three research objectives have been achieved; investigating the main determinants of the financial health of property development firms, the effects of government policy on firms, and how government policy affects different types of property development firms.

A systematic literature review has been conducted to understand the theoretical framework of financial economics and the main components of the theory to investigate the policy impacts on property development firms in mitigating their financial risks. Financial economics can be applied to various financial thinking processes, considering the interrelation of financial variables. A review of the models of financial economics that explain each financial decision was also conducted. It was found that financial economics consists of three components; asset valuation, finance decision, and working capital management. Asset valuation is required for making financial management decisions. The capital asset pricing model and discounted cash flow model have been identified as the common valuation tools. The Modigliani-Miller theorem, trade-off theory, pecking order theory, free cash flow theory, and market timing theory were commonly applied when making financing decisions. It was also suggested that finance costs must be considered when making a financing decision. The relationships between financing decisions, risks, and corporate value have also been reviewed. The applications of financial economics on firms' financial health have been reviewed by understanding the concept of financial economics. One of its main applications is to evaluate alternative circumstances by applying financial theory and analyzing the firm's financial performance. Literature has also emphasized the importance of working capital management in the financial economics theory. Empirical evidence has shown strong links between financial management and firms' performance.

A systematic literature review was carried out to study the external and internal factors that affect the financial health of the firms to identify the main determinants of the financial health of property development firms. The external factors empirically studied were economic variables such as GDP, CPI, financial stability (Global Financial crisis), and economic policies, specifically on changing monetary policies regarding interest rate adjustment and money supply that alters the market's funding (credit) availability to the firms. The internal factors identified from the literature were financial indicators such

as financial flexibility, profitability, liquidity, solvency, and operating efficiency. All these identified determinants were selected to construct the financial health determinant model for property development firms. The results in table suggest that external economic variables such as GDP and CPI did not significantly impact property development firms. In contrast, economic policies related to monetary supply were significant to firms' success or failure" stated that the policy was found significant as the P value (<.001) stated, please refer to Table 4.9 a, model 9. The coefficient of monetary policy and financial health can be seen as negative (-0.285). This result implies that the availability of funding is the priority for property firms to maintain a stable stream of cash flow and sufficient cash holdings to cover the costs of the development period until the sales stage when revenues are realized. Given the capital-intensive nature of the property development industry, financial flexibility is theoretically the most important internal characteristic that reflects firms' ability to access additional funding when facing external shocks. The financial flexibility variable was also tested in the financial health determinant model to better assess firms' financial performance. The results of this empirical test were also consistent with previous studies, as profitability, liquidity, solvency, and operating efficiency were significantly associated with property development firms' financial health. However, variables such as the GDP, CPI, real estate index, and ownership structure were not significant to the financial health of property development firms.

The difference-in-differences (DID) model was applied to testify to policy impact on property developments. The developed financial determinant models showed that the external economic policy of 2008 was testified to have a positive direct effect on property development firms. The financial health of property development firms is affected by the changing interest rate that impacts the finance costs of firms. However, the money supply change may not affect firms' financial health directly. This will depend on the firm's financial flexibility. The combination of monetary policies, using financial instruments of interest rate and money supply (M2), can effectively affect the financial health of firms and the economic environment.

Financial flexibility plays a dominant role in affecting firms' financial health. Financial flexibility not only internally arms firms with a strong ability to bear external shocks but also externally and strongly relies on the available credit that alters the economic policies relating to adjusting the interest rate and money supply. The level of effect of the economic policy on the financial health of a property development firm depends on the firm's financial flexibility. In general, the more financial flexibility the firm has, the less the firm is affected by the policy change. The policy could profoundly impact firms with different financial flexibility levels that determine whether the property firms are currently in financial distress or relatively healthy. Profitability, liquidity, solvency, and capital structure were also found to impact the financial health of property development firms.

To analyze the policy impact on firms with different characteristics, firms were further classified by size, profitability, ownership structure, capital structure, profitability, and cash flow. The empirical results showed that firms of larger sizes and state-owned ownership structures with different financial flexibility had been negatively impacted by the stimulus packages effective in 2008. Firms with higher flexibility, profitability, liquidity and possession of higher cash flows are more sensitive to policy change. This is because a larger size, better profitability, higher financial leverage, and cash flow ensure firms have higher creditability for obtaining new credits. In contrast, non-state firms have a more flexible management structure and complete business control. Profitable and higher liquidity property development firms may not be significantly affected by the changes in economic policy. However, the financial health of property development firms was suggested to be sensitive to changes in economic policy. Firms' capital structure is an element that impacts the financial health of development firms under external shocks. Usually, people will expect that the state-owned firms benefit from the government policy due to the larger firm size and in possession of better resources. However, the results in Table 4.16 showed a negative result. This could be explained that the state-owned firms had a large amount of debt with inefficient operating systems with unhealthy financial status. The stimulus policy gradually improved the SOE's property firms' financial health and reversed the negative impact of the subprime crisis not immediately but rather with the duration of two years from 2008-2010.

6.3 Conclusion of the Thesis

There are several conclusions from this research. First, it narrows the research gap in the main determinants and the policy impact on property development firms. The effect of policy on the different types of property development firms was studied limitedly. Second, financial flexibility is a main determinant affecting firms' financial health. Firms may focus on improving liquidity and profitability, but they cannot neglect the source of finance and capital structure management because firms could fail if they cannot meet the immediate debt obligation though they have plenty of assets. Thus, managing the financial flexibility of firms is an important task to ensure the success of changing external financial environments. Third, the change in economic policies significantly impacts firms' financial health. The impact can be positive or negative depending on the type of policies and whether a single policy or combined policies are produced. In addition, the effects of policies can be different depending on the status of firms. A profitable, state-owned, and financially flexible firm will be less affected by a change in policy. Fourthly, property development firms can differ greatly from firms in other sectors. The first difference is the capital-intensive nature. Costs are incurred over the entire period. However, revenue is only realized when the construction is completed and the property is sold, while cash is needed at every development stage. The other difference is that development firms tend to have higher leverage, which makes them more sensitive to external economic changes or economic policies associated with adjusting interest rates, credit supply, or other regulations related to the accessibility of credit. Therefore, property development firms need to be financially prepared and strengthen their financial health to hedge against the risk when facing an economic downturn or tightening economic policies implemented

by the government. Also, improving financial health could allow property development firms to benefit from more investment and growth opportunities when the economy upturns. Although property development firms are being affected significantly by the changes in economic policies, there is still a lack of research that provides insight into how these economic policies impact property development firms and proposes strategies and solutions to mitigate the risks that the changes will bring.

6.3.1 Research contributions to the body of knowledge

The research has contributed to the body of knowledge in several ways. The most relevant variables have been revealed while investigating the possible determinants that affect property development firms that were proposed based on past empirical studies. Internally, financial flexibility, profitability, liquidity, and cash flow contributed to the property development firms' financial stability, which is consistent with past empirical studies. However, externally, the policies have hardly any direct impact on firms' financial health. This has suggested that there is a missing piece or link between an external policy with internal financial health. Further investigation of previous literature suggests that, theoretically, financial flexibility is measured using three components: cash on hand, potential financing capability, and financing cost that the firm obtains new financing. This implies that compared with other internal factors, it will be more closely affected by the change in economic policies (e.g., interest rate adjustment, money supply, and credit availability). Internally, financial flexibility reflects the ability to adapt to external shocks and protect firms from financial constraints. This has highlighted the importance of financial flexibility in maintaining a firm's financial health, which has not attracted the same attention as traditional financial indicators. The empirical results from this study have supported the theoretical views.

The DID model applied to studying the policy impact for firms has demonstrated a new application of testifying and quantifying the actual effects of policies on individual property development firms. Unlike traditional causal studies, such as event studies that examine the cause-effect relationship between two separated events, the DID method allows the studies of individuals exposed (or not exposed) to the policies, or individuals with different levels of exposure based on different characteristics/features. The various features can be different geographic locations, different treatments, or in this research, different levels of financial flexibility. It broadens the application of the DID model as applied in analyzing property development firms.

6.3.2 Support decision-making on managing financial risks

In this research, the importance of financial flexibility for risk mitigation has been uncovered. It implies that when facing external uncertainty, such as policy changes, focusing only on how much cash is held in hand, how profitable the development project will be, or even increasing leverage to support the funding needs for multiple projects, is insufficient. This research has proved that financial flexibility

can be improved through the following aspects.

1) The cash flow strategies

A stable stream of cash flow helps property development firms to bridge the interval between when costs are incurred and sales are realized. Property development firms could begin by forecasting the expected cash inflows and outflows and highlighting the cash surplus or deficits. This will assist the shareholders and managers to plan and manage borrowing or investing in other projects simultaneously or have better control over the costs and expenses.

2) Accessing new funding and the associated risks

As mentioned previously, property development firms are capital-intensive, with no cash inflow realized until the construction is completed and the property is sold. Therefore, development firms always seek new funding sources to increase financial flexibility and avoid project discontinuation and the risk of defaults. While adopting new financing, property development firms should also balance the benefit and risks of expanding external financing.

In most countries, bank lending is still a major source of property development financing. In China, the land is not for sale, but developers acquire the land use right, which is required to be paid initially by 100 percent equity, referred to as the "land transfer fee." Land financing no longer exists owing to the release of "The notice of the Ministry of Land and Resources, the Ministry of Finance, the People's Bank of China, and the China Banking Regulatory Commission on Strengthen land reserve and financial management." The application for a project development loan can only be realized once the developer receives the state land use permits, planning permits for land use, planning permits for construction, and building construction permission. The sources of loan repayment and financing for acquiring new land for the subsequent development projects rely on the realization of sales. However, this financing pattern induced firms to accelerate the development process by acquiring excessive loans, which caused risks associated with higher debt burdens. In 2021, the government released a "three-red line" policy to mitigate the risks caused by the high debt burden for property development firms. The "three-red line" policy required that property development firms' debt to total assets (excluding account receivable) should not be over 70 percent, the net debt ratio should not be over 100 percent, and the ratio of cash to short-term debt should not be less than 1. All the above requirements suggest that property development firms should consider risks while pursuing high project investment growth and restrict their borrowing at a safe level, which is an effective way of avoiding financial constraints.

Broadening the selection of financing, except for bank lending, can improve firms' financial flexibility and avoid financial constraints. Based on their needs, property developers can also choose from a range of financing methods. To restrict the debt burden to an acceptable level, property development firms can choose equity financing to raise capital through the sale of shares, and this is suitable for property

development firms seeking funding for new project developments. With equity financing, there is no monthly loan payment burden. However, as the principle of equity financing is to sell the firm's ownership in exchange for cash, one should consider to what extent the original owners are still under control. Compared with debt financing, the cost of equity financing is higher as it bears higher risk (the shareholder is the residual claimer after making payments to the other parties, e.g., the debtor). Therefore, the shareholder requires a higher rate of return. Property development firms should maintain a reasonable mix of debt and equity financing. The strategies adopted can be managing the capital structure, using less reliance on bank lending, and using alternative equity sources of finance, such as equity crowdfunding and private equity funding. Development firms can also negotiate to extend the credit policy with their suppliers. Innovative financing strategies can be applied, such as built-to-rent, collaborated development, and Passing-through financing, which will be introduced in the next section..

3) Selection of development models

Unlike the traditional development process, property development firms could engage in more advanced development models to ensure fixed cash flow, manage risks, and maintain financial flexibility. Below are examples of alternative development models that development companies can utilize.

Built-to-rent

Instead of building for selling purposes, built-to-rent development is typically owned by property developers or institutional investors to design for long-term tenants. For property developers, built-to-rent secures a stable and predictable stream of rental income for a fixed period, especially when housing prices decline. Goyoo and Vanke Co. Ltd is one of the first developers engaged in China's built-to-rent model.

Collaborated development

With increasingly restricted housing-related policies imposed by the government, property development firms seek new investment models to share and control risk. One of the models is collaborative development. Property development firms collaboratively engage in a development project while sharing land use rights, capital, and labor resources. The partnership agreement governs the business relationship between the two parties. For instance, one of the property development firms assists with project financing and construction, and the other provides the land or is responsible for negotiating with local governments. Both sides of the joint venture parties are entitled to share the profits of the developed projects within the pre-negotiated amount. The advantage is that the risks are shared.

Pass-through

Under this model, the developer acquires land but immediately sells the land to an individual buyer. The buyer applies for a development loan from the bank and utilizes the development work. The

development cash flow burden is transferred from the developers to the individual buyer. How this strategy can be applied in China is still worth exploring under the unique land use rights system.

6.3.3 Government policy formulation

The government needs to observe the impacts of economic policies used for future reference when strategizing new policies with a more precise objective and to achieve better outcomes.

The property market plays an active role in promoting economic growth. However, past financial crises have suggested that the property market is also the root cause of financial system fragility and economic meltdown. Property development firms are principal actors in the housing market. They coordinate the entire development process, from land acquisition to construction and sales. Understanding the impacts of economic policies on property development firms will allow governments to formulate policies to achieve better effects and minimize the financial risks of firms.

6.4 Research Limitations and Recommendations for Future Research

6.4.1 Research limitations

This study applies cases to Chinese development firms. The research findings may not be applied to other countries. The second limitation is that the data used for the empirical study was sourced from publicly available information from listed firms on the stock exchange. The data of private firms have not been included. Thus, the research findings may not perfectly apply to small and private development firms.

Furthermore, the empirical study was applied to property development firms. The results may not be the same as for other types of businesses. In addition, the policy being studied is specific to economic policy as a series of monetary policies, though the fiscal policy was included in the four trillion stimulus package. The tax implications on development firms have not been included in this study. Further research can be considered in this area.

6.4.2 Future studies for the financial health determinant model

As they compete in a fast-changing economic environment, property development firms may be affected by different determinants. Therefore, the financial health model's variables should be re-assessed on time.

6.4.3 Future studies of risk mitigation for property development firms

The finance models for property development firms are limited and exposed to different risks. Hopefully, with more finance models being constructed, studied, and available, the risks are expected to be under

control and satisfy the need to fuel new investment projects.

In this research, financial flexibility has been identified as important in maintaining firms' financial health. This research proposed that financial flexibility can be strengthened by maintaining adequate cash flows, accessing various financing sources, and balancing the capital structure between debt and equity. However, the importance of maintaining financial flexibility is underestimated and needs to be considered more carefully. It should be encouraged that new strategies for improving financial flexibility in a dynamic environment could be discovered through future studies.

6.4.4 Future studies for DID approach

This research utilizes the DID approach to evaluate the impact of studies on property development. As the use of DID approach became popular and can be applied to policies that exist in multiple periods, generalized DID does not have a precise classification between individuals who have or are not affected by the policies like in this research. Therefore, it can be expected that there will be more tailor-designed DID approaches to fit into different research purposes.

6.4.5 Future studies of policy impacts

From this research, the study of policy impacts differentiated firms with different characteristics, and the results clearly show that firms that are differentiated by size, profitability, liquidity, and operating efficiency are subject to react differently to the policy. Therefore, further studies may consider policy formulation tailored to different types of firms, as it is important to consider the heterogeneity of individuals. Due to the data limitation, the 2008 policy package was applied in this study. Future research may test the policies in recent years to verify whether similar empirical results can be generated. Tax implications on property development firms are also an area of future study.

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Appendix

Appendix 1 List of property development firms studied in this research

Beijing Urban Construction Investment and Development Co., Ltd
Beijing Electronic City Investment and Development Group Co., Ltd
Beijing Huaye Capital Holding Co., Ltd
Beijing Dalong Weiye Real Estate Development Co., Ltd.
Beijing Capital Development Co., Ltd
Beijing Wantong Real Estate Co., Ltd
Chengdu Qianfeng Electronics Co., Ltd
Gree Real Estate Co., Ltd
Citychamp Dartong Co., Ltd.
Everbright Jiabao Co., Ltd
Guangming Real Estate Group Co., Ltd
Guangzhou Yuetai Group Co., Ltd
Guangzhou the Pearl River Industrial Development Co., Ltd
Hainan Airlines Innovation Co., Ltd
HNA Infrastructure Investment Group Co., Ltd
Black Peony (Group) Co.,Ltd.
Huali Family Co., Ltd
China Fortune Land Development Co.,Ltd
Huayuan Real Estate Co., Ltd
Jiangsu Fenghuang Real Estate Investment Co., Ltd
Jindi (Group) Co., Ltd
Jingneng Real Estate Co., Ltd
Metro Land Corporation Ltd.
Kunwu Jiuding Investment Holdings Co., Ltd
Lushang Property co., ltd
Greenland Holdings Group Co., Ltd
Nanjing Gaoke Company Limited
Nanjing Qixia Construction Co., Ltd
Ningbo Fuda Company Limited
Shandong Tianye Hengji Co., Ltd
Shanghai Urban Investment Holdings Co., Ltd
Shanghai Damingcheng Enterprise Co., Ltd
Shanghai Jinqiao Export Processing Zone Development Co., Ltd
Shanghai Lingang Holdings Co., Ltd
Shanghai Lujiazui Finance & Trade Zone Development Co.,Ltd.
Shanghai Industrial Development Co.,Ltd.
Shanghai Shimao Co.,Ltd
Shanghai North High tech Co., Ltd
Shanghai Wanye Enterprises Co.,Ltd.
Shanghai New Huang Pu Real Estate Co.,Ltd.
Shanghai Xinmei Real Estate Co., Ltd
Shanghai Rock Enterprise Development Co., Ltd

Shenzhen Xiangjiang Holdings Co., Ltd
Sichuan Languang Development Co., Ltd.
Songdu Jiye Investment Co., Ltd
Suzhou New District Hi-Tech Industrial Co.,Ltd
Tianjin World Source Technology Development Co., Ltd.
Tianjin Real Estate Development (Group) Co., Ltd
Tianjin Songjiang Co., Ltd
Wolong Real Estate Group Co., Ltd
XI'AN HONGSHENG TECHNOLOGY CO., LTD.
Tibet Urban Development and Investment Co.,Ltd.
Xinhu Zhongbao Co., Ltd
Xinda Real Estate Co., Ltd
Yagor Group Co., Ltd
YunNan Metropolitan Real Estate Development Co., Ltd.
Changchun Economic Development (Group) Co., Ltd
Zhejiang Guangsha co., ltd
Shanghai CRED Real Estate Stock Co., Ltd.
Zhongfang Real Estate Co., Ltd
China World Trade Center Co.,Ltd.
China Enterprise Co., Ltd
China Sports Industry Group Co., Ltd
Chongqing Dima Industrial Co., Ltd
Zhuhai Huafa Industrial Co., Ltd
Poly Real Estate (Group) Co., Ltd
Beijing Beichen Industrial Co., Ltd
New City Holdings Group Co., Ltd

Appendix 2 Variables Definition Table

	Variable Name	Symbol	Variable Definition
Dependent variable	Financial health	FH	when 3 = save zone, 2 = significant likelihood that the corporation will go bankrupt in the next two years. 3 = a high probability of distress within this time period.
Independent Variables	Firm size (Assets)	TA	Total assets of the firms
	Firm size (Total sales)	TS	Sales revenue of the firms
	Return on total Assets	ROA	Net income/Total assets
	Return on equity of the firms	ROE	Net income/Equity
	Gross profit margin of the firms	GP	Gross income/Revenue
	Return on invested capital	ROIC	Net operating profit after tax/Invested capital
	EBITDA margin	EBITDA	Earnings that a company is generating before interest, taxes, depreciation, and amortization/Revenue
	Total debt to equity ratio	DE	Total debt/Equity
	Debt ratios	DR	Total debt/Total assets
	Equity multiplier	EM	Total assets/Total equity
	Degree of financial leverage	DFL	Percentage changed in EPS/Percentage changed in EBIT

Interest coverage	IntCov	Earnings before Interest and Taxes/Interest expenses
Tobin Q	TQ	Express the relationship between the firms' market value and its replacement value
capital expenditure to sales	CE	Funds generated from sales, and used by a company to acquire or upgrade physical assets (Property, building or equipment)
CFOTA	CFOTA	Operating cash flow to total assets
Current ratio	CR	Current assets/Current liability
Quick ratio	QR	(Current assets - Cash)/Current liability
Days sales outstanding	DSO	The average number of days a business takes to collect its receivables
Gross Domestic Product	GDP	Value added created through the production of goods and services in the country during a certain period
Consumer Price Index	CPI	Measure of inflation
Property Climate Index	PCI	Industry indicator
Money supply	M_2	Household cash + Deposit that circulate in the economic
Interest rate	I	1-5 Year Loans Benchmark rate

Appendix 3 The Difference in differences results

1）Model 1 (Dependent variable: Financial Health by 3 categories；Independent variables: Financial Flexibility*Policy effective year ； Financial Flexibility (VOFF); Policy effective year (P2008))

Source	SS	df	MS	Number of obs	=	1,073
				F(2, 1070)	=	19.26
Model	12.2614179	2	6.13070894	Prob > F	=	0.0000
Residual	340.569896	1,070	.318289623	R-squared	=	0.0348
				Adj R-squared	=	0.0329
Total	352.831314	1,072	.329133689	Root MSE	=	.56417

Categries	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
VOFFp2008	.0694021	.0251742	2.76	0.006	.0200057	.1187985
P2008	-.2322011	.0375152	-6.19	0.000	-.3058128	-.1585895
_cons	1.374194	.0261628	52.52	0.000	1.322857	1.42553

2）Model 2 (Dependent variable: Financial Health by 3 categories；Independent variables: Current ratio)

Source	SS	df	MS	Number of obs	=	1,073
				F(1, 1071)	=	348.91
Model	86.7001428	1	86.7001428	Prob > F	=	0.0000
Residual	266.131171	1,071	.248488489	R-squared	=	0.2457
				Adj R-squared	=	0.2450
Total	352.831314	1,072	.329133689	Root MSE	=	.49849

Categries	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
CurrentRatio	.1559578	.0083493	18.68	0.000	.1395749	.1723406
_cons	.9618548	.0222353	43.26	0.000	.9182252	1.005484

3) Model 3 (Dependent variable: Financial Health by 3 categories; Independent variables: Current ratio, M2(log))

Source	SS	df	MS	Number of obs	=	1,073
				F(2, 1070)	=	208.57
Model	98.9700516	2	49.4850258	Prob > F	=	0.0000
Residual	253.861263	1,070	.237253516	R-squared	=	0.2805
				Adj R-squared	=	0.2792
Total	352.831314	1,072	.329133689	Root MSE	=	.48709

Categries	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
CurrentRatio	.1548892	.0081597	18.98	0.000	.1388784	.1709001
LogformofM2	-.3335163	.046377	-7.19	0.000	-.4245166	-.2425161
_cons	2.530022	.2191408	11.55	0.000	2.100028	2.960017

4) Model 4 (Dependent variable: Financial Health by 3 categories; Independent variables: Current ratio, M2(log), Rate of return on assets)

Source	SS	df	MS	Number of obs	=	1,073
				F(3, 1069)	=	152.79
Model	105.885349	3	35.2951165	Prob > F	=	0.0000
Residual	246.945965	1,069	.231006515	R-squared	=	0.3001
				Adj R-squared	=	0.2981
Total	352.831314	1,072	.329133689	Root MSE	=	.48063

Categries	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
CurrentRatio	.154683	.0080517	19.21	0.000	.1388842	.1704819
LogformofM2	-.3428318	.045794	-7.49	0.000	-.4326882	-.2529754
RateofreturnonAssets	.4448586	.0813071	5.47	0.000	.2853189	.6043983
_cons	2.554752	.2162837	11.81	0.000	2.130363	2.979141

5）Model 5 (Dependent variable: Financial Health by 3 categories; Independent variables: Financial Flexibility, Current ratio, M2(log), Rate of return on assets)

Source	SS	df	MS	Number of obs	=	1,073
				F(4, 1068)	=	116.56
Model	107.2221	4	26.805525	Prob > F	=	0.0000
Residual	245.609214	1,068	.229971174	R-squared	=	0.3039
				Adj R-squared	=	0.3013
Total	352.831314	1,072	.329133689	Root MSE	=	.47955

Categries	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
VOFF	.0537016	.022274	2.41	0.016	.0099958	.0974075
CurrentRatio	.1514232	.0081466	18.59	0.000	.1354381	.1674084
LogformofM2	-.3364668	.0457675	-7.35	0.000	-.4262712	-.2466624
RateofreturnonAssets	.36447	.0877097	4.16	0.000	.1923672	.5365728
_cons	2.503061	.2168609	11.54	0.000	2.077539	2.928583

6) Model 6 (Dependent variable: Financial Health by 3 categories; Independent variables: Financial Flexibility*Year of Policy Effective, Financial Flexibility, Current ratio, M2(log), Rate of return on assets)

Source	SS	df	MS	Number of obs	=	1,073
				F(5, 1067)	=	105.88
Model	117.004041	5	23.4008081	Prob > F	=	0.0000
Residual	235.827274	1,067	.221019001	R-squared	=	0.3316
				Adj R-squared	=	0.3285
Total	352.831314	1,072	.329133689	Root MSE	=	.47013

Categries	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
VOFFp2008	-.3871777	.0581986	-6.65	0.000	-.5013745	-.272981
VOFF	.4099556	.0578313	7.09	0.000	.2964797	.5234315
CurrentRatio	.1427588	.008092	17.64	0.000	.1268809	.1586368
LogformofM2	-.0024863	.0673305	-0.04	0.971	-.1346015	.1296289
RateofreturnonAssets	.3245519	.0861947	3.77	0.000	.1554217	.4936822
_cons	.8665142	.325135	2.67	0.008	.2285377	1.504491

7) Model 7 (Dependent variable: Financial Health by 3 categories; Independent variables: Financial Flexibility, Current ratio, M2(log), Rate of return on assets)

Source	SS	df	MS	Number of obs	=	1,073
				F(4, 1068)	=	116.56
Model	107.2221	4	26.805525	Prob > F	=	0.0000
Residual	245.609214	1,068	.229971174	R-squared	=	0.3039
				Adj R-squared	=	0.3013
Total	352.831314	1,072	.329133689	Root MSE	=	.47955

Categries	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
VOFF	.0537016	.022274	2.41	0.016	.0099958	.0974075
CurrentRatio	.1514232	.0081466	18.59	0.000	.1354381	.1674084
LogformofM2	-.3364668	.0457675	-7.35	0.000	-.4262712	-.2466624
RateofreturnonAssets	.36447	.0877097	4.16	0.000	.1923672	.5365728
_cons	2.503061	.2168609	11.54	0.000	2.077539	2.928583

8) Model 8 (Dependent variable: Financial Health by 3 categories; Independent variables: Financial Flexibility*Policy effective year, Financial Flexibility, M2(log), Rate of return on assets)

Source	SS	df	MS	Number of obs	=	1,073
				F(4, 1068)	=	42.26
Model	48.2134845	4	12.0533711	Prob > F	=	0.0000
Residual	304.61783	1,068	.285222687	R-squared	=	0.1366
				Adj R-squared	=	0.1334
Total	352.831314	1,072	.329133689	Root MSE	=	.53406

Categries	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
VOFFp2008	-.5524312	.0652515	-8.47	0.000	-.680467	-.4243955
VOFF	.6251139	.0642187	9.73	0.000	.4991047	.751123
LogformofM2	.1334117	.075985	1.76	0.079	-.0156851	.2825086
RateofreturnonAssets	.2194438	.0976827	2.25	0.025	.027772	.4111156
_cons	.4359154	.3683102	1.18	0.237	-.2867783	1.158609

9) Model 9 (Dependent variable: Financial Health by 3 categories; Independent variables: Financial Flexibility*Policy effective year, Financial Flexibility, Policy effective year, Current assets, M2(log), Rate of return on assets)

Source	SS	df	MS	Number of obs	=	1,073
				F(6, 1066)	=	93.04
Model	121.263192	6	20.210532	Prob > F	=	0.0000
Residual	231.568122	1,066	.217230883	R-squared	=	0.3437
				Adj R-squared	=	0.3400
Total	352.831314	1,072	.329133689	Root MSE	=	.46608

Categries	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
VOFFp2008	-.5573973	.0693313	-8.04	0.000	-.6934387	-.4213559
VOFF	.570372	.0678205	8.41	0.000	.4372951	.7034489
P2008	.3178822	.0717903	4.43	0.000	.177016	.4587485
LogformofM2	-.2856698	.0924435	-3.09	0.002	-.4670616	-.1042779
CurrentRatio	.1380307	.0080931	17.06	0.000	.1221505	.1539108
RateofreturnonAssets	.2901069	.0858062	3.38	0.001	.1217388	.458475
_cons	1.986406	.4097159	4.85	0.000	1.182465	2.790347

10) The Fixed effect of the DID model (Using variables from Model 9 from the above)

```
Fixed-effects (within) regression               Number of obs      =     1,073
Group variable: 股票代码                        Number of groups   =        68

R-squared:                                      Obs per group:
     Within  = 0.3133                                         min =         5
     Between = 0.4227                                         avg =      15.8
     Overall = 0.3401                                         max =        16

                                                F(6, 999)          =     75.96
corr(u_i, Xb) = 0.0960                          Prob > F           =    0.0000
```

Categries	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
VOFFp2008	-.5953954	.0689619	-8.63	0.000	-.7307222	-.4600687
VOFF	.6269969	.0687301	9.12	0.000	.4921251	.7618688
P2008	.3414366	.066107	5.16	0.000	.2117121	.471161
LogformofM2	-.2795211	.0821313	-3.40	0.001	-.4406907	-.1183515
CurrentRatio	.1150305	.0088619	12.98	0.000	.0976405	.1324206
RateofreturnonAssets	.288578	.0797154	3.62	0.000	.1321491	.4450068
_cons	1.967628	.365384	5.39	0.000	1.25062	2.684636
sigma_u	.24312154					
sigma_e	.41296055					
rho	.25738951	(fraction of variance due to u_i)				

```
F test that all u_i=0: F(67, 999) = 5.36                     Prob > F = 0.0000
```

11) The Fixed effect DID model without Control variables

```
Fixed-effects (within) regression               Number of obs      =     1,073
Group variable: 股票代码                        Number of groups   =        68

R-squared:                                      Obs per group:
     Within  = 0.1842                                         min =         5
     Between = 0.0873                                         avg =      15.8
     Overall = 0.1545                                         max =        16

                                                F(3, 1002)         =     75.42
corr(u_i, Xb) = -0.0233                         Prob > F           =    0.0000
```

Categries	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
VOFFp2008	-.8091711	.0730748	-11.07	0.000	-.9525682	-.6657739
VOFF	.907905	.0704667	12.88	0.000	.7696258	1.046184
P2008	.3236063	.053214	6.08	0.000	.2191827	.4280299
_cons	.8035712	.0488321	16.46	0.000	.7077463	.8993961
sigma_u	.30029359					
sigma_e	.44942808					
rho	.30865167	(fraction of variance due to u_i)				

```
F test that all u_i=0: F(67, 1002) = 7.06                    Prob > F = 0.0000
```

Appendix 4 Effects of stimulus packages on individual firms

1) DID analysis by Firm size (Sales)

Results for Small to medium firms

```
Random-effects GLS regression                   Number of obs     =       702
Group variable: 股票代码                        Number of groups  =        66

R-squared:                                      Obs per group:
     Within  = 0.2979                                         min =         1
     Between = 0.4911                                         avg =      10.6
     Overall = 0.3895                                         max =        16

                                                Wald chi2(12)     =    320.74
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =    0.0000
```

Categries	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
VOFFp2008	-.0563414	.1094457	-0.51	0.607	-.270851	.1581681
VOFF	.5685197	.0821096	6.92	0.000	.4075878	.7294517
P2008	-.0330791	.1070686	-0.31	0.757	-.2429296	.1767715
Totaldebttoequity	-.0002671	.0002754	-0.97	0.332	-.000807	.0002727
Cashflowtototalassetsratio	.3192959	.0917789	3.48	0.001	.1394125	.4991793
ReturnonEquity	-.0129367	.0163956	-0.79	0.430	-.0450714	.019198
Netprofitmargin	-.0138246	.0097316	-1.42	0.155	-.0328982	.005249
CurrentRatio	.1103917	.0097292	11.35	0.000	.0913228	.1294607
ROIC	-.0006431	.0014485	-0.44	0.657	-.0034821	.0021959
LogformofM2	-.0739774	.1148911	-0.64	0.520	-.2991597	.151205
GDP	-.0161082	.0121213	-1.33	0.184	-.0398655	.0076492
logofCPI	.4938378	2.411623	0.20	0.838	-4.232857	5.220533
_cons	.2876741	4.783973	0.06	0.952	-9.08874	9.664088
sigma_u	.29136601					
sigma_e	.42837821					
rho	.31629474	(fraction of variance due to u_i)				

Results for Larger firms

```
Random-effects GLS regression                   Number of obs     =       364
Group variable: 股票代码                        Number of groups  =        52

R-squared:                                      Obs per group:
     Within  = 0.4297                                         min =         1
     Between = 0.6034                                         avg =       7.0
     Overall = 0.4149                                         max =        15

                                                Wald chi2(12)     =    269.58
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =    0.0000
```

Categries	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
VOFFp2008	-.444307	.1364233	-3.26	0.001	-.7116918	-.1769221
VOFF	.5123284	.1318921	3.88	0.000	.2538246	.7708322
P2008	.0254375	.1255417	0.20	0.839	-.2206198	.2714947
Totaldebttoequity	.0096073	.0074267	1.29	0.196	-.0049487	.0241633
Cashflowtototalassetsratio	4.388108	.8894817	4.93	0.000	2.644756	6.13146
ReturnonEquity	-.5059345	.1539605	-3.29	0.001	-.8076916	-.2041774
Netprofitmargin	-.8410996	.2132227	-3.94	0.000	-1.259008	-.4231907
CurrentRatio	.1758184	.0311117	5.65	0.000	.1148406	.2367962
ROIC	.0195422	.0038311	5.10	0.000	.0120333	.0270511
LogformofM2	-.2340658	.103108	-2.27	0.023	-.4361537	-.0319779
GDP	-.0533588	.0124612	-4.28	0.000	-.0777823	-.0289352
logofCPI	3.361185	1.936774	1.74	0.083	-.434823	7.157193
_cons	-4.593991	3.837469	-1.20	0.231	-12.11529	2.92731
sigma_u	.1282995					
sigma_e	.21419783					
rho	.26404192	(fraction of variance due to u_i)				

2) DID analysis by Firm size (Total Assets)

Results for Small to medium firms

```
Random-effects GLS regression                   Number of obs     =       197
Group variable: 股票代码                        Number of groups  =        38

R-squared:                                      Obs per group:
     Within  = 0.2975                                         min =         1
     Between = 0.4925                                         avg =       5.2
     Overall = 0.4684                                         max =        16

                                                Wald chi2(12)     =    111.50
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =    0.0000
```

Categries	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
VOFFp2008	.4158153	.2821886	1.47	0.141	-.1372641	.9688947
VOFF	.7511232	.1686205	4.45	0.000	.4206331	1.081613
P2008	.2006996	.2500242	0.80	0.422	-.289339	.6907381
Totaldebttoequity	-.0019975	.0029559	-0.68	0.499	-.0077908	.0037959
Cashflowtototalassetsratio	.2518579	.1159139	2.17	0.030	.0246707	.479045
ReturnonEquity	.0087953	.0360609	0.24	0.807	-.0618827	.0794732
Netprofitmargin	-.0309369	.028482	-1.09	0.277	-.0867606	.0248869
CurrentRatio	.0755519	.0142966	5.28	0.000	.047531	.1035728
ROIC	-.0008008	.0020248	-0.40	0.692	-.0047694	.0031678
LogformofM2	-.4031335	.3390375	-1.19	0.234	-1.067635	.2613678
GDP	.0412271	.0324742	1.27	0.204	-.0224212	.1048754
logofCPI	.9397041	5.896586	0.16	0.873	-10.61739	12.4968
_cons	.2855744	11.73725	0.02	0.981	-22.71901	23.29016
sigma_u	.25884049					
sigma_e	.50381515					
rho	.20882958	(fraction of variance due to u_i)				

Results for Large firms

```
Random-effects GLS regression                   Number of obs     =        869
Group variable: 股票代码                        Number of groups  =         67

R-squared:                                      Obs per group:
     Within  = 0.3663                                         min =          2
     Between = 0.4634                                         avg =       13.0
     Overall = 0.4141                                         max =         16

                                                Wald chi2(12)     =     512.94
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =     0.0000
```

Categries	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
VOFFp2008	-.37898	.0866286	-4.37	0.000	-.5487689	-.2091911
VOFF	.4838874	.0802637	6.03	0.000	.3265734	.6412013
P2008	.0521086	.0854039	0.61	0.542	-.1152799	.219497
Totaldebttoequity	-.0005062	.000215	-2.35	0.019	-.0009276	-.0000848
Cashflowtototalassetsratio	2.633708	.6073853	4.34	0.000	1.443255	3.824161
ReturnonEquity	-.0492742	.0175226	-2.81	0.005	-.0836179	-.0149305
Netprofitmargin	-.0231121	.0083779	-2.76	0.006	-.0395324	-.0066918
CurrentRatio	.189006	.0134021	14.10	0.000	.1627383	.2152737
ROIC	-.003432	.0031041	-1.11	0.269	-.0095158	.0026518
LogformofM2	-.1009785	.077634	-1.30	0.193	-.2531383	.0511813
GDP	-.0209141	.0087289	-2.40	0.017	-.0380224	-.0038058
logofCPI	2.234267	1.727413	1.29	0.196	-1.1514	5.619935
_cons	-3.206087	3.42867	-0.94	0.350	-9.926156	3.513982
sigma_u	.18639805					
sigma_e	.33232314					
rho	.23931353	(fraction of variance due to u_i)				

3) DID analysis by different capital structure (debt to equity)

Firms with larger debt proportion

```
Random-effects GLS regression                   Number of obs     =       393
Group variable: 股票代码                        Number of groups  =        55

R-squared:                                      Obs per group:
     Within  = 0.4984                                         min =         1
     Between = 0.1676                                         avg =       7.1
     Overall = 0.3351                                         max =        14

                                                Wald chi2(12)     =    333.08
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =    0.0000
```

Categries	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
VOFFp2008	-.1252567	.0445069	-2.81	0.005	-.2124887	-.0380248
VOFF	.1325144	.0398718	3.32	0.001	.054367	.2106618
P2008	.0502995	.0357618	1.41	0.160	-.0197922	.1203913
Totaldebttoequity	-.0000453	.0000664	-0.68	0.495	-.0001755	.0000849
Cashflowtototalassetsratio	.2901583	.0228051	12.72	0.000	.2454612	.3348554
ReturnonEquity	-.0004226	.0041558	-0.10	0.919	-.0085678	.0077227
Netprofitmargin	-.0197963	.0060664	-3.26	0.001	-.0316862	-.0079064
CurrentRatio	-.0152707	.0153502	-0.99	0.320	-.0453566	.0148152
ROIC	-.0001214	.0004067	-0.30	0.765	-.0009185	.0006756
LogformofM2	-.0376217	.0403361	-0.93	0.351	-.1166791	.0414357
GDP	-.0025371	.0045247	-0.56	0.575	-.0114053	.006331
logofCPI	-.8217359	.8550293	-0.96	0.337	-2.497562	.8540907
_cons	2.848945	1.688225	1.69	0.091	-.4599142	6.157804
sigma_u	.11717031					
sigma_e	.10264203					
rho	.56580656	(fraction of variance due to u_i)				

Firms with less debt proportion

Random-effects GLS regression — Number of obs = 673
Group variable: 股票代码 — Number of groups = 66

R-squared:
Within = 0.4737
Between = 0.6811
Overall = 0.5540

Obs per group:
min = 2
avg = 10.2
max = 16

Wald chi2(12) = 678.31
corr(u_i, X) = 0 (assumed) — Prob > chi2 = 0.0000

Categries	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
VOFFp2008	-.1454621	.1255442	-1.16	0.247	-.3915241	.1005999
VOFF	.3644733	.1001608	3.64	0.000	.1681617	.5607849
P2008	.015312	.1217965	0.13	0.900	-.2234047	.2540287
Totaldebttoequity	-.5594347	.0428898	-13.04	0.000	-.6434972	-.4753723
Cashflowtototalassetsratio	2.99449	.9206135	3.25	0.001	1.190121	4.79886
ReturnonEquity	-.92041	.4172939	-2.21	0.027	-1.738291	-.1025289
Netprofitmargin	-.0195757	.009933	-1.97	0.049	-.039044	-.0001073
CurrentRatio	.0788672	.0093976	8.39	0.000	.0604482	.0972861
ROIC	.0093768	.0039393	2.38	0.017	.0016559	.0170976
LogformofM2	.048631	.1062009	0.46	0.647	-.1595188	.2567809
GDP	-.0082438	.0116585	-0.71	0.479	-.031094	.0146064
logofCPI	2.559589	2.336715	1.10	0.273	-2.020289	7.139467
_cons	-3.761847	4.641431	-0.81	0.418	-12.85889	5.335191
sigma_u	.1881549					
sigma_e	.40483451					
rho	.17763907	(fraction of variance due to u_i)				

4）DID analysis by different Retained earnings

Firms with higher Retained earnings

```
Random-effects GLS regression                   Number of obs     =       227
Group variable: 股票代码                        Number of groups  =        42

R-squared:                                      Obs per group:
     Within  = 0.6930                                         min =         1
     Between = 0.7689                                         avg =       5.4
     Overall = 0.7385                                         max =        13

                                                Wald chi2(12)     =    527.90
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =    0.0000
```

Categries	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
VOFFp2008	-3.43224	.4327776	-7.93	0.000	-4.280468	-2.584011
VOFF	3.457786	.4320243	8.00	0.000	2.611034	4.304538
P2008	2.897089	.4505868	6.43	0.000	2.013955	3.780223
Totaldebttoequity	.0299451	.0188987	1.58	0.113	-.0070957	.0669859
Cashflowtototalassetsratio	13.83151	1.418233	9.75	0.000	11.05183	16.6112
ReturnonEquity	-2.132861	.4044596	-5.27	0.000	-2.925587	-1.340134
Netprofitmargin	-.8373994	.2246305	-3.73	0.000	-1.277667	-.3971317
CurrentRatio	.1597187	.0323947	4.93	0.000	.0962262	.2232112
ROIC	.0178396	.0054985	3.24	0.001	.0070627	.0286165
LogformofM2	.4371495	.1797564	2.43	0.015	.0848335	.7894655
GDP	-.0051133	.0219435	-0.23	0.816	-.0481217	.0378952
logofCPI	2.714101	2.330013	1.16	0.244	-1.852641	7.280842
_cons	-10.03479	4.66223	-2.15	0.031	-19.17259	-.8969855
sigma_u	.0977027					
sigma_e	.16498931					
rho	.25962798	(fraction of variance due to u_i)				

Firms with less Retained earnings

Random-effects GLS regression — Number of obs = 839
Group variable: 股票代码 — Number of groups = 67

R-squared:
Within = 0.3030
Between = 0.4961
Overall = 0.3730

Obs per group:
min = 3
avg = 12.5
max = 16

Wald chi2(12) = 388.17
corr(u_i, X) = 0 (assumed) — Prob > chi2 = 0.0000

Categries	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
VOFFp2008	-.2163901	.0998719	-2.17	0.030	-.4121354	-.0206447
VOFF	.5894013	.0747611	7.88	0.000	.4428723	.7359304
P2008	.0168822	.0998415	0.17	0.866	-.1788035	.2125679
Totaldebttoequity	-.0002341	.000259	-0.90	0.366	-.0007417	.0002735
Cashflowtototalassetsratio	.2815077	.0856258	3.29	0.001	.1136843	.4493311
ReturnonEquity	-.0148906	.0159287	-0.93	0.350	-.0461102	.0163291
Netprofitmargin	-.0161588	.0093802	-1.72	0.085	-.0345437	.0022261
CurrentRatio	.1097436	.008916	12.31	0.000	.0922686	.1272186
ROIC	.000303	.0013601	0.22	0.824	-.0023627	.0029688
LogformofM2	-.1023451	.1029982	-0.99	0.320	-.3042179	.0995277
GDP	-.0188255	.0108059	-1.74	0.081	-.0400047	.0023536
logofCPI	.6048139	2.102679	0.29	0.774	-3.516362	4.72599
_cons	.2154021	4.175284	0.05	0.959	-7.968005	8.398809
sigma_u	.23774865					
sigma_e	.4143985					
rho	.247642	(fraction of variance due to u_i)				

5）DID analysis by different Return on assets

Firms with higher Return on Assets

```
Random-effects GLS regression                   Number of obs     =       576
Group variable: 股票代码                        Number of groups  =        68

R-squared:                                      Obs per group:
     Within  = 0.4442                                         min =         1
     Between = 0.5641                                         avg =       8.5
     Overall = 0.4860                                         max =        16

                                                Wald chi2(12)     =    475.16
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =    0.0000
```

Categries	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
VOFFp2008	-.7984439	.1641011	-4.87	0.000	-1.120076	-.4768117
VOFF	.9785054	.1309614	7.47	0.000	.7218258	1.235185
P2008	.3647203	.1613261	2.26	0.024	.0485268	.6809137
Totaldebttoequity	-.0518953	.0139005	-3.73	0.000	-.0791398	-.0246507
Cashflowtototalassetsratio	.2091329	.0948844	2.20	0.028	.0231629	.3951029
ReturnonEquity	.6938824	.2257718	3.07	0.002	.2513778	1.136387
Netprofitmargin	-.0220013	.009035	-2.44	0.015	-.0397095	-.0042931
CurrentRatio	.2454414	.0223763	10.97	0.000	.2015846	.2892983
ROIC	.0043626	.0022352	1.95	0.051	-.0000184	.0087436
LogformofM2	.0474071	.0990509	0.48	0.632	-.1467291	.2415432
GDP	-.028901	.0110163	-2.62	0.009	-.0504926	-.0073094
logofCPI	2.505402	2.18488	1.15	0.252	-1.776884	6.787688
_cons	-4.813906	4.332431	-1.11	0.267	-13.30532	3.677503
sigma_u	.23895379					
sigma_e	.34412549					
rho	.32531051	(fraction of variance due to u_i)				

Firms with less Return on Assets

Random-effects GLS regression — Number of obs = 490
Group variable: 股票代码 — Number of groups = 62

R-squared:
Within = 0.3345
Between = 0.5603
Overall = 0.4174

Obs per group:
min = 1
avg = 7.9
max = 15

Wald chi2(12) = 289.51
corr(u_i, X) = 0 (assumed) — Prob > chi2 = 0.0000

Categries	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
VOFFp2008	-.3606482	.1580558	-2.28	0.023	-.6704319	-.0508645
VOFF	.7245757	.1370969	5.29	0.000	.4558706	.9932807
P2008	.2464987	.1144966	2.15	0.031	.0220894	.470908
Totaldebttoequity	-.0001442	.0002568	-0.56	0.574	-.0006476	.0003591
Cashflowtototalassetsratio	.3848899	.3274917	1.18	0.240	-.256982	1.026762
ReturnonEquity	.0006512	.0161648	0.04	0.968	-.0310312	.0323336
Netprofitmargin	-.0157427	.0197968	-0.80	0.426	-.0545437	.0230583
CurrentRatio	.098896	.0095044	10.41	0.000	.0802677	.1175244
ROIC	-.0025779	.0023434	-1.10	0.271	-.007171	.0020152
LogformofM2	-.3995782	.1279368	-3.12	0.002	-.6503298	-.1488266
GDP	.0013797	.0145893	0.09	0.925	-.0272147	.0299741
logofCPI	.1208777	2.971396	0.04	0.968	-5.702952	5.944707
_cons	2.293975	5.895218	0.39	0.697	-9.26044	13.84839
sigma_u	.14672063					
sigma_e	.40455215					
rho	.11624285	(fraction of variance due to u_i)				

6) DID analysis with different cash flow

Firms with higher Cash flow (Cash flow to total assets)

```
Random-effects GLS regression                   Number of obs     =       884
Group variable: 股票代码                        Number of groups  =        68

R-squared:                                      Obs per group:
     Within  = 0.3467                                         min =         5
     Between = 0.4336                                         avg =      13.0
     Overall = 0.3718                                         max =        16

                                                Wald chi2(12)     =    473.56
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =    0.0000
```

Categries	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
VOFFp2008	-.3935135	.1051434	-3.74	0.000	-.5995909	-.1874362
VOFF	.7109048	.080796	8.80	0.000	.5525476	.8692619
P2008	.1530518	.103463	1.48	0.139	-.049732	.3558356
Totaldebttoequity	-.0042281	.0041589	-1.02	0.309	-.0123794	.0039233
Cashflowtototalassetsratio	.1768024	.1015154	1.74	0.082	-.022164	.3757689
ReturnonEquity	-.342938	.1645319	-2.08	0.037	-.6654145	-.0204614
Netprofitmargin	-.0172947	.0105168	-1.64	0.100	-.0379073	.0033179
CurrentRatio	.1170757	.0095519	12.26	0.000	.0983543	.1357972
ROIC	.0045942	.0022117	2.08	0.038	.0002593	.008929
LogformofM2	-.2105677	.0929387	-2.27	0.023	-.3927241	-.0284112
GDP	-.007754	.010243	-0.76	0.449	-.0278298	.0123218
logofCPI	.1750914	2.071864	0.08	0.933	-3.885687	4.235869
_cons	1.34874	4.103148	0.33	0.742	-6.693282	9.390763
sigma_u	.21879429					
sigma_e	.40633961					
rho	.22476433	(fraction of variance due to u_i)				

Firms with less cash flow (Cash flow to total assets)

```
Random-effects GLS regression                   Number of obs     =       182
Group variable: 股票代码                        Number of groups  =        47

R-squared:                                      Obs per group:
     Within  = 0.4850                                         min =         1
     Between = 0.5240                                         avg =       3.9
     Overall = 0.4850                                         max =        10

                                                Wald chi2(12)     =    161.51
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =    0.0000
```

Categries	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
VOFFp2008	1.048333	.2890331	3.63	0.000	.4818382	1.614827
VOFF	.3776125	.2577598	1.46	0.143	-.1275875	.8828125
P2008	-.1217591	.146541	-0.83	0.406	-.4089741	.1654559
Totaldebttoequity	-.0000559	.0001896	-0.29	0.768	-.0004274	.0003156
Cashflowtototalassetsratio	-.1216026	.2482275	-0.49	0.624	-.6081195	.3649143
ReturnonEquity	-.0010261	.0116169	-0.09	0.930	-.0237949	.0217426
Netprofitmargin	-.0090387	.0150499	-0.60	0.548	-.0385359	.0204585
CurrentRatio	.104237	.0148893	7.00	0.000	.0750545	.1334194
ROIC	6.39e-07	.0017768	0.00	1.000	-.0034818	.0034831
LogformofM2	-.2854665	.1581802	-1.80	0.071	-.5954939	.024561
GDP	-.003119	.018647	-0.17	0.867	-.0396664	.0334284
logofCPI	4.404783	3.833453	1.15	0.251	-3.108646	11.91821
_cons	-6.747771	7.668846	-0.88	0.379	-21.77843	8.282891
sigma_u	.15864414					
sigma_e	.27718941					
rho	.24674005	(fraction of variance due to u_i)				

7) Analysis firms with different ownership structure

State-owned firms

```
Random-effects GLS regression                   Number of obs     =       635
Group variable: 股票代码                        Number of groups  =        40

R-squared:                                      Obs per group:
     Within  = 0.3773                                         min =        14
     Between = 0.5343                                         avg =      15.9
     Overall = 0.4210                                         max =        16

                                                Wald chi2(12)     =    393.40
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =    0.0000
```

Categries	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
VOFFp2008	-.4602851	.0993228	-4.63	0.000	-.6549542	-.265616
VOFF	.6825693	.0853028	8.00	0.000	.5153789	.8497597
P2008	.0750331	.0989677	0.76	0.448	-.11894	.2690061
Totaldebttoequity	-.0064259	.0031965	-2.01	0.044	-.0126909	-.0001609
Cashflowtototalassetsratio	1.120197	.4074672	2.75	0.006	.3215758	1.918818
ReturnonEquity	-.0633053	.028776	-2.20	0.028	-.1197053	-.0069054
Netprofitmargin	-.0060417	.0189924	-0.32	0.750	-.0432662	.0311827
CurrentRatio	.0907253	.0086155	10.53	0.000	.0738393	.1076114
ROIC	-.003132	.001795	-1.74	0.081	-.0066502	.0003861
LogformofM2	-.0851324	.0982723	-0.87	0.386	-.2777426	.1074778
GDP	-.0159398	.0109966	-1.45	0.147	-.0374927	.0056132
logofCPI	-.0893473	2.230113	-0.04	0.968	-4.460289	4.281595
_cons	1.485627	4.422069	0.34	0.737	-7.18147	10.15272
sigma_u	.19650948					
sigma_e	.36990398					
rho	.22010311	(fraction of variance due to u_i)				

Non state-owned firms

Random-effects GLS regression — Number of obs = 431
Group variable: 股票代码 — Number of groups = 28

R-squared:
Within = 0.3493
Between = 0.5920
Overall = 0.4004

Obs per group:
min = 5
avg = 15.4
max = 16

Wald chi2(12) = 241.36
corr(u_i, X) = 0 (assumed) — Prob > chi2 = 0.0000

Categries	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
VOFFp2008	-.0872697	.1532228	-0.57	0.569	-.3875808	.2130415
VOFF	.4429443	.1222776	3.62	0.000	.2032847	.682604
P2008	.0240832	.1482533	0.16	0.871	-.266488	.3146543
Totaldebttoequity	-.0002983	.0002751	-1.08	0.278	-.0008375	.0002409
Cashflowtototalassetsratio	.1812495	.1144628	1.58	0.113	-.0430935	.4055925
ReturnonEquity	-.0202904	.021197	-0.96	0.338	-.0618359	.021255
Netprofitmargin	-.025815	.0111467	-2.32	0.021	-.0476621	-.0039679
CurrentRatio	.2189448	.0202223	10.83	0.000	.1793099	.2585797
ROIC	.0029566	.002431	1.22	0.224	-.0018081	.0077212
LogformofM2	-.2980006	.1421008	-2.10	0.036	-.5765131	-.0194881
GDP	-.0079108	.0159293	-0.50	0.619	-.0391317	.0233101
logofCPI	2.554708	3.271896	0.78	0.435	-3.85809	8.967506
_cons	-3.058987	6.490463	-0.47	0.637	-15.78006	9.662087
sigma_u	.182297					
sigma_e	.44019822					
rho	.14639304	(fraction of variance due to u_i)				