Cashflow Investment Relationship: Empirical Evidence of Chinese Financial Market

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Cashflow Investment Relationship: Empirical Evidence of Chinese Financial Market

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Abstract

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Purpose: In this study, we examine the data from Chinese companies to test the relationship between cash flow and investment. While a wide assortment of previous research has examined the relationship between cash flow and investment, they have largely focused on empirical analysis from an US or a Western perspective. But, to date, little attention has been paid to such relationship using empirical materials from a largely different Eastern context, such as China.

Methodology: The econometric methodology is based upon a panel data setup, where Ordinary Least Square (OLS)- regressions with fixed and random effects were conducted. Investment is our dependent variable, whereas cash flow is the main explanatory variable. Apart from these two variables, for in-depth analysis, we also control for other independent variables: revenue, leverage, and Tobin's Q. Dummy variables are introduced, as well as an interaction term to test for effect of year and cashflow on investment. We take Year 2000-2010 as pre-Fintech era and Year 2011-2020 as post fintech era. Lastly, check the robustness of the models.

Theoretical Perspectives: The theoretical perspectives of this study are derived from the regarding M&M theorem, Free Cashflow theory, Trade off theory, Pecking order theory, and Agency cost theory, and discuss how these relate to and affect each other and our variables.

Empirical Foundation: Our main reference is Robert E. Carpenter and Alessandra Guariglia's study from 2007 where they looked at cash flow-investment relationships by using panel data on UK firms. Some of our hypotheses are inspired from hypotheses that have already been empirically tested in this research paper, we are curious to see if the results differ with regard to Chinese companies. We also take Ascioglu et al.'s (2007) research as a base for our study since they used more direct measures derived from the market microstructure literature, such as debt and revenue, to observe the cash flow-investment sensitivity.

Conclusions: Differing from the findings in previous papers– we find pre and post fintech era has impact on the relationship between cash flow and investment—as predicted we found that, when it comes to Chinese companies, cash flow has a positive relationship with investment. The effect of cash flow diminishes as other control variables- leverage, Tobin's Q, and revenue are added. Explanatory variables- cashflow, Tobin's Q and revenue have positive relation with investment, whereas Leverage has negative relation. All the variables are highly statistically significant except for Tobin's Q.

Abbreviation:

CNY: Chinese Yuan Renminbi

ESG: Environmental, Social, and Governance

FD: First Differencing

FCF: Free Cash Flow

FE: Fixed Effects

Fintech: Financial Technology

GDP: Gross Domestic Product

GFC: Global Financial Crisis

GNI: Gross National Income

IMF: International Monetary Fund

LGFV: Local Government Financing Vehicles

MLR: Multiple Linear Regression

M&M: Modigliani–Miller theorem

NPV: Net Present Value

OCED: Organization for Economic Cooperation and Development

PPE: Property, Plant or Equipment

PPP: Purchasing Power Parity

PV: Present Value

R&D: Research and Development

RE: Random Effects

SIC: Standard Industrial Classification

SOE: State-Owned Enterprises

VARL: Vector Autoregression

US: United States

Definition

Fintech: computer programs and other technology used to support or enable banking and financial services.

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Section 1: Introduction

This opening chapter introduces the reader to this turbulent history and background of investment and Chinese financial market which is led by the problem discussion regarding the factors affecting the investment decision and China's shift in GDP. Subsequently this will introduce the aim of the study, leading to the formulation of research questions. This furthermore elaborates why Chinese financial market is an interesting arena for this test and the scope of this study. The chapter ends with a holistic outline of the overall thesis.

1.1 Background

With the growing development of the world economy, corporate investment plays a significant role in maintaining corporate growth and scaling business. Moreover, corporate investment behaviour can create value and affect the development of the economy. Financing and investment have always been the most attractive and critical decision for firms. Although researchers have widely studied this (Meyer and Kuh, 1957; Kuh, 1963), yet cashflow somewhat remained silent within the investment literature until a research breakthrough was brought about by Fazzari et al. (1988). Following the models of asymmetric information, Fazzari et al. (1988) posited the econometric model of investment with functions of cash flow and Tobin's Q. They argued that when firms have restricted access to external capital, i.e., in case of financially constrained firms, it is generally that investment is sensitive to the availability of firm's internal flow of fund. In earlier studies, similarity was in magnitude and patterns of investment-cash flow sensitivity. For instance, firms with high growth rate and low dividend payout ratios tends to have higher investment cashflow sensitivity (Alti, 2003). Carpenter (2008) found tobin's Q to be a noisy measure for near-term investment plans. Nevertheless, it remains controversial why cash flow matters for investment, because when external financing is costly, it is somehow that any fluctuations in firm's flow of fund may cause value- destroying disruptions to the firm's optimal investment behavior (Jankensgård and Moursli, 2020).

Financial and economic systems are intertwined and a planned system would lead to the formulation of a modern society (Nazir et al., 2018). Traditionally, investment decision is

primarily reliant on the financing decision of any firm, i.e., how to best allocate the firm's capital to get the maximum return out of it in an optimal way to finance the investment. However, according to Malender et al. (2017), cashflow is not a determinant of investment for a firm based on the neoclassical theory of investment, rather financial variables can have an impact on investment, in presence of any financial frictions of the market. On the other hand, various studies have demonstrated that it is not investment, but rather a company's leverage that affects the firm value (Ullah and Islam, 2018). Nevertheless, the amount of internal and external investment is closely related to capital structure of the firm. Previous studies found that investment decision vary for financial constrained and unconstrained firms (Seo and Soh, 2019; Fazzari and Petersen, 1993; Fazzari et al., 2000).

It is interesting and important to understand how firm's capital structure theories work in a transitional economy environment, within which variables affecting the firms structures and financial constrains differ not only from developed countries but also from developing economies. The People's Republic of China is a developing country, whose financial system is controlled by the state and the regulator, and the government has a strong influence over market participants and decision making. China's history of economic development has been truly remarkable, rising from a poor developing country to a major economic power of the world has been spectacular and took about 40 years. China initiated economic reforms and opened up trade liberalization and investment and implemented free market reform in 1979, that enabled China to double its Gross Domestic Product (GDP) every eight years and also helped the country with rapid urbanization and to raise an estimated of 800 million people out of the poverty zone. The World Bank has described the pace as "the fastest sustained expansion by a major economy in history" with a real annual GDP growth of average rate of nearly 10%. According to an International Monetary Fund (IMF) research team, for any companies growth-nation's stock is the capital asset as investing in new factories or manufacturing machinery and communication was important as well as the increase of productivity works as a driving force behind economic boom (Hu and Khan, 1997). The country has emerged as world's largest economy in terms of Purchasing Power Parity (PPP), with value added manufacturing, trade merchandising and holder of foreign exchange reserves.

Investment has been a major role player in this rapid expansion of economy allowing China to use a large share of global output of commodities as the country makes intensive use of raw commodities. This reflects high rate of investment in the construction of new housing, work

places, road and communication, transport, power, water storage and treatement facilities as this continuously adds to the stocks of capital and housing. Previous research on economic development suggests that capital investment has a significant role in economic growth of any nation (Hu and Khan, 1997). Hu and Khan (1997) mentioned that, during 1979-1994 the productivity gains accounted for more than 42 percent of China's growth which is, in fact, attributable to capital investment. With growing economic power, China has become increasingly involved in more investment in the infrastructure development, especially in new machinery, better technology and have helped to raise output. According to data from the World Bank and the Organisation for Economic Co-operation and Development (OECD), in 2010, China overtook Japan as the world's second-largest economy, measured in current prices or nominal terms (not accounting for inflation), second only to the United States (US) (Global Times, 2020). Due to China's repressive financial policies maintained by the government, it was unlikely for China to have been affected in the Global Financial Crisis (GFC). However, with respect to the GFC, the government adopted huge fiscal stimulus program in response to the global financial crisis (GFC) which has greatly jeopardised China's financial stability, intensified the severity of China's financial repression and economic security (Xu and Gui, 2019). With those programs, China started to have a positive shift in its growth index.

Lately but surely China started to have it footprint in fintech. As Chinese financial services were not developed and faced crisis after GFC, Fintech lets it leapfrog over traditional banking systems emblematic of developed. According to Wharton School of the University of Pennsylvania, this opened up an opportunity for tech companies such as Alibaba and Tencent to offer financial services. After the introduction of these fintechs, China has been at the forefront of fintech growth and became the largest fintech market in the world. According to Accenture analysis, China made some huge investments of about $25.5 billion in 2018 in fintech sector, which was a nine-fold increase over the previous year and accounts for 46% of all fintech investments globally in 2018 (Wharton School of the University of Pennsylvania, 2019). According to the World Bank development levels of economies or index to method development is measuring the per capita gross national income (GNI). According to the World Bank report, China went from a low-income economy to a low-middle-income economy in 1997, and in 2010, it became an upper-middle-income country. Therefore, we take 2010 as the breakeven point where China had an enormous investment in digitalization and their development indices became upward sloping.

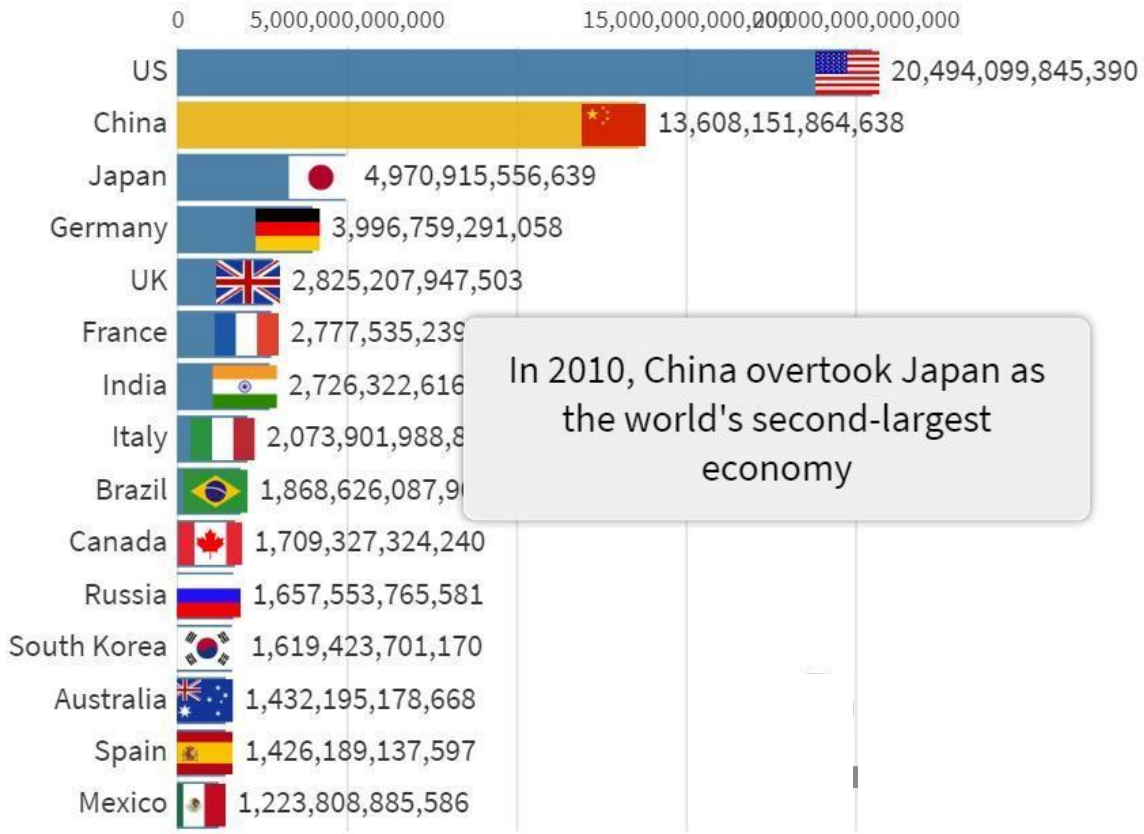

Figure 1 Source World Bank, OECD

1.2 Problem Statement

Based on many previous research, numerous problems were identified, which question the mechanism that drives the relationship between investment and cash flow (Almeid and Campello, 2007; Alti, 2003; Kaplan and Zingales, 1997, 2000). According to pioneer work of Modigliani and Miller (1958), in perfect capital markets, there would be no link between free cash flows and firm level investments. However, prior research has documented a positive relation between them (Hubbard, 1998), although the relationship varies on different conditions. There are two explanations for the relation: one is information asymmetry; the other is agency costs where, Myers and Majluf (1984) show that, in imperfect capital markets, information asymmetries increase the cost of capital and it is costly for firms to raise external finance. They conclude that, external financing constraints force firms to reduce feasible investments and to invest more in the presence of internally generated free cash flows due to its lower cost of capital (Fazzari et al., 1988; Hubbard, 1998). Another explanation is agency costs which stem from the separation of corporate ownership and control, exhibiting over-

investment where managers in firms with free cash flows have strong incentive to invest in negative Net Present Value (NPV) projects (Jensen, 1986). Hence, to understand and link with China this study is essential. Richardson (2006) examines firm level over-investment of free cash flow, and finds that over-investment is concentrated in firms with the highest levels of free cash flow, which is consistent with the agency cost explanation, however there is a gap for assessing these with any change in financial market of a country.

1.3 Purpose

The purpose of our paper is to analyse the impact of investment cashflow relationship to see if the pre and post fintech year i.e., 2010 describes any fluctuation in investment or not. In one of his studies, Ismail et al. (2010a), used a full sample approach to identify the investment and cashflow relationship; whereas in another study, Ismail et al. (2010b) used exogenous sample split to analyse investment cashflow relationship, but in this the threshold regression is taken into consideration, which was proposed by Hansen (1999). This method is able to analyse the relationship between cash flow and investment among different firm groups. In our study, we aim to see if there is any relation between investment and cashflow and if revenue, leverage, and Tobin's Q have any impact on firm investment, and, we would be able to see if digitalization has a positive impact on economic shift in China.

Our study is different from prior research in two ways: first, as per our knowledge, no other research have tested cashflow investment relationship with impact of digitization of the country. Second, identifying investment cashflow relationship in China is not very common. Previous research always focused on a Euromerican or Western context and largely neglected Eastern and rapidly developing economics. Also, in terms of socioeconomic context China is very different than that of the West, especially in terms of state regulations. So, a Chinese perspective can help shed lights into interesting insights, that might not be possible from existing studies. We choose Chinese listed firms as the research target because prior literature studying the links between cash flow and investment of Chinese firms is very limited. We also aim to investigate the relationship of other variables as revenue, leverage, and Tobin's Q with investment. We believe that this would bridge the gap between existing literature on investment cashflow sensitivity and China's financial market.

In the pioneering work of Modigliani and Miller (1958), as cited in The Relationship between Firm Investment and Financial Status (1999), the financing and investment decisions of the

firm can be considered independent i.e., corporate capital structure is irrelevant to its value in the absence of market frictions (in perfect capital market). However, the real market is not perfect and full of market frictions, where capital structure may have effect on investment decision and other factors might have impact. Fazzari et al. (1988) argue that the investment cashflow sensitivity would be higher for firms with that have low dividend payout ratio, compared with firms that pay high dividends. Based on the pecking order theory, the cost of internal funds for investment is extremely cheaper than external funds for investment. Thus, we expect that there is a positive relationship between internal cash flow and investment for both pre and post year 2010 for China. Furthermore, we expect to see stronger investment cashflow relationship after year 2010 due to the result of huge investment in digitization.

1.4 Research Question

Financing and investment have always been a tough decision for firms. The capital structure theories are the most attractive still complex issue in the field of finance. Several research has been done in the US and UK firms about the decision making in firm's capital structure, which has been a very much susceptible issue to all firms due to its internal and external effects on firms. Our aim is to conduct a similar test in Chinese firms, a largely different context than that of the existing studies, and find the factors that affect the investment decision of a firm because these factors vary across countries, industries, firm characteristics and time.

The research questions in this paper are based on the discussion and purpose, and is as follows:

1. *Does cash flow, leverage, revenue and Tobin's Q have any effect on investment?*
2. *Does economic shift in Chinese financial market have any impact on investment- cash flow relationship?*

1.5 Why China

China was once "The sleeping giant" but now the second most influential economic superpower. We focus on China, a country with one of the highest levels of financial repression in the world. China's case is very unique and can be exemplary, when financial repression is maintained at a modest level, as the Chinese government did before 2008, the possibility of a financial crisis is low. When financial repression policies are pushed to an excessive level, as the Chinese government did after 2008, the national asset-liability structure may be damaged

to such an extent that a financial crisis becomes likely. So how they move from any situation and change the policies was very interesting to study. The key to understanding the changing role of China's financial repression policies lies in the survival strategy of the Chinese party-state, which regards finance as a powerful weapon and is eager to use it to address certain economic, political, or social problems that may endanger its rule. China's economic condition changed dramatically after 2010 as they started introducing technology in their financial market. So their changes and impact caught our attention, hence we chose China. As we mentioned in introduction, China being the role of economy giant and vest in traditional value make it deserve more attention.

Furthermore, China is one of the major emerging economies where in last four decades, without any doubt, the country is the rising economic power of the 21st century, which may be called the Chinese Century. The country accounts for one-third of global growth. At the beginning of 2019, China was one of three largest global economies. Also, another reason for being interested with China is because Chinese capital market and the corporate governance are unique.

1.6 Scope and Delimitation

It is of interest both to macroeconomics – because investment is an important part of the business cycle – and to corporate finance, because the financing of investment is a central purpose of corporate capital structure.

The principal contribution of this thesis is to clarify if change in financial system brings change in the investment, hence to company's overall flow of fund. Another interesting aspect of our work is its contribution to the debate on the effects of leverage, revenue and Tobin's Q on investment, with a focus on the China rather than the West. This is important to understand the Asian market because less studies has been done on this topic from the context of emerging economies.

To our knowledge, our study is the first to explore the link among investment and cashflow relationship that have been tested in the Chinese financial market to see the variation in different timeline. The primary objectives of this study are to (1) investigate the effect of any change (introduction of fintech) in Chinese financial market on the relationship between investment and cash flow, and (2) examine the effect of other variables in investment for any

firm of China. Our study could also have global implications, in terms of (1) understanding emerging economies, those that are not in the West, for a more comprehensive and nuanced understanding of investment and cash flow relationship, and (2) considering globalization and the increasing importance of the Chinese economy in the world, it is crucial to recognize the impact of the Chinese market for a more holistic understanding of world economies. The findings of this study provide important implications for Chinese investors to invest after proper studying on the market. Secondly, another delimitation concerns our sample, as we only include firms with ESG-ratings for the whole period and only one index of corporate social performance. It would be preferable to construct a new index using primary data to be able to compare the findings.

Considering the scope of this thesis, delimitations have been necessary to carry out the study. Firstly, this study focuses solely on Chinese financial market. While it would have been interesting to examine Sweden and China and show juxtapose both economies, however, due to limited data and time constraints, this was not been attempted. Thus, our findings apply to firms in China, but considering the prevailing interest in change in financial market in this region, it may not be generalizable. Although this study would be more generalizable to emerging economies than existing research that have been conducted from a Western perspective. Including more countries from different continents would have broadened the statistical inference while increasing the generalisability simultaneously. Secondly, another delimitation concerns our sample, as we only include firms listed in the Shanghai Stock Exchange that have made investment in the past 20 years. It would be preferable to construct a new index using primary data to be able to compare the findings between firms that made investments and firms that did not.

1.7 Disposition

The rest of the thesis is laid out as follows. Section 2 discusses the main literature review and idea of investment cashflow relationship, followed by Section 3, that explores the background of the study and demonstrates hypothesis development. While Section 4 presents the econometric model step by step and discusses about the methodology of the test. Section 5 describes the data and presents some summary statistics. Section 6 presents our analysis and econometric results, followed by our conclusion in Section. The rest of the thesis comprises references in Section 8, Figures and tables in Section 9 and Appendix in Section 10.

Section 2: Literature Review

Before diving deep into our paper, it is imperative to conduct an in-depth review of previous literature. This chapter presents relevant literature on the topic in terms of the Chinese financial industry. We have first added the literature review based on our variables, followed by literature that sheds light on the Chinse financial market. So, we in this chapter, we explore the previous literature streams that unites our variables and China.

The question of how investment is influenced by other variables is a historical debate and over the years many research papers have proven that a significant number of variables are suitable for explaining investment models. Back in 1995, Robert S. Chirinko, as mentioned in Saltari and Travaglini (2006), claimed that Tobin's Q is a "sufficient statistic for investment" as it was considered that the Q already incorporates the needed firm indicators and effects of capital market imperfection and it is a measure of liquidity (such as cash flow) need not be added to the model". Yet, with more research coming up on this topic, it was clear that Tobin's Q is not sufficient and Cash Flow is more appropriate for analyzing the investment model. To dig deeper in this dynamic relationship between investment and cash flow some research articles, like Carpenter and Guariglia (2007) and Melander et al. (2015), state that the significance of cash flow in investment decisions is tied to its capacity of capturing the effects of dysfunction in credit markets, also known as credit frictions, and that the effect of cash flow on investment is remarkably important for financially constrained companies. This is similar to Safiullin et al.'s (2013) findings where they explain that in underdeveloped financial markets, such as the Russian market, internal financing has the main role and the company's profitability is a direct driver of investment expenditures. Carpenter and Guariglia (2007) also mention that the explanatory power of cash flow over the investment decision decreases as the firm's size increases and Ismail and Yunus (2015) show, with the example of the Malaysian market, that there is different cash flow-investment relationship among firms with different levels of debt. Likewise, Gayane Hovakimian (2009) indicates that internal liquidity and firm's growth potential are other variables that impact the relationship's sensitivity and the companies that have low levels of internal liquidity and high levels of potential growth show even a negative cash flow-investment sensitivity. Others, like Ascioglu et al. (2007), argue that there are much more indirect variables that affect this relationship and management's available information

has a great impact on investing decisions as the investment-cash flow connection is more sensitive when more informed trading takes place. In addition to Carpenter and Guariglia's (2007) findings, Keefe and Tate (2013) claim that firm's age also has an impact on investment to cash flow sensitivity and even Melander et al. (2015) argue, in the same paper mentioned before, that investment-cash flow sensitivity is varying across time periods and is significantly higher during recession periods. Furthermore, as indicated by Gayane Hovakimian (2009), internal liquidity and firm's growth potential are other variables that impact the relationship's sensitivity and when the companies that have low levels of internal liquidity and high levels of potential growth show a negative cash flow-investment sensitivity.

Although each research paper is looking at particular models to explain investment, a common theme persists throughout the papers and it is that cash flow plays a main role as an explanatory variable and Tobin's Q is not a "sufficient statistic" as many other variables should be taken into consideration. Twenty years later, Fabio Verona (2020) conducting a more deeper research about the connection between investment, cash flow and Tobin's Q across different time periods and frequencies, claimed that Tobin's Q sensitivity declines over time while cash flow sensitivity remains largely stable on medium to long run, yet the information content of these two variables are more complementary than alternative. As Bloch's (2005) findings show, the coefficient for cash flow is only moderately higher using Tobin's Q when studying the cash flow-investment relationship and for large companies variables like sales have a significant impact. Likewise, we test for similar model like Carpenter and Guariglia (2007), where it can be concluded that when measuring firm's investment opportunities in the presence of asymmetric information, Tobin's Q is a slightly imperfect measure of the firm's investment opportunities, therefore more attention should be assigned to the cash flow and other variables.

2.1 Investment

Macro Drivers for Investment

Investment could be driven by various set of factors which could be either company-specific or policies and related to macro-economic variables. Firstly, the macro-drivers are those which are uncontrollable for the company while the company-specific factors are under the control of the company. Therefore, it would be necessary to segregate the factors based on their empirical evidence. Investments, in any industry tends to be driven by a set of factors which are prevalent in the economy. One of the facts worth considering is that since the companies are a part of the

economy, the role of external factors is key to the success of the firms, thereby making the investments feasible. Some of the factors which tend to be key drivers of the investments are GDP, Savings and Investment, Rates of Interest, Political Scenario, and Infrastructure.

Keeley and Ikeda (2017), in a study indicated that some of the macroeconomic factors which tend to influence the investments in nations include regulatory aspects, political support, and economic factors. Furthermore, one of the major findings is that considering that the study focused on the renewable energy industries, the role of sustainability tends to be critical in raising the investments. Similarly, in a different study, Anwar (2017) focused on an underdeveloped nation and found that the investment in the stock exchange of the companies is driven by the supply and demand of the company's stocks which is driven by the investment feasibility of the market, followed by the economic scenario, such as the macroeconomic conditions. Additionally, the factors such as the prevalence of the competition and the political scenario of the country tends to play a key role in determining the investment feasibility of the company.

Over the past two decades, studies had taken the imperfect market conditions into account, where the role of financial factors has never been neglected in firms' investment decision. Corporations often face the problem of financing in every worthwhile investment decision making. Firm's investments could be funded either internally, such as via retained earnings, depreciation provision, accumulated profits in the form of various reserves, and or externally, which include but not limited to debt/external loan (institutional or non-institutional) (Ajide, 2017). Keynes (1936) found some evidence for financial influences on investment through effects of Liquidity or profitability in a variety of empirical investment functions. In empirical literature, prior studies show that corporate investments can be impacted by firm-specific or financial factors such as leverages (debt), cash flow (retained earnings), sales (revenue), and stock of Liquid assets (Adelegan & Ariyo, 2008; Love & Zucchino, 2006). Many variables and other factors have been tested to examine the relationship between finance and investment, however, the most explainable variable to this relationship is cash flow and investment (Ismail, 2015; Degryse & Jong 2006). Based on their study, these authors claimed the roles played by the firm specific financial factors on corporate investment and express different conclusion. While some authors debunk the view of the neoclassicists (Modigliani & Miller, 1958) of irrelevance financial factors of the perfect market (e.g. Bhagat & Obreja, 2013), other authors express that, in an imperfect capital market, internal and external capitals are not perfect

substitutes of each other (Hu & Schiantarelli, 1998). Meanwhile, those authors that empirically debunk neoclassicists' views, affirm that financial factors have contradictory findings; one significant positive; others confirm significant negative effect on investment cashflow relationship (Bhagat & Obreja, 2013). The idea of the neoclassicists is that financial factors enter through the cost of capital, which, in turn, is independent of the way the firm's finances grow and invest. This independence arises because capital markets are assumed to be perfect in neoclassical perspective, which may not be true in the modern capital market system. In his study on Jamaica, Palmer (1967) claimed that the development of economy of any market is largely dependent upon the extent of investment in the private sector (Ajide, 2017). Zhang, Tong and Li (2020) have stated that it is expected that higher investments have a **positive** influence on cash flow. When the aspect of investment dynamics is considered, the enhanced cash flow generation usually results in the growth rate of fixed assets and investments. Investments are one of the key drivers of higher cash flow in industries or economies. The long-term influence has been improved cash flow generation which further results in development through the investments made towards long-term and fixed assets. There is no specific relationship between investment and cash flow that remains constant, investment-cash flow sensitivity are dependent on underinvestment or overinvestment factors that change based on the cycle of the economy. Investment-cash flow sensitivity has been utilized as an important financial indicator of measuring the financial constraints of an industry or the economy as a whole (Xhang, 2017).

Investments, in any industry tends to be driven by a set of factors which are prevalent in the economy. One of the facts worth considering is that since the companies are a part of the economy, the role of external factors is key to the success of the firms, therby making the investments feasible. Some of the factors which tend to be key drivers of the investments are GDP, Savings and Investment, Rates of Interest, Political Scenario, and Infrastructure. Keeley and Ikeda (2017), in a study, indicated that some of the macroeconomic factors which tend to influence the investments in nations include regulatory aspects, political support, and economic factors. Furthermore, one of the major findings is that considering that the study focused on the renewable energy industries, the role of sustainability tends to be critical in raising the investments. Similarly, in a different study, Anwar (2017) focused on an underdeveloped nation and found that the investment in the stock exchange of the companies is driven by the supply and demand of the company's stocks which is, in turn, driven by the investment feasibility of the market, followed by the economic scenario, such as the macroeconomic

conditions. Additionally, the factors such as the prevalence of the competition and the political scenario of the country tends to play a key role in determining the investment feasibility of the company.

Referring to the Chinese markets, there has been an exponential growth in the extent of investments across the economy resulting in higher capital availability across industries. Sun and Yamori (2019), discuss that industry level overinvestment has emerged as a common practice in the Chinese capital markets as a result of the rising cash flow availability. **Scott Richardson's Framework** explains the extent of overinvestment/underinvestment based on the cash flow availability. The application of the framework in the case of Chinese capital markets depicts that the managers of businesses with higher levels of cash flow are motivated to commit towards overinvestment. On the contrary, firms with marginal cash flow are unable to meet its investment criteria and rely on external financial instruments towards achieving its investment requirements. The investment-cash flow sensitivity depends on numerous variable factors such as agency costs, market condition, industrial norms etc (He, Ma and Zhang, 2020). The managers of the companies operating in the Chinese market are exposed to high cash flows due to extensive investments and industrial growth resulting in the event of overinvestment on a regular basis.

Overinvestment as a result of the availability of excessive cash flow is a common occurrence at rapidly growing countries as industries operating in the capital market of China are benefitted from large-scale domestic and foreign direct investment. From the prospect of investments, overinvesting is a common action to fast-track growth and benefit from the opportunities to which a firm is exposed to. Arguing further, it is important to understand the negative consequences of overinvesting (Liu and Zhang, 2019). Overinvesting in certain assets can certainly expose the firm to exponential risk and overcommitment towards a specific project or asset. Diversification of investments through interval-based investing is crucial which avoids overinvestment issues. The Chinese capital markets have been for decades witnessing over-investment as a result of the growing cash flows into the market. Ding, Knight and Zhang (2019), discuss the case of Chinese industries and highlight that the Chinese private sector (non-state) has witnessed significant levels of overinvestment which has often proven to have negative impact on the business propositions. The state-sector has also witnessed an extent of overinvestment due to increased cash-flows which is a result of the improper financial screening and monitoring methodologies (Zeng et al., 2018). Despite a range of opportunities,

the requirement to conduct optimal investing in the Chinese capital markets is crucial to avoid the risks of overinvesting which can negatively impact firms and industries owing to the higher exposure to a range of risks.

China's experience with investment boom has been continuing for the last few decades as industries and the state government recognizing a range of business opportunities has resulted in the economic development of the country, which continues at a fast pace with capital formation contribution towards 34% of the Chinese GDP on an average (He, Chen and Hu, 2019). The low cost of investing, higher cash flows and moderate bank lending rates are key contributors towards the investment boom in the country's capital markets. Ding, Knight and Zhang (2016) have depicted that the non-state sector has been the major driver of the investments into the country in the form of foreign direct investments. As a result of the growth in investments, Chinese firms are able to invest aggressively towards growth opportunities enabling rapid growth and economic development. As a result of the investment in growth opportunities, enhanced cash flow is being generated which has led to further investment causing the advent of overinvestment in numerous firms across the non-state sector. The consequences have seldom been witnessed owing to the rapid growth in the economy. The challenges related to overinvestment may be a cause of concern in the near future. The situation highlights the necessity to ensure optimal investments are being made to minimize risk and enable adequate business function towards the opportunities (He, Chen and Hu, 2019). The opportunities and growth prospects are the key drivers of rapid investments by Chinese firms as the incentives of the investments are extensively positive and enable financial benefits and long-term growth of business operations.

China's investment strategies are highly controversial and have been discussed through research specially in the last two decades. Irrespective of the nature of investments strategy, the overall success of the country in terms of economic development remains unparalleled as it has been able to continue a steady growth in its GDP and per capita income for an extended period of time. The role of investments in the economic development of the country has proven to be pivotal as it acts as a catalyst to enhanced industrial function and business growth (Lin, Liu and Sun, 2016). Through investments, Chinese firms are able to garner the adequate resources that are necessary to benefit from the growth opportunities in the varying industries of the country, which is a result of globalization and enhanced global trade. Despite the success of Chinese industries, critiques have highlighted how prolonged overinvestments can cause

greater inefficiencies, overcapacity and also threaten future investment prospects due to the absence of adequate investment resources in the near future. There have been recent economic slowdowns in the country which might have been contributed by overinvestments in the state and non-state sector of the country. This requires further research and introspection into the investment strategies being adapted by most businesses and industries across the varying sectors (He, Ma and Zhang, 2020). **The interdependence of investments and cash-flows have been widely depicted through the discussions.**

2.2 Cash Flow

Cash Flow has been widely referred to as the movement of money inwards or outwards in a business entity. Varying cash flow categories have been recognized which includes cash flow from operations, investing, financing etc. The cash flow statement is the most effective instruments responsible for tracking and reporting the cash flow for businesses. Lewellen (2016) argues that firms might use cash flow in seven ways: i) to increase cash holdings, ii) to invest in working capital, iii) to buy property, plant, and equipment (PPE) and other fixed assets, iv) to acquire other firms, v) to pay down debt, vi) to repurchase shares, vii) or to pay dividends. It was originally proposed by Keynes (1936), that a major advantage of a liquid balance sheet is that it allows firms to undertake valuable investment opportunities (Almeida et. al 2004). Worthington (1995) defined cash flow as the difference between the value of shipments and all non-capital plant-level input costs. Investments are made by businesses towards creating cash flow and ultimately profitability. Lewellen (2016) have found from the study that investment and cash flow are strongly related after controlling for firm’s investment opportunities. The cash flow–investment relationship in a firm is likely to depend on the national financial environment, hence can be different for different countries. For example, in countries with high costs of accessing external capital, investment levels in firms will depend more on the availability of internal funds (Aggarwal, R. and Zong, S., 2006). Researchers suggest a model in which Tobin's Q is (theoretically) a sufficient statistic for investment and adding cash flow to the model, this interprets residual sensitivity of investment to cash flow as evidence of financing constraints (Gilchrist, 1995, Fazzari, Oliner and Rudebusch, 1992; Hubbard, and Petersen, 1988;). Gilchrist (1995) interprets 'excess sensitivity' as, some firms cannot obtain external funds at any cost, so, for those firms, an increase in current cash flow directly increases funds available for current investment. Another general argument goes that the premium on external funds depends on the collateral represented by the net worth of the

firm. In both cases, an increase in cash flow signals an increase in net worth (Gilchrist, 1995). An issue that has received particular attention from researchers and financial experts is the sensitivity of investment to internally generated cash flow for a firm. Empirical literature states that, a firm usually invests for three reasons when cashflow is high: i) when internal funds are less costly than external funds, ii) when managers overspend internally available funds, and iii) cash flow may simply be correlated with investment opportunities (Lewellen, 2016).

Chinese economic boom has resulted in significant investments being made towards its industries resulting in higher cash flow generation. Through the development of industries both inward and outward cash flow have a grown at a rapid pace. Over the last four decades as Chinese economy has grown at a fast pace there have been numerous transitions and transformations in the cash flow practices of businesses within the country (Jiang et al., 2018). As discussed earlier, extensive investments are being made which directly indicates an activity of extensive cash outflow aimed towards promoting business growth and profitability. The changing nature of the Chinese business environment has prompted the changes in behaviourism of business towards cash flow. Developing countries are known to have industries that utilize a majority of cash inflows towards further development costs and investments which enable further growth from the opportunities at its disposal. The activity being conducted by Chinese businesses and industries have caught global attention owing to the rapid cash outflows being made towards foreign investments which has resulted in China emerging as one of the largest outward foreign direct investment (FDI) contributors globally (Zhang et al., 2019). The investments by Chinese businesses being made through extra cash flow is unprecedented and unparalleled.

Influence of mass cash outflow towards investments and growth opportunities by Chinese industries have been widely analysed and depict a risk centric approach being adapted to by the aforementioned industries. The commitment towards growth and accelerated economic development has prompted practices which are centered around cash outflows towards growth prospects (Ding, Kim and Zhang, 2018). Based on historical research, ensuring adequate retainment of cash flows with relatively moderate investments is an ideal practice to ensure the industry/business is able to benefit from its growth opportunities. On the contrary, Chinese businesses have adapted towards a rapid cash out flow strategy with a majority of its earnings and inflows being dedicated towards domestic and foreign business development activities. The example of a Chinese company Anbang which is an insurer in the country shocked global

entities by announcing a total outward investment of US$ 32 billion (Ma, Rogers and Zhou, 2020). China has been known for producing a range of billion-dollar companies which have been benefitting from aggressive investment practices allowing it to utilize its cash flow from operations, financing and investments towards improving the market presence in its respective industry not only domestically but also globally (Financial Times, 2020). Non-state sectors are prone to investment strategies that involve extensive cash flow investments towards internal growth and outward investments. The changing nature of financial practices in investing a majority of the inward cash flow towards ventures has been depicted as a cause of concern as over commitment of cash flow is expected to cause a major issue for industries across China in the times of a global financial crisis (Ding, Kim and Zhang, 2018).

Distinct strategies have been followed prior to making large-scale commitments towards the utilization of business cash flow towards investments and growth opportunities. Cash out flow activities being conducted by Chinese industries are primarily made towards foreign markets in acquiring technologies, investment in international businesses or expansion towards global markets. On the other hand, in the domestic market cash out flow investments are made in aspects such as enhancing business operations through research & development, enhancement of infrastructure etc (Haider, 2019). The activities related to cash out flows have been primarily conducted to ensure enhanced cash in-flows and ultimately profitability which would ensure the growth of business operations and industries in China. Aggressive practices related to cash outflows towards investments has been determining factor towards the development of the Chinese economy as the industries have been able to benefit in the era of globalization and global trade by utilizing its cash-flow towards growth centric technologies, infrastructure and knowledge creation. The approach of cash flow utilization has been widely recognized across China with modern industries in the non-state sectors prioritizing it a rapid pace as the industrial segments such as technology, manufacturing are key contributors towards the free cash out flow strategy (Financial Times, 2020).

2.3 Leverage

The role of leverage utilization has proven to be crucial in combination with investments and cash-flow usage in contributing towards the growth of its industries and the economy in general. Financial leverage is considered as the practice of utilizing financial resources primarily borrowings towards investments and cash-flow enhancement to benefit from the profitable opportunities at the disposal of a business (Ferrarini, Hinojales and Scaramozzino,

2017). Aivazian et al. (2005) analysed the impact of leverage on investment on Canadian industrial companies over the period from 1982 to 1999. In their observation, they found a negative relationship between investment and leverage and that the relationship is higher for low growth firms rather than high growth firms. Ajide (2017) claimed that the impact of leverage on investment is less prevalent than that focusing on investment cashflow sensitivity. Altman (1984) argues that on average, highly leveraged firms have a high probability of bankruptcy. It is not always easy to judge whether highly leveraged firms have good investment opportunities or not (Tsuratae, 2015). Tsuratae (2015) argued hat information asymmetry between borrowers and creditors is significant in case of highly leveraged firms, hence, even after having positive NPVs, they cannot find new creditors, and lose potential earnings from new projects. Jensen (1986) argued that highly leveraged firms with large amounts of debt, have an incentive to earn more cash from efficient investments and to enhance their performance because they have to pay off debts and make interest payments. On the contrary, Campelloo (2006) posited that, because highly leveraged firms have greater access to credit than low-leveraged firms, so they enjoy greater competitiveness. Aivazian, Ge and Qiu, (2005) found negative relationship between investment and leverage (Ajide, F.M., 2017) . In a similar vein, Lang, Ofek and Stulz (1996) found leverage and investment negatively related and that the negative effect is significantly stronger for firms with low growth opportunities than those with high growth opportunities. Meanwhile, Whited (1992) finds that firms that have higher leverage and higher ratio of interest expenses to cash flow, tend to have higher investment-cash flow sensitivity.

The Chinese economy is the 2nd largest across the globe with more than three decades of rapid economic growth being its key driver. China has been witnessing a constant growth in total economic leverage as industries within the country focus on growth and utilize financial leverage towards financing its investment activities across the globe through rapid internationalization and domestic growth. The manufacturing industry of the country is a key contributor towards its economic development as the country has a diversified and strong manufacturing sector. The industry is highly reliant on financial leverage available through its financial institutions, which enables it to finance its operational activities by ensuring domestic growth through expansions while focusing on establishing an international presence through ambitious growth strategies (Liang et al., 2021). A majority of the financial leverage provided to Chinese industries are utilized towards investment activities and towards aspects such as technology acquisitions, development of a strong organizational infrastructure and rapid

innovation towards improvement in its business processes (Liang et al., 2021). While the acquiring of financial leverage at a fast pace exposes the industries to numerous opportunities, the sustainability of the particular strategy of leverage utilization has been questioned intensively due to the risks associated with it.

Figure 2 Total Private Credit in China

(Source: Liang et al., 2021)

Criticisms of China's leverage utilization approach has grown exponentially specially since 2016 when its debt ratio to gross domestic product exceeded 250%. The particular figure depicts rapid usage of leverage and enhanced credit adapted by the non-state sector of the country. The risks involved with aggressive leverage utilization are significant in its nature and is expected to have severe consequences on the economy of the country in the event of a financial crisis of a large magnitude (Ma et al., 2020). The development of the financial institutions and banking sector of China has resulted in the increased availability of financial facilities and ultimately leverage, which is a key contributor in the form of private credit for the Chinese economy. On the contrary, leverage has been a key contributor towards the economic growth of the company by enabling non-state sectors to opt for financial resources which is required for financing the growth strategies and investments (Ferrarini, Hinojales and Scaramozzino, 2017a). It is through financial leverage that the industries across the country have been able to develop state of the art infrastructures enhancing its operational capabilities while technology acquisition from international markets is another form of useful usage of the leverage available to Chinese private sectors.

Despite the growth in the leverage of the Chinese economy, it has been argued that the extent of leverage of the private sectors remains extensively lower in comparison to its European and Japanese peers. The major cause of concern with the rapid growth in leverage remains in the fact that China is still classified as a developing country and the GDP and income per capita of the country is much lower than that of its developed counterparts which exposes it to a much higher risk in the event of rapidly growing leverage for the country's private sector (Dianhong, 2021). Industries such as real-estate and manufacturing in China are highly leveraged in comparison to global peers. This highlights a cause of concern as the Chinese economy is highly dependent on the manufacturing sector and the real-estate prowess of the country has emerged as a key contributor towards its infrastructural growth in the last two decades. The sustainability of the leverage being provided to these sectors are questioned and the ability to emerge as profitability, hrough the leverage utilization remains in doubt. China's financial isolation from the globe is a key factor which has enabled it to survive with such wide leverages and the rapid growth in its businesses can enable its industries to emerge as profitable from its leverage utilization. On the other hand, it is important to understand that the highly leverage centric strategy exposes the industries and the economy in general to exponential risks (Liu, Sun and Zhang, 2020). **Enhanced investments being made towards Chinese industries requires a higher leverage capacity to ensure that the investment decisions are financed through adequate financial resources.**

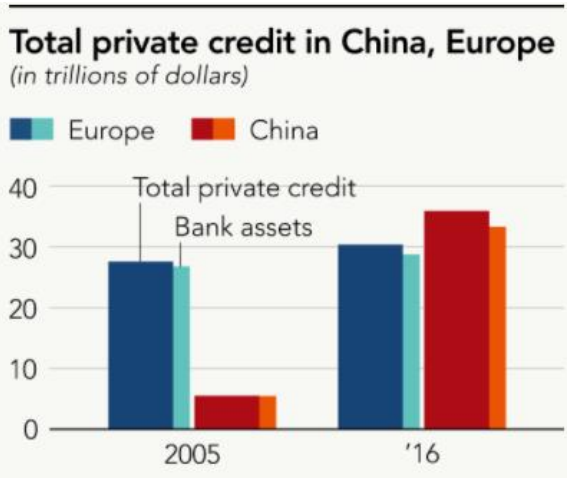

Figure 3 Comparison of Private Credit China and Europe

(Source: Liu, Sun and Zhang, 2020)

2.4 Revenue

Kadapakkan et al. (1998) under different categorizations, classified the sample of firms into three categories of firm size: firm value, total assets and revenue. In their study, they studied 6 member countries from the OECD (Organization for Economic Cooperation and Development) and found that investment sensitivity is correlated with size of the firms, i.e., it is high among large firms and low among small firms. In our study, we are measuring firm size with the revenue it generates. Bhaduri (2002) found correlation with financial liberalization in his study in India. In the paper he found that financial liberalization benefits middle-sized firms, but it changes after the liberation, i.e., small firms have higher investment sensitivity after the liberalization. Ismail et al. (2010b) used firm value and used size split method for analyzing and found that small firms are significantly sensitive to cash flow but large firms are not sensitive to available cash flow. On the other hand, Ismail et al. (2010b) used the Median criterion as the cut- off point of number of employees to categorize firms into small and large firms. Carpenter, et al. (2008) used a panel of 693 UK firms over the period 1983– 2000 and used employees as a measure of size to estimate investment regressions distinguishing firms into more and less likely to face financial constraints. However, under Modigliani and Miller's (1958) theorem of perfect capital market, a firm with good opportunities will face no barrier in raising funds from outside investors or financial institutions. So, firm value is irrelevant to financial structure (Modigliani and Miller, 1958). Hovakimian (2009) suggests that firm size affects cash flow sensitivity of investment for several reasons. First- large borrowing costs of capital; second due to adverse selection problem and third, higher transaction costs for larger firms. For similar set of reasons, younger firms may also face a wider chunk between the costs of external and internal capital. Thus, younger and smaller firms have been expected to show higher investment-cash flow sensitivity. Kadapakkan et al. (1998) claims in their paper that smaller firms that generates less revenue, rely more in internal funds for investing than large firms. The reason being, smaller firms face relatively higher transaction costs while issuing new securities, so this will raise the costs of using external capital for them. (Kadapakkan et al. 1998).

The revenue of Chinese industries has been growing at a fast pace as businesses rapidly focus on investments and utilization of leverage towards industrial expansion. Revenue is one of the most important financial measures towards evaluating the capabilities of industries across China. As of 2021, China is the 2nd largest economy in the world highlighting that the revenue

generated by the country's industries exceed trillions of dollars. Enhanced revenue has resulted in China being the country with the maximum purchasing power of US$ 23.5 trillion which exceeds the USA. The ability of China to sustain an economic growth of approximately 10% for more than two decades highlights its capabilities to generate adequate revenue from its industries which are further invested towards growth operations of the industrial businesses (Alvarez, Larkin and Ropicki, 2020). China being the world leader in manufacturing indicates that the particular industrial sector contributes extensively towards the revenue generation and economic growth of the country. The revenue generated by the manufacturing sector in China contributed towards 39% of its GDP while the technology sector reported a total revenue of US$ 940 billion in 2020 which has emerged as the fastest growing industry in China (Del Giudice et al., 2021). Owing to the dynamic nature of the Chinese economy a range of industries contribute towards its combined revenue growth and the up-trend in the country's total revenue is expected to continue in the near future as rapid investments are being made towards growth opportunities domestically and internationally.

The 10 Biggest Industries by Revenue in China

	Industry	Revenue for 2021
1.	Building Construction in China	$2,486,8B
2.	Real Estate Development and Management in China	$1,957,1B
3.	Online Shopping in China	$1,774,1B
4.	Residential Real Estate in China	$1,529,5B
5.	Mail-Order & Online Shopping in China	$1,320,0B
6.	Bridge, Tunnel and Subway Construction in China	$1,261,5B
7.	Software Development in China	$1,116,5B
8.	Steel Rolling in China	$952,1B
9.	Engineering Services in China	$885,5B
10.	Internet Services in China	$803,1B

Figure 4 Revenue by Industry in China

(Source: IBIS World, 2020)

Most industries in China have been experiencing an improvement in its revenue generating capabilities as the opportunities continue to grow due to domestic policies facilitating growth and the relevance of foreign direct investment rapidly rising as the country emerges as the world's largest recipient of FDI. A range of practices that have been utilized involve

development of industries through the improvement in infrastructure and other capabilities that enhance its ability to generate revenue (Tian et al., 2021). The role of revenue is quintessential as it provides the businesses with the required operating power towards its operations and management. While the revenue of Chinese industries has grown at a fast pace, it is evident that the extent of costs has also increased. The significant investments being made towards growth strategies highlight the necessity to rapidly enhance revenue generation in order to cater to the financial requirements of supporting large-scale businesses. As the varying industries contribute towards the revenue of the Chinese economy, the dependence of the economy on the aforementioned top 10 industries has grown at a fast pace. The growing relevance of technology has depicted those varying segments related to technology as gradually contributing more towards the revenue contribution of the economy (Del Giudice et al., 2021). Despite the growth in the new sectors, the real-estate and manufacturing industries continue to dominantly emerge as key revenue generators for the Chinese economy. One of the key reasons behind these two industries producing the maximum amount of revenue has been the rapid investments being made towards these industrial sectors resulting in its growth and enabling it to contribute towards the economic development by creating business opportunities and generating employment.

Economic liberalization of China in the 1970s and 1980s has been the major driver for the growth of the economy giving birth to a range of industries that are revenue generating mechanisms. Currently, China is the largest consumer globally with the highest purchasing power. Higher revenue generation by its businesses has enabled the consumers to enhance the purchasing power. As the revenue generation capabilities of its businesses increase with rapid investments going into the varying industrial sector the extent of purchasing power would also increase in the near future (Chen, 2020). The Chinese economy is unique in its nature owing to the unique approach adapted towards growth and development adapted by the country which has largely influenced its industries. Based on the current economic growth plan of China, it is evident that the role of revenue creation is crucial as the private sector is highly dependent on leverage, which highlights the requirement to promote revenue generation. This utilizes measures to finance business activities through existing revenues being created by the industrial sectors that would reduce leverage dependence and enhance profitability – the ultimate motive of industries and businesses within any given economy (Del Giudice et al., 2021). With the transformational nature of the Chinese economy, the contribution of emerging

industries such as tourism and e-commerce is growing in relevance in terms of its contribution towards economic growth and revenue generation.

China's economic growth has been consistent and its further improvement has been termed as inevitable as the country is set to emerge as the largest economy globally. There are concerns that need to be addressed which would enable the country to utilize its industries towards holistic growth and stable economic development. Statistics have been indicative that Chinese industries are often limiting its capability to generate revenue owing to the growth in economic issues such as high leverage usage and enhanced inflation. Struggle in the real-estate industry to generate revenue after significant investment is a concern to the economic activity in the near future (Chen, 2020). While there are certain challenges to the revenue generation capabilities of the country in its domestic market, the enhanced foreign activity has ensured that the country is able to generate revenue which contributes towards its regular growth. Investments are a key contributor which drives higher revenue development by the industrial sectors across the Chinese economy (Chen, 2020). Despite economic challenges and questionable growth methods adapted by the Chinese industries, the number of foreign investors continue to grow rapidly as the FDI inflows continue to increase in the country which enhances the revenue generating capacity of the industries. The evaluation highlights that the investments are the key drivers of higher revenue generation as higher investments enable the industries to make adequate transformations and focus on long-term growth of its business operations by generating revenue (IBIS World, 2020). **This indicates that higher investments under ideal industrial circumstances enhances the revenue of industries in the Chinese economy.**

2.5 Tobin's Q Ratio

James Tobin devised an investment theory based on financial markets. He claimed that firms' investment level should depend on the ratio of the present value (PV) of installed capital to the replacement cost of the capital (Ajide, F.M., 2017). This ratio is Tobin's Q or Q ratio after his name. The theory argues that investment depends on q, the ratio of the market value of equity capital should relate to Q- i.e., the cost of capital based on its replacement cost, which provides a channel for speculation and expectations, and monetary policy to have an impact on investment through asset prices. (Ajide, F.M., 2017, Safiullin, et, al. 2013). Safiullin, et, al. (2013) mentions that the results of empiric tests of the Q theory of J. Tobin are controversial in the Western market. Beginning with the work of Fazzari, Hubbard and Petersen (1988), and

continuing through a vast growing study, Q has made only a small contribution to the explanatory power of investment spending equations that also include cash flow or some other output-related variable. (Baum and Thies, 1999). It is widely utilized towards understanding the relationship between the market value and intrinsic value. Based on the ratio the equilibrium is reached when the market value of a company is equal to its asset replacement cost. For numerous years Tobin's Q has been a concept for business professionals to understand the influence of regulations, laws and policies on a firm's value (Potepa and Welch, 2018).

Application of the Tobin's Q on Chinese businesses and industries brings forth significant insights that influence the firm's market value (Wang, 2018). The economic slowdown and the concerns related to the real-estate industry have depicted the necessity to evaluate the industrial firm valuations through the Tobin's Q ratio, which would enable businesses and key stakeholders to understand the actual value of the ratio. The importance of understanding the firm valuations is quintessential to detect economic bubbles which would have long-term negative impact on the industrial sectors. As the real-estate sector has prioritized continual growth, the stock prices of the Chinese capital markets have grown at a fast pace (Nikkei Asia, 2021). The recent challenges have continued to not affect the stock prices negatively which has drawn attention to the Tobin's Q that would enable an improved understanding of the firm's market value to determine whether the stocks/valuation of the company is overvalued.

The large-scale implementation may cause a market correction, the long-term benefits persist as it would enable the key stakeholders to understand the actual market value of the firms in lieu of its market replacement costs enabling an accurate overview of the industrial valuations (Potepa and Welch, 2018). The application of the Q's ratio to Chinese real-estate and manufacturing firms have indicated a clear trend highlighting that there are certain firms which are highly overvalued owing to the improper financial reporting and the enhanced valuations based primarily on profitability. Form a long-term perspective, taking into account the asset valuation of a firm is critically important to ensure that the valuation is based on the long-term capability of the firm/industry to continue its profit performance through its asset utilization rather than depending only on its short-term profitability which may be highly volatile (Wang, 2018). The evaluation of the Chinese industries depicted that an array of non-state real estate companies was highly overvalued indicating that it did not have the capability to cover its current market value with its assets base. The extreme overpricing of the real-estate sector which has been slowing down is a cause of concern from the economic perspective due to the

contribution of the real-estate sector on the Chinese economy (Potepa and Welch, 2018). The overvaluations are not restricted to the real-estate sector as other non-state industries have also numerous firms that are extremely overvalued and require adequate correction to gain a better grasp of its actual market valuation. Towards avoiding overvaluation of stocks and industries in general, the application of the Tobin's Q provides adequate checks to the stakeholders providing an in-depth insight into the functional capabilities of the firm to sustain its long-term growth (Nikkei Asia, 2021).

The current Q ratio depicts deepened overvaluation of real-estate stocks while other industries such as the manufacturing and technology industries remain slightly overvalued. Based on the changing nature of market valuations, it can be determined that there is a requirement to understand the true valuation of industries based on its capability to sustain growth during economic downtime rather than enhancing its valuation growth based on short-term profitability which may lead to the development of an industrial bubble causing an extensive negative impact on the Chinese economy during economic slowdowns (Lin and Zhang, 2019). During the economic stagnation in the year 2020, numerous non-state sectors struggled in the initial phases but the well-developed finance system of China in combination with the vast availability of leverage enabled the industrial sectors to continue on its growth trends with adequate liquidity availability post (coronavirus) pandemic and register rapid growth. The concerns rely on the growth of leverage utilisation and the continuing rallies the capital markets that is causing a further overvaluation of firms and industries that rely heavily on a constant supply of leverage from the financial institutions (Nikkei Asia, 2021). The growth opportunities have enabled the industries to function efficiently but the ability to sustain its value and growth trends during an economic slowdown is a major challenge for most non-state sectors of China. A major obstacle lying ahead is the slowing real-estate sector, which has been witnessing stagnation in investment that questions its capability to pay-off the leverage and financial debt that has piled over the last few decades.

Remarkably high Tobin's Q for the Chinese real-estate industry depicts a concern for the Chinese economy. The extensively high investments being made towards the sector depicts that both state and non-state entities are highly dependent on its returns. With the real-estate sector growth slowing down, the overvaluation of the firm values is expected to see large-scale corrections (Lin and Zhang, 2019). Discussing the case of other industries, the Tobin's Q remains manageable as the stocks are not highly overvalued. The changing nature of the

modern economy of China and its high dependence on foreign direct investment depicts that the market valuation of the businesses would depend largely on further investments, which would enable it to maintain its growth sustainability. Currently, there are numerous threats lurking over the real-estate sector owing to the slow down for its demand which highlights that a major correction is expected. From the investment perspective, shareholders and large-scale investors are regularly utilizing Tobin's Q prior to making investment decisions (Nikkei Asia, 2021). Hence, investments have an influence on the Tobin's Q by determining the valuation of the firm and its ability to replace assets towards evaluating its actual valuation**.**

Section 3: Theoretical Background and Hypothesis Development

The purpose of this chapter is to present the primary theories that underlines our field of research, followed by discussing how they relate to the subject of this thesis. The chapter systematically explores Pecking Order Theory or Asymmetry Information Theory, Free Cashflow theory, M&M theorem, Trade-off Theory and Debt Overhung Problem, and Agency Cost Theory and Adverse Selection & Moral Hazard; and discuss how these relate to and affect each other and our variables. Subsequently, in each section we will demonstrate how these theories lead to hypotheses formulation. Lastly, we will conclude by summarizing all hypotheses developed throughout the chapter.

3.1 Pecking Order Theory or Asymmetry Information Theory

The pecking order theory or the pecking order model was established by Myers and Majluf (1984), which states that financial managers follow an order when they consider different sources of financing in their capital structure. This suggests that managers have their own preference of sources for funding investment opportunities (Luigi and Sorin, 2009).

With companies growing and expanding internationally, they are provided with access to different sources of finance for funding operations and projects. Albeit a company generates cash flow from revenues, these cash flows are insufficient for expanding into newer projects. In such situations, companies are on the lookout for newer investment opportunities (Frank and Goyal, 2003). Based on the pecking order theory, managers prefer a source of finance to another. For example, the theory states a company should finance itself from retained earnings,

and if that source of finance is unavailable, then the company should be on the lookout for debt. This theory is important as it portrays the company's performance to the public (Frank and Goyal, 2003). For example, if a company is able to finance itself through retained earnings as per the pecking order theory, it can signal to investors that the company is strong. On the contrary, if the company finances itself using debt it may send out a negative signal to investors.

The pecking order theory relates to the capital structure of a company and it helps explain why companies prefer to finance projects using internal sources of finance, and then debt, and lastly, using equity (Frank and Goyal, 2003). The theory is based on the concept of *information asymmetry* and it implies that equity financing is the costliest source of finance, and it should be used as the last resort to gather finance for operations.

Vogt (1994) explained the positive relationship between cash flow and investment that is based on the pecking-order hypothesis. The hypothesis is also well known as the financial constraints hypothesis. This preference of fund arises due to information asymmetric problem among firms' insiders and outsiders, where insiders are always in a better position in knowing about their firms' values. Therefore, to avoid financing bad lemons, the outsiders impose credit rationing in order to finance firm investment. Contemporaneously, firms with the aim to save their internal fund, have to forgo some profitable investments due to low accessibility to financing sources. Conversely, firms have to retain their current earnings in order to finance those prospective profitable investments. This relationship indicates positive correlation between investment and internal flow of fund, which says that in order to increase investment, the firms need to retain more cash. Our first hypothesis can be explained by this theory.

Hypothesis 1: There is no significant impact of cashflow on investment

Null Hypothesis, H_{O1}: $\beta_1=0$

Alternative Hypothesis, H_{a1}: $\beta_1\neq0$

3.2 Free Cash Flow Theory

Free Cash Flow (FCF) refers to the cash a company generates after the company accounts for cash for supporting operations and maintaining capital assets. It represents the financial performance of a company, and it shows the cash, which a company can produce and generate after deducting the purchase of assets such as equipment, property and different major

investments. Richardson (2006) studied free-cash flow and added that FCF is defined as the cash flow that exists beyond what is necessary for maintaining the assets in place and for financing newer investments. In common parlance, it could also be referred as the measure that is arrived at by reconciling net-income after adjusting for non-cash expenses, capital expenditure and working capital changes. FCF can be used as a supplemental tool for financial analysis, and it can reveal problems in the fundamentals before they are presented on the income statement. As FCF accounts for working capital changes, it can provide insights to managers of companies on the health of the company and its financial trends. FCF can be a helpful tool for shareholders or lenders to evaluate the probability of the company paying interests or dividends. However, a limitation of the FCF measure is that it considers the entire capital expenditure to be incurred in a single period rather than spreading it across different periods. This can result in a misleading impression of the cash position of a company. As a result, year-over-year (YoY) cash flows can become volatile in comparison to operating cash flow or net-income. FCF is of two types; *free cash flow to the firm* (FCFF) and *free-cash flow to equity* (FCFE). FCFE refers to the cash generated for potential distribution to equity-shareholders, whereas, FCFF refers to the cash available to investors after consideration of business costs, dividends, non-cash expenses, working capital, investments and interest costs.

Investment has positive relation and at times negative relation with cashflow, which can be explained by this theory. First, the negative relationship can be seen within the distressed firms, operating with losses- invest more in the current year than the previous year. Albeit these losses reduce cashflow, firms are still able to invest because they receive financings from different sources including equity claimants (Bhagat et al. 2005). Second, if we exclude the distressed firms, the negative relationship can still occur as explained by the free-cash flow hypothesis. This hypothesis is developed based on agency problem, which is explained in Agency Cost Theory, where the management of the company and shareholders pursue their own interests. This argues that management acts in a way to maximise shareholders' value, however, due to low monitoring, managers tend to increase their benefits at the cost of shareholders. They will end up overinvesting in less-profit making activities. Jensen (1986) shows that firms with more likelihood of agency problem use more debt to reduce availability of free cash flows at manager's hand so that managers can be restrained from bad investment decision. As far as the relevance of FCF is concerned, one of the factors worth considering is that there has been substantial empirical evidence which indicated that the role of cash flows are critical in driving investments. As a result, an increase in the investments leads to an increase in the cash flow

and vice-versa. Therefore, it is a strong driver of the investment, and is critical to develop the hypothesis.

Hypothesis 1: There is no significant impact of cashflow on investment

Null Hypothesis, H_{O1}: $\beta_1=0$

Alternative Hypothesis, H_{a1}: $\beta_1\neq0$

3.3 Trade-off Theory and Debt Overhung Problem

The *trade-off* theory of capital structure refers to the idea where a company chooses the amount of debt-finance and equity finance that can be used through a balance of costs and benefits (Luigi and Sorin, 2009). This theory assumes that firms tend to trade-off the benefits and the cost of equity and debt financing, and investors look to find an optimal capital structure after considering and accounting in different market imperfections like bankruptcy costs, agency costs and taxes (Luigi and Sorin, 2009).

The trade-off theory is used by researchers to imply a family of interrelated theories. The original trade-off theory extends the M&M theorem. In light of the M&M theorem, when income taxes were added, a benefit was created for companies with debt as debt is a tax-deductible expense at source and it helped save earnings. It is imperative that the objective of the firm is linear, and as a result, a firm should focus on 100% debt financing.

The static trade off theory is an extension of the trade-off theory, and it affirms that firms have optimal capital structures that are determined by trading off costs against the benefits for use of equity and debt. Here, debt is considered advantageous as it provides a tax-shield. However, the trade-off theory is plagued as if a firm raises too much debt, the costs of financial distress might rise. Thus, to summarise, the trade-off theory is based on the proposition that a company chooses how much debt and equity is appropriate for balancing the costs and benefits, and by doing so, the theory explains that corporations use a mix of debt and equity in their capital structure and solely not rely on debt as it raises the costs of financial distress.

As explained by the Pecking Order Theory, firms with high liquidity will borrow less. Generally, a firm with more current assets is expected to generate more internal fund, which can be used to finance its operating and investments activities. On the other hand, trade-off

theory suggests a positive relationship between leverage and flow of fund, helping firm to invest more, because higher liquidity ratio reflects the greater ability of a firm to meet short-term obligation on time.

Jensen and Meckling (1976) and Myers and Majluf (1984) claimed that there are two problems that arise from debt (leverage), namely moral hazard and adverse selection. The moral hazard problem happens when levered firms tend to invest in risky projects with higher expected returns to shareholders. On the contrary, adverse selection problem occurs when outside investors receive wrong signal; they cannot identify the lemons, and gets an idea that high debt firms are truly good firms. Therefore, it is crucial to empirically investigate the behaviour of levered and unlevered firms, distinguish the high debt firms and low debt firms with respect to the investment financing using internal funds, i.e. cash flows.

Debt Overhang: Highly leveraged small businesses cannot obtain enough credit because of the debt overhang problem. Therefore, highly leveraged firms may lose potential profits from profitable investment opportunities in which they are unable to invest. First, as Myers (1977) argued, debt overhang problems create underinvestment issues and cause poor firm performance. Even if firms with high leverage have new investment projects that generate positive net present values (NPV), they cannot issue new junior debt. Because the earnings generated by new investment projects are used to pay off debts to existing debt holders, new junior debtors do not obtain adequate payments from the earnings of new projects. Therefore, banks and other creditors do not offer credit for new projects with positive NPVs. As highly leveraged firms cannot obtain enough credit, they can lose potential profits from profitable investment opportunities of which they are unable to take advantage.

As stated by Luigi and Sorin (2009), one of the factors worth considering regarding the Trade-off Theory is the cost-benefit analysis which is a major reason for the increase in the value of the companies. In case of investments, on the other hand, the investors seek the same balance whereby the focus is to reduce the cost of investment and enhance the returns. Our variable-Leverage is motivated and second hypothesis is formed from this theory.

Hypothesis 2: There is no significant impact of leverage on investment

Null Hypothesis, H_{O2}: $\beta_2=0$

Alternative Hypothesis, H_{a2}: $\beta_2\neq0$

3.4 Agency Cost Theory and Adverse Selection & Moral Hazard:

The second factor that causes the market imperfection is agency problem. The problem is closely related to the asymmetric information problem because it elucidates a situation where outside investors do not have enough relevant information on firm investment, activities and returns. Agency costs refer to internal company expenses that arise due to the existence of an agent operating on behalf of a concerned principal. These costs typically arise if core inefficiencies, disruptions, dissatisfactions and conflicts of interest emerge between the management and shareholders (Eisenhardt, 1989). The agency cost theory is based on the *principal-agent* relationship that implies the relationship between the management and the shareholders. Based on the relationship, the shareholders are the principal, whereas, the agent is the management. The *agency theory* addresses the issues that arises in this relationship. Primarily, the theory addresses issues in two areas; difference in goals between the principal and the agent, and the difference in risk-aversion levels between the principal and the agent (Luigi and Sorin, 2009). For example, the managers of a company might neglect profitability and focus on business expansion. However, shareholders may find this risky as they might be more concerned with growth and capital appreciation. This issue can be explained based on the agency cost theory. The contradiction between the shareholders and the managers may paramount to inconsistent levels of risk-tolerance. For example, shareholders may reject the proposal of the managers as they might not be comfortable to bear the risk of default.

The primary proponent of the agency theory is to reduce agency by resolving agency loss that arises between the principal and agent (Luigi and Sorin, 2009). To do so, the agency theory could advocate offering greater incentives to the agent to address the requirements of the principal. Thus, the agency theory is focused on mitigating conflict between principal and the agent (Eisenhardt, 1989).

The problems of adverse selection and moral hazard are closely related to asymmetry of information, which is mentioned in section 3.1. A high level of asymmetry of information between insiders and creditors results in a higher cost of debt financing (for leveraged firms) which may lead to the rejection of investing in less risky projects by relatively successful companies (adverse selection). Moral Hazard will take place when, companies are forced to implement the riskiest projects and transferring a part of risks to the holders of debt instruments. The total effect will lead to a further increase in the existing significant costs for debt capital and a negative effect on the investment activity. Smaller firms (generating less

revenue) are typically followed by fewer analysts and should experience a larger degree of information asymmetry between insiders and outsiders. Agency costs may be greater for firms with less revenue, which may not face large institutional oversight. Since these factors raise the costs of using external capital for the small firm, our a priori expectations are that firms with less revenue will rely more on internal funds than large firms do. Fama and Jensen (1983) claimed that there may be less asymmetric information about firms generating larger revenue, since these firms would provide more information to outside investors than firms generating less revenue. Our variable Revenue is motivated from this theory; hence we add this in our second hypothesis.

Hypothesis 3: There is no significant impact of revenue on investment

Null Hypothesis, H_{O3}: $\beta_3=0$

Alternative Hypothesis, H_{a3}: $\beta_3\neq0$

3.5 M&M Theorem

The M&M theory is the cornerstone of corporate finance, and it provides the conditions based upon which the capital structure changes of a firm does not impact a firm's fundamental value. The M&M theorem was put forward by Modigliani-Miller (1958). According to the theorem, the overall cost of financing of a bank is not affected by changes in leverage. Aboura and Lépinette (2013) argued that the theorem of M&M has become central to the debate on banking regulation as regulators rely on the theory for justifying the policies of requiring equity. This suggests that the theorem can be provided under the assumption where neither the individual nor the firm can default, and all debt is riskless under this theorem. Hellwig (1981) added that the existence of perfect capital markets, firm borrowing and individual borrowing are perfect substitutes. However, Hellwig (1981) argued that the approach of M&M is unsatisfactory, and the bankruptcy of a firm is dependent on the debt-equity ratio. Thus, empirical research has presented contradictory evidence. The M&M theory is a capital structure theory, which states that a company's market value can be interpreted as the present value of the company's future earnings and underlying assets, and this is independent of the company's capital structure (Stiglitz, 1969).

Companies have only three methods of raising finance to conduct daily operations for expansion and growth. They can either borrow money by issuing bonds, they can re-invest

profits in operations or they can issue stock to investors. The M&M theory argues that these options are irrelevant to investors and the choice of financing has no material impact on the market value of firms. There are two versions of the M&M theory, 1 and 2.

Proposition 1: $V_L = V_U$

Here,

- V_L: Value of the Levered Firm.
- V_U: Value of the Unlevered Firm.

Proposition 2: $r_E = r_A + \frac{D}{E}(r_A - r_D)$

Here,

- r_E: Cost of Levered Equity.
- r_a: Cosft of Unlevered Equity
- r_d: Cost of Debt
- D/E: Debt-to-Equity Ratio

The relationship between internal funds and investment is well known in the financial market. Meyer and Kuh (1957) argued about the importance of financial variables for investment and firm's preference for internal funds. Under Modigliani and Miller's (1958) theorem of perfect capital market, firm's value is irrelevant to the financial structure of the firm. This theory holds under the frictionless world, in which sources of financing are perfect substitutes, and all market agents are well-acquainted with market information. However, the real world is imperfect. Economists studied the main causes of these imperfections which are information asymmetries and agency problem as causes to the demolish of classical ideas (Ismail, 2015). In a similar vein, Bhaduri (2005) argued that the magnitude of imperfection varies in parallel with the information asymmetries and agency problem. Over the last two decades, researchers studied and had taken the imperfect market's conditions into account. Out of many variables which were tested to examine the relationship between finance and investment, the most explainable variable is relationship with cash flow (Carpenter et al. 1998; Degryse & Jong 2006). Modigliani and Miller (1958) also argue that the investment policy of a firm should be based only on those factors that would increase the profitability, cashflow or net value of the firm (net revenue it generates).

Jorgensen (1963) argues that the idea of how firm's financing choices affected the investment method was shelved in 1960s with the extensive development of neoclassical models of

investment. The Q-theory of investment was the reformulation of the neoclassical theory, which explains the investment demand by the ratio of the market value of the firm's capital stock and its replacement cost (Tobin, 1969; Hayashi, 1982). Neither the neoclassical nor the Q-theory recognised any role of financial variables in determining investment. Unlike the neoclassical model, the Q- theory focuses on the future market value of the firm's asset rather than the lagged past variables (Schaller, 1990). Most studies of financing constrained firms and corporate investment- since Fazzari, Hubbard and Petersen (1988) estimates Q and cash flow model of investment. This motivates the formulation of our fourth hypothesis.

Hypothesis 4: There is no significant impact of Tobin's Q on investment

Null Hypothesis, H_{O4}: $\beta_4=0$

Alternative Hypothesis, H_{a4}: $\beta_4\neq0$

3.6 Hypothesis Development

Considering the literature on investment and our explanatory variables and based on our research questions and taking motivation from theoretical perspectives, we propose the following the hypotheses:

Based on the Pecking Order Theory or Asymmetry Information Theory and Free cashflow Theory, we propose our first hypothesis:

Hypothesis 1: There is no significant impact of cashflow on investment

Null Hypothesis, H_{O1}: $\beta_1=0$

Alternative Hypothesis, H_{a1}: $\beta_1\neq0$

Based on the Trade-off Theory and Debt Overhung Problem, we propose the following hypothesis:

Hypothesis 2: There is no significant impact of leverage on investment

Null Hypothesis, H_{O2}: $\beta_2=0$

Alternative Hypothesis, H_{a2}: $\beta_2\neq0$

Based on the Agency Cost Theory and Adverse Selection & Moral Hazard, we propose our third hypothesis:

Hypothesis 3: There is no significant impact of revenue on investment

Null Hypothesis, H_{O3}: $\beta_3=0$

Alternative Hypothesis, H_{a3}: $\beta_3\neq0$

Based on the M&M Theory we propose our fourth hypothesis:

Hypothesis 4: There is no significant impact of Tobin's Q on investment

Null Hypothesis, H_{O4}: $\beta_4=0$

Alternative Hypothesis, H_{a4}: $\beta_4\neq0$

We would like to test hypothesis 1,2,3,4 in pre and post fintech era in different time frame. So, our hypothesis 5 is motivated from the similar theories from where hypothesis 1,2,3,4 is stirred.

Hypothesis 5: The estimated coefficient of pre fintech era and cashflow with is higher than post fintech era and cashflow with investment

Null Hypothesis, H_{O5}: $\beta_5> \beta_6$

Alternative Hypothesis, H_{a5}: $\beta_5< \beta_6$

Section 4: Methodology

This fourth chapter will motivate practical details of how the study aims to answer its purpose and research questions. This chapter starts with a section that presents the research method that was undertaken and how the data collection was conducted and an explanation about our sample universe. The next section highlights the empirical methodology, followed by the econometric methods used in the thesis to answer to research questions and critically examining the study's validity and reliability. This chapter ends with the methodological limitations we encountered during the study.

4.1 Research Method

There are two main methods for doing a research – deductive and an inductive approach. The deductive method is an approach where one or many hypotheses are developed based on prevailing theories and then the hypothesis are empirically tested on collected sample data to be accepted or rejected. According to Sekaran & Bougie (2016), the inductive approach collects data with an aim to develop new theories. For our study, we have used the deductive approach method with the aim to test the effect of net cash flow, leverage, revenue and Tobin's Q on the investment decision, using the theories regarding MM theorem, Free Cashflow theory, Trade off theory, Pecking order theory, and Agency cost theory discussed in the previous chapter, on the collected data.

To answer the research questions of our study, two research methods, for data collection and analysis, were available: quantitative research and qualitative research. Quantitative research is a method where a measurable data sample is collected, evaluated empirically and then used to test one or several hypotheses. On the other hand, Qualitative research is a method where non-numerical data is instead collected instead (Sekaran & Bougie, 2016). In our study, we have used numerical data to empirically test using quantitative research method to answer the research questions and test the hypotheses.

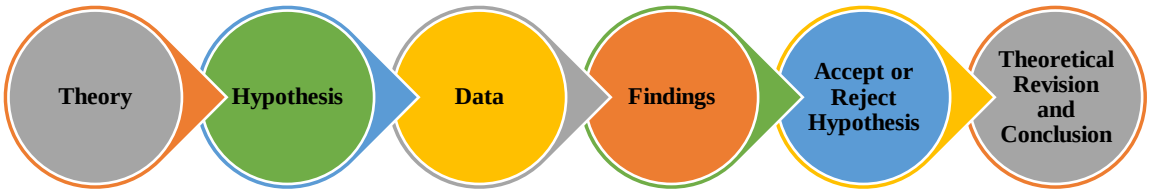

Figure 5 Deductive Research Approach

4.2 Data collection

For data collection, we selected Chinese publicly traded companies listed on the Shanghai Stock Exchange from year 2000 to 2020 after screening the data from WRDS as our sample. All the numbers used are in USD-millions. We didn't take into consideration those companies that had zero investment in the proposed time frame, as it is beyond our research interest and scope. We used a sample of 1,177 listed companies diversified into 241 industries from nine sectors of industries which are measured by Standard Industry Code (SIC). A data panel was established from 2000 to 2020. In view of the development of China's capital markets, especially the rapid development of digital capital markets after 2010, we will discuss the relationship between cash flow and investment in two periods – before 2010 and after 2010. The data we have collected goes back to 2000, because we wanted to see the effect of recession due to financial crisis of 2008. Initially, we obtained 19,662 obversions along with data with 0 investments across all the Chinese market. Gradually we have taken only the companies that had investments in 2000-2020 and are listed in Shanghai Stock Exchange, and so our final dataset had 7,398 observations to conduct our study. There are some companies that was not listed in the stock exchange, or maybe entered the stock exchange but later discontinued, and some of them entered the stock market sometime later. Hence, the data becomes unbalanced. We have worked with this unbalanced panel data method is applied in the study. ***Table 1 and 2*** shows the summary statistics of variables for the sample.

4.3 Empirical Methodology

To control for normality due to skewness in the residuals, the natural logarithm of *Amount Issued* and *Modified Duration* is used in the regressions models following previous research (Chen *et al.,* 2007; Febi *et al.,* 2018; Bachelet *et al.,* 2019).

We initially run a regression of investment and Cash Flow and other variables to test our hypotheses (1st- 4th hypotheses) and answer our first research question with the following equation:

$$\text{linvestment}_{(i,t)} = \beta_0 + \beta_1 \text{lcashflow}_{(i,t)} + \beta_2 \text{leverage}_{(i,t)} + \beta_3 \text{lrevenue}_{(i,t)} + \beta_4 \text{Tobin's Q}_{(i,t)} + u_{(i,t)} \ldots\ldots\ldots 1$$

To answer the second research question, we add two interacted terms with equation 1. We do interaction between Y1 (2000-2010) and Y2 (2011-2020) with cashflow to see if changes in time have any effect on investment cashflow relationship. This equation is the final equation to our study to test our 5th hypothesis.

$$\text{linvestment}_{(i,t)} = \beta_0 + \beta_1 \text{lcashflow}_{(i,t)} + \beta_2 \text{leverage}_{(i,t)} + \beta_3 \text{lrevenue}_{(i,t)} + \beta_4 \text{Tobin's Q}_{(i,t)} + \beta_5 \text{ Y1lCF}_{(i,t)} +$$

$$\beta_6 \text{ Y2lCF}_{(i,t)} + u_{(i,t)} \ldots\ldots\ldots 2$$

Each variable's definition and calculation is presented in ***Table 11***. The subscript *i* indexes firms categorized in industries using SIC, and *t*, time, where *t* = 2000-2020. We are aware that we are working with Panel Data and the Pooled OLS (Ordinary Least Square) technique is likely to suffer from biases due to unobserved firm-specific heterogeneity and, possibly, endogeneity of the regressors (Carpenter and Guariglia, 2007). We therefore test our data for the presence of heteroscedasticity through running the Breusch-Pagan Test and the White Test to see the extent to which the variance of the residuals depends on our predictor variable. Next, we run our model with POOLED OLS (POLS) including the "Robust" standard errors to obtain unbiased standard errors of OLS coefficients. We also include the clustered standard errors since our data is panel data, where each unit is observed across time, within different industries. Alongside, we include year dummy variables and industry dummy variables to be able to use the single regression equation to represent multiple groups, without the need to write out separate equation models for each subgroup. We then estimate our model using First Differencing, Fixed Effects and Random Effects methods and run a Hausman test to determine

which model is preferred. The null hypothesis in the preferred model is random effects but we expect our test to reject the null and POLS to be similar to FE.

4.4 Econometric Methodology

The data used in this study is pooled cross-sectional data, which is data where the variables are collected at different points in time. This paper aimed to follow a similar empirical method as in previous research on the same topic, whereas a similar approach used by Carpenter and Guariglia (2008) and Ascioglu, et al. (2008) will be followed. Both these studies, in a similar vein, use pooled cross-sectional data, investment as dependent variable and analogous independent variables. Following a similar econometric method as in these papers and previous researches, would make it possible to compare the results from the studies.

In this study, one base regression have been performed with investment as dependent variable. Heteroscedasticity-robust standard errors are used in all regressions in line with the method used in previous research papers on the similar topic. The econometric study has been performed using Statistical software Stata, and by following the descriptions, the models and regressions below, the study can easily be replicated by any researchers. As we have applied similar methods, this makes it easy to understand and follow, which makes the results comparable with previous papers. This increases the reliability and external validity of the study, as the results can be considered to be generalizable, and the methodology can easily be followed. More about validity and reliability would be discussed in later in this chapter.

4.5 Diagnostic Tests

We will do the following tests for analyzing our research problems and to get result on our hypotheses.

4.5.1 Breusch-Pagan Test; Test for Heteroskedasticity

One of assumptions of linear regression is known as homoscedasticity, which is, the residuals that are distributed with equal variance at each level of the predictor variable, and if this assumption is violated, we say that heteroscedasticity is present in the residuals. If heteroscedasticity is present in the residuals, the results of the regression become unreliable. One way to visually identify if there is heteroscedasticity present in the residuals is to create a scatter plot of the residuals against the fitted values of the regression model, which we have

done in the ***figure 6***. Correspondingly, we have also used a Breusch-Pagan test- a formal statistical way to determine if heteroscedasticity is present or not. The idea is, if the p-value of the test is less than the significance level (i.e., $\alpha = .05$) then we reject the null hypothesis, and it can be concluded that there is presence of heteroscedasticity in our regression model.

4.5.2 White Test: Test for Heteroskedasticity

A White's test for heteroskedasticity has been conducted, i.e., to check that there is no constant variance between the variables and the error term. If evidence of heteroskedasticity is found, it will lead to biased estimates indicating that the OLS- results should not be interpreted. The null hypothesis states that the residuals of the regression model are constant for every predicted value of the dependent variable, indicating the existence of homoskedasticity. If heteroskedasticity is evident, robust standard errors will be applied to the initial OLS-model before proceeding with further regressions to counteract the issue.

4.5.3 Multicollinearity

Multicollinearity refers to the problem of having perfectly correlated independent variables. If multicollinearity is found evident, then the model omits one of the variables. Furthermore, the interpretation of the OLS model is important to understand, because it becomes a problem as it assumes that all other independent variables remain constant when a coefficient is interpreted. Since correlated variables are co-related and depend on each other, it is unreasonable to assume that all other coefficients of the study will remain the same when changing only one of the variables.

4.5.4 The Hausman Test

We have done the initial regressions analysis with the base model (equation 1) and estimated using pooled OLS multivariate regression analysis. However, the data in this study follow a unbalanced panel-data structure, so the model is therefore potentially more suitable. Fixed effects models are commonly used in previous similar studies. To determine the most suitable approach for our paper, we have conducted a Hausman test. In a panel data set, it investigates whether there is any correlation between the explanatory variables and unique errors in the model (Wooldridge, 2016). The null hypothesis is that there is no correlation between the two,

indicating that a random-effects model fits our data better than fixed effect model. If there is any correlation, a fixed-effects model is more appropriate for our study.

4.6 Validity and Reliability

4.6.1 Validity

When assessing the quality and strength of an empirical study, it is mainly measured by internal and external validity as well as reliability. This concept mainly refers to which extent the research aligns with its study purpose (Bryman & Bell, 2015). We aim to understand the effect of variables on investment and impact of economic shift in investment-cashflow relationship- in our study. According to Bond (2003), validity can be seen as the core of any form of assessment that is trustworthy and accurate. The selection of method and variables are supposed to be based on previous studies and there should not be any measurement errors present in the study (Bryman & Bell, 2015). The choice of dependent variable, i.e., investment is well rooted in prior research and the selection of the explanatory variables, and the methods used to measure them, are recurring throughout the previous studies within the topic. Moreover, the methodology used in our study is well from relevant theories and former studies and have been used many a times times in other fields of corporate finance. Thereby, it can be concluded that this study is comparable with former studies irrespective of the introduction of the variable. Accordingly, the study contributes with a unique edge, which is comparing the result with the impact of fintech, while still being highly valid.

4.6.2 Reliability

For quantitative studies, reliability is important because it is a concern for the researchers whether the techniques used in the study are correct and consistent (Bryman & Bell, 2011, Heale and Twycross, 2015). Researchers defined reliability as the degree to which a test is free from measurement errors, since the more measurement errors occur the less reliable the test is (McMillan & Schumacher, 2001, 2006; Fraenkel & Wallen, 2003). Bryman & Bell (2015) mentioned about the importance of stability in studies in order to be reliable. The reliability of the study can be lower if the selected variables vary over time. For our study, we aim to test if the chosen time has an impact on our variables. One potential source of error could have been the effect of post crisis biasedness, which might have had a skewing effect on the results. To normalize this effect, we have chosen a longer time-frame. The data have been collected from

S&P Global Market Intelligence Data through Wharton Research Data Services which is a well known source for data collection and have access to primary data and use standardized classification of the data to maintain consistency. The data from this source should be considered reliable.

4.7 Limitations

Aside from the contributions of the thesis paper, we want to shed lights on the various limitations we encountered while conducting this study. The first limitation we came across while doing this thesis is a paucity of information because of our chosen context of study. China is very restrictive regarding the information it shares. Also, there are several prior studies based on the variables we have in our thesis, but very few are from Chinese market. So, an additional limitation of the study is the lack of previous studies conducted on similar topic in similar country. So, our thesis paper is kind of first of its kind to elaborate investment cashflow relation, along with the other explanatory variables, studying in Chinese financial market. Although some of the above mentioned aspects could have been included in this thesis paper, it should be mentioned that due to lack of time for this study, the current scope was justified, the geographical scope of the study constrained the assessment to the Chinese market, which justified the mere focus of market-internal divestments. Another limitation is suggested to be due to insufficient sample size. If we have taken years before 2000, that would cover any other financial ups-and downs of China. As we have deleted the lines with zero investment and the companies those are not listed in the Shanghai Stock Exchange, that makes our data unbalanced.

Section 5: Data and Descriptive Statistics

The purpose of this chapter is to describe the data used in this study. This chapter starts with a description of the used variables, and followed by the details descriptive statistics related to respective variable.

5.1 Variables Definition

The variables used in this study as required by the investment model are investment, cash flow, revenue, leverage and Tobin's Q. We have taken the logarithm of investment, cashflow and

revenue as the logarithm of the variables suits our purpose. The definition of each variable is as follows:

1. *Investment:*

   It is the current period of investment between the time 2000-2020. It is equal to the cash paid by the company towards the purchase of fixed assets (property, plant and equipment). We have taken data as per the definitions from on Carpenter and Guariglia (2007).

2. *Cash flow:*

   Cash flow is measured as the total earnings before extraordinary items and depreciation and is an important determinant of growth opportunities. If firms have enough cash inflows it can be utilized in investment activities. It also provides evidence that investment is related to the availability of internal funds. Cash flow may be termed as the amount of money in excess of that needed to finance all positive net present value of projects. The purpose of allocating money to a project is to generate a cash inflow in the future, significantly greater than the amount invested.

3. *Leverage:*

   We have used the same definition of leverage as Lang. et al (1996), who defines it as the ratio of total liabilities to the book value of total assets. According to Lang et al. (1996), if leverage has a significant negative effect on investment, mainly two interpretations can be adopted. Firstly, it would mean that firm's capital structure plays an important role in the investment policies; secondly, this can be explained by an agency problem between the agents who are related and the shareholders. If managers are overburdened by debt which means that leverage ratio is high, they may give up projects that might yield positive net present values. Also there will be support for both the underinvestment and overinvestment theory.

4. *Revenue:*

   Firm sizes are measured in many ways, either by the number of employees or the output it generates (revenue). There is evidently no ideal measure of firm size; the choice of a

particular measure ultimately depends on the purpose of the study (Kumar et al., 1999). We are measuring the firm size with revenue. Some literatures find the positive relationship between firm size and investment with reasons that larger firms are likely to be more diversified causes stable or less volatile cash flows, often less failure, and more application of the economies of scale in issuing securities. Eventually, larger firms may invest more with the stable cash flows. Fama and Jensen (1983) states that there may be less asymmetric information for large firms, since these firms are expected to share more information to outside investors than smaller firms. Therefore, they increase their preference for equity relative for investment. Following Rajan and Zingales (1995) the natural logarithm of net sales is used as a proxy for size.

5. *Tobin's Q:*

We have used Perfect and Wiles' (1994) simple Q (market value + liabilities / book value of assets) for growth opportunities defined as the market value of total assets of the firm divided by the book value of assets. Market value of the firm is the summation of total liabilities, the value of shareholders equity and the estimated value of preference shares. High Tobin's Q values encourage companies to invest more in their capital because these are obviously "worth" more than the price they paid for. On the other hand, if Tobin's Q is less than 1, the market value is less than the recorded value of the assets of the company.

5.2 Data Description

Table 1 shows the summary statistics of variables for the sample by the year pre and post fintech era. We can see that the mean investment in the pre fintech era is $174.820m and that increased to $830.690m after fintech era. The standard deviation was $1,194.580 in the pre fintech era and was $4,618.970 in the post fintech era, which indicates a large variability in investment across the companies in the sample in both the eras and which corresponds to the super large maximum investment of $118,199.600m in the post fintech era. The average net cashflow is $235.87m, with a standard deviation of 3,001.830 in the pre fintech era, which implies that most data differ from the average broadly. The mean net cashflow is $321.330m with a standard deviation of 3,752.470 in the post fintech era. The maximum net cashflow is $69,675.000m, whereas the maximum net cashflow increased to $100,400.970 in the post fintech era and the minimum of negative cashflow in some companies in both the eras. The

average revenue has increased from $12,584.190m to $29,318.080m during the pre-fintech era to post fintech era. The standard deviation was 82,107.270 in the pre fintech era and 169,168.440 in the post fintech era, which is reasonable for firms' significant difference. The maximum revenue generated in the pre fintech era is $1,880,000.000m that increased up to $2,900,000.000m in the next 10 years. For leverage, the means are in percentage of 0.060 in both the eras with standard deviation of 0.100 and 0.090 respectively. The means of Tobin's Q are in percentage and the values didn't change much in pre and post fintech era. The relative small standard deviations means small variability in leverage and Tobin's Q. The minimum and maximum values of leverage look reasonable and indicate a short range of leverage among companies.

Table 2 reports the descriptive statistics of variables across nine industry categories, which are Agricultural, Forestry and Fishing, Construction, Manufacturing, Mining, Public Administration, Retail Trade, Services, Transportation & Public Utilities, Wholesale Trade. We summarized the mean value, standard deviation (SD), maximum, minimum, and number of firm observations for our variables: investment, net cash flow, leverage, revenue, and Tobin's Q. From the table we see that during this period, retail trade had the largest average investment of $1,684.970m, although the highest investment made in a single year in the manufacturing industry. This makes sense, as this sector has a standard deviation of 10,520.070, which is the highest in the industry categories. According to Statista (2021), Manufacturing sector had the highest Foreign Direct Investment (FDI) of 215.6 billion yuan in 2020. According to Santander, the most invested sector in 2018 was Manufacturing, with 30.5% of the total investment made. It also mentions that Manufacturing industry has the highest investment opportunity in China (Santander, 2021). The highest mean net cashflow was in the construction sector of $2,643.320m with 10,623.070 being the highest standard deviation across all the industries, that makes sense as the maximum new cashflow was generated from the construction sector. The firms in the Transportation & Public Utilities sector had the highest mean leverage percentage, i.e., 0.140. although firms in the Transportation & Public Utilities sector were highly levered, but the standard deviation was more in the Mining sector with the highest industry maximum value 2.00. The mean of Tobin's Q is highest in the mining sector, but the standard deviation is 0.210, and maximum value is 7.160, in manufacturing sector which is highest industry average. On average, firms in the Construction sector generated more revenue, which is $133,353.500m. although firms in the retail trade had

the maximum revenue, i.e., $2,900,000.00m generated in these 20 years with the highest standard deviation among all the sectors, i.e., 486,589.800.

Figure 6 shows the histograms of investment in levels. We can see that the variable is heavily skewed to the left and do not display as a normal distribution. We then generate the log of investment and plot their histogram in ***figure 7***. We can see that after taking the natural logarithm of them, both variable is less skewed and more symmetric partially. The partial normal distribution implies that using logarithm of investment can be more feasible for the regression model than the level form. Moreover, the abnormal part can be explained by the lack of complete data and very large extremum in some cases. ***Figure 8*** and ***figure 9*** show the histogram of net cash flow and log of net cash flow, where we can see that after taking log of net cash flow the graph is symmetrical and not skewed ***(figure 9). Figure 10*** and ***figure 11*** show the histogram of revenue and log of revenue, where it can be observed that after taking log of revenue the graph is symmetrical and not skewed to the left anymore ***(figure 11).*** Moreover, we have graphed a two-way scatterplot ***(figure 12)*** with the residuals û of our main variable log of investment against year. It can be seen from the graph that the residuals are kind of a mirror image across the fitted value line, which means, the residuals have the same variance from the mean, so, there is presence of homoscedasticity in our model.

5.3 Dependent Variable and Explanatory Variables

The dependent variable is investment, which is basic indicator for understanding any country's financial position and free cash position. The mean of the dependent variable is 582.721 ***(table 1)***, which means that an average of $582.721m is invested by China in the past 20 years. The standard deviation is 3,729.366, which indicates a large spread as the value is higher than the mean. Furthermore, the maximum value in the sample is $118,199.600m, which indicates the presence of extreme outliers. As previously mentioned, the distribution of the variable is heavily skewed to the left, therefore, the natural logarithm has been applied for the dependent variable. The independent or explanatory variables are net cashflow, leverage, Tobin's Q and revenue. The minimum value of the net cashflow and revenue are negative and maximum values are much higher than mean, the standard deviations are 3,487.751 and 142,866.600 respectively, which indicates the presence of extreme outliers in the data. Also, natural logarithm has been applied to the variable net cash flow because of the distribution not being asymmetrical. Tobin's Q is defined as the ratio of the market value of the firm's equity and

book value of debt to the book value of total assets. In our sample ***(table 1)***, the mean Tobin's Q is 0.154 with a standard deviation of 0.184 over 7,398 firm-year observations.

$$Tobin's\ Q = \frac{Market\ Value\ of\ Equity + Book\ Value\ of\ Debt}{Total\ Assets}$$

5.4 Control Variable

Researchers use control variables in the model to provide more accuracy and reliability to the study findings. Control variables help to mitigate potential error terms and help to improve the statistical power of the results. By implementing control variables, the validity of the study is supposed to be strengthened (Becker, 2005). Several variables that affect both the relationship between investment and net cash flow and other explanatory variables as leverage, Tobin's Q and revenue, have been included in an attempt to isolate the main explanatory variable's effect on the dependent variable Investment. We have used two different control variables- *industry* and *year* for the sake of understanding the effect of these, which are used in previous similar empirical studies.

Since this study utilizes panel data, year effects are controlled for from the period of 2000 to 2020. We categorized the year into 2000-2010 and 2011-2020. *Industry* is defined using 4 digit Standard Industrial Classification (SIC) and is separated into 241 industry and 9 different major industry category as Agricultural, Forestry, Fishing, Construction, Manufacturing, Mining, Public Administration, Retail Trade, Services, Transportation & Public Utilities and wholesale trade.

5.5 Interaction Term

We have interacted our dummy variable year Y1 (2000-2010) and Y2 (2011-2020) with the cashflow term to see the effect of year changes in cashflow investment relation and to get answer to our second research question. Then we did the regression test again with the interacted dummy variable and regular continuous variable natural logarithm of Cash flow to see the effect of Year dummy variable interacted with natural logarithm of Cash flow with Investment.

Section 6: Empirical Analysis

The purpose of this chapter is to present the results of the study. First, the results of the statistical tests are presented before proceeding with the results of the hypothesis. This will be followed by an analysis of these results, using previous research and theories presented throughout the paper.

6.1 Results of Diagnostic Tests

6.1.1 Results of the Base Model

We test for log of investment (linvestment) with log of cash flow (lCF) (equation 1), and we expect the relationship to be positive. Panel A of ***Table 4*** reports the POLS estimates, where the coefficient associated with lCF is 0.542, meaning that if the cash flow increases by 1% then the investment of a firm increases by 0.542%. Also, the table depicts that the coefficient is highly statistically significant at 1% level. Thus, the relationship of cash flow and investment is positive, analogous to the results obtained in the previous studies conducted with data from the UK. Gugler et al. (2004) found in their paper positive relationship with investment and cashflow for average and marginal Q. However, the POLS estimates are likely to suffer due to unobserved heterogeneity and omitted variable bias. Besides, with only one explanatory variable the economic significance of the estimation would not make much sense. We need more information other than cash flow that investment of a firm might depend on. We have also done the regression test for pre fintech and post fintech era.

6.1.2 Correlation Analysis

Table 3 presents the Pearson's correlation matrix of the variables to examine the presence of multicollinearity between the variables used in the study. As observed, all variables except *Tobin's Q* is significantly correlated with the dependent variable log of investment. Tobin's Q is negatively correlated with all the explanatory variables- cashflow, revenue and leverage. Furthermore, log of Revenue and Leverage is positively correlated with log of cashflow, which means that the more a firm is levered, the more its flow of cash will be. The same conclusion can be drawn for investment and the variables- cashflow, revenue and leverage, where the more revenue the firm generates or cash inflow takes place or more levered a firm is, the more it will

likely to have more investment. In general, most correlations can be perceived as low to moderate, where only log of *Revenue* , have a high correlation of +0.650. This could potentially lead to an issue with multicollinearity.

Woolridge (2016) mentioned that the amount of correlation that should be accepted among two explanatory variables is very difficult to specify. However, in the presence of high collinearity or having multicollinearity problem, the statistical program Stata used in this study will automatically drop the variables causing the collinearity issue. Therefore, we do not identify these high-correlation values to have any significant impact on our study results.

6.1.3 Omitted Variable Biasedness

As we control for more critical and relevant variables our estimation becomes less prone to biases. To estimate model (2), we can see the correlation coefficient of leverage and linvestment is 0.012 from correlation matrix ***(table 3)***. By regressing for the second variable Leverage, ***(Panel B, table 4)***, we find the value of coefficient β_2 as -1.904. Now, referring to the Omitted Variable Bias Table (***Table 10)***, we can say that the estimation of β2 is **Negatively Biased**. By comparing the regression results, we can deduce that, the effect of linvestment is underestimated when leverage is excluded from the model. The estimated coefficient of lCF decreases when leverage is added in the model. Although the relationship is statistically significant with or without adding leverage in the model. Large firms will continue investing no matter what the cash flow variation is, dispersing the investments over longer periods of time, but firms with less cash flow, may not invest or invest internally, although as the cash flow increases, the tendency to invest increases. When we add Tobin's Q in our model, the value of coefficient for log of cashflow increases.

6.1.4 Additional Control Variable

We add leverage, Log of Revenue and Tobin's Q in our model (equation 1) and regress ***(table 4).*** From the table, we can see that the sign of estimated coefficient of variables leverage and Tobin's Q is negative and decreases further with the addition of other variables. The coefficient of leverage is highly statistically significant at 99% level; however, the coefficient of Tobin's Q is not statistically significant with investment. The sign of Log of revenue is positive, meaning they have a positive relationship with investment and is highly statistically significant. The coefficient of log of cashflow is positive and highly statistically significant at 99%

confidence level. The magnitude is 0.55 remains same over the addition of other variables in the model, except for the addition of log of revenue. With the addition of log of revenue in the model, the magnitude decreases to 0.346. Which means cashflow effects investment, but this impact changes due to firm size.

6.1.5 Pre Fintech era and Post Fintech era

We add the interaction term between Y1 (2000-2010) and cashflow and Y2 (2011-2020) and cashflow in our equation (Equation 2). We have done regression analysis with interacting between year dummy variable and log of cashflow (***Table 6).*** Y1 being pre fintech era and Y2 being post fintech era, we have regressed these with our main explanatory variable log of cashflow to get answer to our second research question. The interactive variable we get by multiplying post fintech era and log of cashflow gets omitted due to collinearity because if we add both the variables, it will be perfectly collinear with the constant and violate one of the assumptions of MLR 3, which says that there cannot be any perfect collinearity (Wooldridge, 2015). From the table we can see that the coefficient for log of cashflow is 0.436 and strongly statistically significant at 99% confidence level, which states that when cashflow increase by 10% investment increases by 4.3%. The sign of the estimated coefficient of log of revenue and tobin's Q is positive and the values are 0.290 and 0.063, which means that with the increase of revenue or tobin's Q, investment would also increase. However, the estimated coefficient for leverage is -2.193, which means that when the leverage ratio of a company is 1, the investment decreases by 2.193. Log of revenue and leverage are highly statistically significant at 99% confidence level. The term in the table Y1lCF is the interaction between Y1 (2000-2010) and log of cashflow. We have shown interaction with Y1 (2000-2010), however, we haven't shown the interaction between Y2 (2011-2020) and log of cashflow because it's omitted by Stata due to collinearity. The estimated coefficient $\beta 5$ of equation 5 is -0.307, which means that the cashflow in the year Y1 (2000-2010) was 30.7% lower than Y2 (2011-2020). This is highly statistically significant at 99% confidence level hence we reject the null hypothesis H_{o5}.

6.1.6 Dummy Variable and Robustness Check

We run the Breusch-Pagan test and white test to see whether the variance of the error term is dependent on the value of our main explanatory variable lCF. The null and Alternative hypothesis for this is given below:

Null Hypothesis, H_0: $\beta_1=0$

Alternative Hypothesis, H_1: $\beta_1\neq0$

The Breusch-Pagan test gives us a ***(Panel A, Table 5),*** p-value of 0.2238 which is not statistically significant, and we fail to reject the null hypothesis. On the other hand, results for the White test shown in ***(Panel B, table 5)*** gives us a p-value of 0.2723, which is also not statistically significant, and we also fail to reject the null hypothesis. Based on both the tests, we do not find any evidence of heteroskedasticity, which in turn satisfies the MLR.5 (Multiple Linear Regression) assumption and means that we can rely on our estimated standard errors for inference, yet, we will run our POLS regression controlling for robust errors and cluster robust.

For endogeneity, we add year and industry dummy variables to the model and run POLS regression ***(Table 7)*** with robust and cluster robust standard errors using the panel data approach. We find that the results are consistent with that in ***Table 4***. From the table it could be seen that the sign of the coefficient for our main variable log of cash flow is positive and the coefficient decreases from 0.346 to 0.247 with the addition of year and industry dummy variables, which means, when controlling for year and industry, if the lCF increases by 100%, the investment increases by 24.7% and remains same across all panels. The sign of log of Revenue remains positive across all panels and is highly statistically significant at 99% confidence level, however, the magnitude increases when controlled for dummy variables. This means that when controlled for the year and industry, if the revenue is increased by 100%, the investment will increase by 40%, when cluster robustness is checked, then revenue is statistically significant at 99% confidence level. On the other hand, the sign of leverage is negative across all the panels at 99% confidence level. The magnitude increases with the addition of dummy variables in the model. Furthermore, Tobin's Q initially was negative, but after having year and industry dummy controls, the sign of the variable becomes positive and remains the same for the robust and cluster robustness standard errors.

6.1.7 First differencing, Fixed effects and Random effects

We have used First differencing (FD), Fixed effects (FE) and Random effects (RE) ***(Table 8)*** to see which method best fits our model. The coefficient associated with log (cashflow) is positive and strongly statistically significant for all the three models FD, FE and RE. The coefficient associated with log of cashflow for FD is 0.068 and increase for FE and RE models

up to 0.202, which means that when cashflow increase by 100%, investment increases by 20.2%. The estimated coefficient is positive for leverage for the FD model but negative for FE and RE models and the estimated coefficient decreases for FE and RE models. The coefficient associated with Tobin's Q in all the models are positive, however the value is 0.676 for FD but 0.125 and 0.124 for FE and RE models. The estimated coefficient for log of revenue is 0.035 and increases to 0.292, which is strongly statistically significant for RE model. If we take a closer look at the data, it could be seen that the values of the variables except for variable Leverage are lowest for model FD, moderate for FE and highest for RE model, i.e., values are higher for FE and RE than FD. However, from the Random Effects model, controls are not removed as RE keeps a portion of the fixed effect term in the model. From the results it can also be interpreted that the results are quite consistent over all the models for all the variables except for log of Revenue, where the magnitude of the coefficient decreases in FE model and again increases for RE model. Finally, magnitude and sign of the coefficients of the variables are reasonably unswerving, so we have to choose one of these models to which one is economically important.

6.1.8 The Hausman Test

To choose which test would give economic significance, we run the Hausman test (***Table 9)***. Our Null Hypothesis is, H_o: Random effect is better than Fixed effect. From the table we can see that the p value<0.001, which is less than 0.05. So, we can reject the null hypothesis, meaning the fixed effect method fits our data better than the random effect method. RE method is quite different and applicable if we have some fixed effect that we don't want to take out from the model and believe that part of it should appear in the model. On the other hand, for FE, we are changing the nature of the variable by removing the mean from them. However, for our model we believe the test results make sense as we don't have any variable that remains fixed over time or increases at the same ratio.

6.2 Hypothesis Testing and Analysis

From the econometric analysis results, we see that all the estimated coefficients are highly statistically significant at 99% confidence level except for Tobin's Q. All the p values are less than 0.01 except for Tobin's Q, so we reject all the null hypothesis H_{o1}, H_{o2}, H_{o3}, and H_{o5} at 99% confidence level and fails to reject the null hypothesis H_{o4}.

6.2.1 Relation between Cashflow and Investment

Vogt (1994) extensively explained the relationship between cash flow and investment. The positive relationship is based on the pecking-order hypothesis of Myers and Majluf (1984). Fazzari, Hubbard, and Petersen (1988) finds that cash flow has strong positive effect on investment, that spends in firms with low dividend payout policy (Vogt, 1994). Whited (1992) extends the Fazzari, Hubbard, and Petersen (1988) results in an analysis of firms facing debt financing constraints because of financial distress. They have found evidence of strong relationship between cash flow and investment on firms spending with a high debt ratio (high interest coverage ratio), or without rated debt. In a similar vein, Oliner and Rudebusch (1992) analyzes several firms and found an alternative explanation for the strong investment and cash flow relationship. In their study they found that firm ownership and insider shareholdings has little influence on cashflow investment relationship than firm age, exchange listing and insider stock trading patter, which has moderately stronger influence. Contrarily, Strong and Meyer (1990) in their paper disaggregates the investment and cash flow of firms in the paper industry into two forms of investment: sustaining investment or productive capacity maintaining and discretionary investment, and two forms of cashflow as: total cash flow and residual cash flow (i.e., cash flow after paying off debt service, taxes, sustaining investment, and established dividends). They have found opposite relation in these categories- discretionary investment and residual cash flow are found to be positively and strongly related; and Discretionary investment and stock price performance are negatively and strongly correlated. Carpenter et al. (2008) used a panel of 693 UK firms over the period of 1983-2000 to analyze the investment regressions where they have distinguished firms into more and less likely to face financial constraints and used employees as a measure of firm size. From the study they have found that cash flow tends to have bigger effect on investment of firms more likely to face financial constraints and which can be interpreted because of capital market imperfections. Furthermore, Ismail et al. (2015) in their paper done on 234 companies listed on Bursa Malaysia from 2004-2010, found positive correlation between investment and internal flow of fund, where to increase investment, firm need to retain more cash in hand. Similarly, Verona (2020) has analyzed in the sample of quarterly aggregate US data from 1952: Q1 to 2017: Q4 and found that a positive cash flow shock has a positive effect on investment, even using the entire sample of firms. It was also found in the study that, the positive and stable relationship between investment and cash flow is largely described at business cycles frequencies. Our study finds similar result like the papers mentioned above, i.e., we found positive and strongly significant

relation with investment and cashflow and our p value is less than 0.01 so we reject the null hypothesis H_{o1} accept the alternative hypothesis H_{a1}.

6.2.2 Relation between Leverage and Investment

Former theoretical and econometrical studies posit that financial leverage can have either positive or a negative impact on the value of the firm because of its impact on investment decisions. Franklin et al., (2011) analyzed the impact of leverage on firm's financial decision of Indian pharmaceutical companies during the period of 1998 to 2009. He found that leverage and investment are positively related, given the level of financing- investment increase would lower financial risk and hence the cost of bond financing. On the contrary, Deangelo and Masulis (1980) found a negative relationship as the tax benefit of debt (leverage) would compete with the tax benefit of capital investment. In a related vein, Dotan and Ravid (1988) also claims a negative relationship because investment increase would raise financial risk for any company and hence the cost of bond financing would increase. Whited (1992) has shown how investment is more sensitive to cash flow in his test of a sample of 325 U.S. manufacturing firms with high leverages as compared to firms with low leverage. They reported that high level of debt increases default risk and overall risk of running a firm. We have found negative and strongly significant relation with investment and leverage, where investment decreases when leverage ratio increase. We hereby reject the null hypothesis H_{o2} accept the alternative hypothesis H_{a2}.

6.2.3 Relation between Revenue and Investment

The relationship between revenue and investment is ambiguous. Some prior literatures offer positive relationship while others show negative relationship the reason being large firms or firms that earns more revenues are more likely to be more diversified, causes less volatile or more stable cash flows. Similarly, larger firms are likely to be levered, causing more risks for the firm. In the frictionless world of the Modigliani-Miller theorem, cashflow and investment should be unrelated. A firm with good investment opportunities should be able to fund its investment either out of its own cash flow or by raising external funds no matter what the size of the firm is or how much revenue it generates (Weinberg, 1994). However, some studies also finds association with large firm size with more scatter ownership structure, there is greater flexibility in investment timing, and higher likelihood of agency problems of overinvestment, leads to higher cash flow sensitivity for larger set of firms (Kadapakka et al., 1998; Vogt, 1994).

Hence, the relation between cash flow investment sensitivity and size of firm is vague. In our study we have found positive and strongly significant relation with investment and revenue at 99% confidence level where investment is higher for companies with higher revenue or large firm size and hereby reject the null hypothesis H_{o3} accept the alternative hypothesis H_{a3}.

6.2.4 Relation between Tobin's Q and Investment

Lin et al. (2018) analyzed the aggregate and firm-level data from 1963-2014 and found in their paper that Tobin's Q is a sufficient measurement to predict investment and that the interest rate negatively predicts investment via its impact on Tobin's Q. Ismail et al. (2015) in their paper on a sample of 234 listed companies from Bursa Malaysia, from 2004-2010, found that Tobin's Q is positively correlated with investment and the result had similar findings as previous studies such as Kadapakkam et al. (1998), Koo and Maeng (2005), Ismail et al. (2010a; 2010b) and Aivazian et al. (2005). For instance, Abel and Eberly (2012) argue that movements in Q of Tobin's Q could primarily affect investment behavior over long-horizons (into the future), as Q is based on equity prices, and it is a forward-looking variable that would capture information about the value of long-term growth options available to the firm. On the other hand, Verona (2020) argues that Q may not be very informative about sharing the near-term investment plans and thus highly likely would perform poorly in explaining current investment. Overall, these results suggest that even after controlling for cash flow, Q is an important determinant of aggregate investment. Although this contradicts the findings of Grullon, Hund and Weston (2018), who argue that Q is a sideshow at the aggregate level and found that the investment cashflow sensitivity of the largest 100 investing firms has increased over time. This is in line with the findings of Gallegati and Ramsey (2013a, 2014), who suggest that the leading behavior of Q of Tobin's Q-at all frequencies, is a forward-looking variable that captures the expected present discounted value of a firm's longer-term profits, and hence the firm's longer-term investment decisions. In our case, we have found positive but insignificant relation with Tobin's Q and investment and fails to reject the null hypothesis H_{o4}.

6.2.5 Relation between Interaction term- year dummy and cashflow and Investment

According to the argument of McKinnon (1973) and Shaw (1973), developing countries have restricted competition in the financial economy through government intervention. Based on their argument, saving and investment is discouraged in repressed financial sector because, the available rates of return are lower than those obtained in any competitive market. The influence

of financial repression in any economy has been tested in numerous prior studies, where a negative association between financial repression and economic variables (savings rates, investment, and economic growth) has been found. On the other hand, in the financing of the growth of private firms, internal and informed financing for example, retained earnings, trade credit, and private loans have played an important role (Allen et al., 2005; Cull et al., 2009).

An unexpected financial crisis spread globally and rapidly in 2008 and resulted in triggering a severe global economic recession in 2009. This crisis has been termed as 'once in a century' and likened to the Great Depression era in the 1920s, and this period from 2007-2009 has been defined as 'crisis period' (Santos, 2011). Although China's banking sector was relatively protected, even this global economic crisis hit was harder for China than no country outside OECD (Haan, 2010). The global financial crisis (GFC) threatened devastation on the global economic system just as China overtook Germany to become the world's third largest economy (Cook and Gu, 2009). After the GFC China was taking steps to slow down its own over-heated economy that was snowballing with the construction and investment booms in 2008 coupled with the 2008 Olympics sports.

China's response to this crisis was enormous and post crisis started having enormous global impact on financial factors (investment, cashflow, banking sector). After the deep and lasting depression, China was gradually able to pull the world economy out. In response to the GFC of 2008, the Chinese government announced a 'CNY (Chinese Yuan Renminbi) 4 trillion stimulus program' (a large stimulus program) on 5 November 2008 which appears to have boosted China's economic growth, especially in the short term. The idea of the program was to stimulate China's economy by mobilizing state-owned enterprises (SOEs), particularly local government financing vehicles (LGFVs), which, invest in the certain low-yielding projects, such as infrastructure with the help of the banking sector (Xu and Gui, 2019). China was successfully maintaining the global financial stability also working to reduce the imbalances alongside its domestic stimulus and was playing a larger role in the international financial institutions (Haan, 2010). After the financial crisis, China's economy boosted and rapidly become again-one of the world's largest and fastest growing economies in the world (Haan, 2010).

Digital finance has been operating in China for more than 10 years, starting soon after the crisis period. However, Yu'ebao- an online sales platform established by Alibaba's Ant Financial Services in June 2013, whose launch has been regarded as the point from which the recent

gigantic development of digital finance in China began and when eventually improvement in financial sector started to happen (Huang and Wang, 2017). In our study we have seen that the estimated coefficient in the post fintech era is higher in the interacted variable, than in the pre fintech era. The P-value is less than 0.01, so we reject the null hypothesis H_{O5} at 99% confidence level and accept the alternative hypothesis H_{a5}.

Section 7: Conclusion

In the concluding chapter of the paper, we summarize the main contributions made by our work while acknowledging its potential limitations. As a final remark, we review our proposals for further research in the field.

The underlying relationship between firm investment and cash flow, and factors that affect the firm investment- are one of the extensively studied topics by researchers and policy makers. Although numerous literatures can be found studying the similar association, studies relating to Chinese firms in particular are very limited. This paper sheds some light on the relationship between investment and cash flow on a panel of firm, where we tried to understand whether cash flow is actually an important determinant for investment or its importance is inflated in the presence of other controlling variables. We used a panel of 1177 publicly listed Chinese firms over the period 2000–2020 to estimate the factors affecting investment. From the previous research works, we have found that cash flows have a positive relationship with investment, where the firms with higher cash flow tend to invest more. Hovakimian (2009), in his paper on investment- cash flow sensitivity found that firms with low cash inflows are more likely to underreact to investment opportunities, given that, investment of a firm is sensitive to changes in cash flows. Investment is also affected by many other variables and the impact of cashflow changes a bit with the injection of other variables, but the significance remains the same.

Many researchers concluded that leverage and investment have either a positive relationship or a negative relation with investment, depending on the size of the firm (John and Muthusamy, 2011). Aivazian et al. (2005), in their paper based on US and Canadian data, found that leverage is negatively related with firm investment. In this study, we found similar results akin to these prior studies. Keefe (2013), in a similar test in financially constrained firms, found that cash flow volatility decreases investment in financially constrained firms, whereas, for the firms

which are not financially constrained, it does not. Lang et al. (1996) has done an econometric study on firms that have had $1 billion of sales in 1989 for each year. Based on their analysis of the relationship between the debt ratio and the rate of growth of companies, they pointed out that for companies with fewer investment opportunities (i.e., firms with a low Tobin's Q ratio), there is a negative correlation between the debt ratio and the investment. In China, we have seen similar result as of prior research, where leverage has a negative relation with investment. Meaning, the higher the debt/asset ratio, the less likely that the firm will invest since its credit unavailability increases or vice versa. McLean and Zhao (2014) analyzed all the U.S firms during the years 1965 through 2010 and find that investment- Tobin's Q (investment–cash flow) sensitivity varies over the economic condition and investor sentiment with higher sensitivity during expansions (recessions). Bloch (2005) analyzed 250-300 firms listed on the Copenhagen Stock Exchange over the period 1989-2001 using the Tobin's Q approach. Investment and Q had positive and significant effect, however, there were sector differences found on R&D (Research and Development) investment.

Although prior studies find that investment is correlated with Tobin's Q however the effect of Tobin's Q on investment is sometimes weak and often dominated by direct effect of cash flow on investment (Abel and Eberly, 2012). In our study, we have observed negative and statistically insignificant relation, hence Tobin's Q is not a good measure for analyzing investment behavior in China. Ascioglu et al. (2008) found in their paper that unless the size and quality of the firm's investment opportunity set is correlated with current cash in flow of the firm, there is no reason to expect a correlation between cash flow and investment (Ascioglu, et al., 2008). According to an extensive review of international evidence on the size effect by Schiantarelli (1996), investment-cash flow sensitivity is observed to be higher for smaller firms when samples include a wide range of firm sizes. However, for smaller samples with a higher proportion of relatively larger firms, the observed investment-cash flow sensitivities are either higher for larger firms or not significantly different across size groups. Revenue is an important variable that determines size of the firm and in our study helped to analyze its relationship with investment.

The unique analysis that can bring breakthrough in financial research is about the effect of fintech era on investment-cash flow relation. We have found that the coefficient of cashflow decreases in the post fintech era. However, we have also seen that when cashflow was interreacted with year dummy, the result was higher in the post fintech era. Injecting

digitalization in financial industry has brought positive impact for industrialization. This is a particular scenario, and many more major changes in the financial industry can bring breakthrough. This leaves a question for the policy makers and further research can be done to analyze certain scenarios in several countries. China is the largest and richest country in Asia, so this study can be interesting to researchers from other emerging economies in the East- to conduct similar study in Asian countries. Also, this would be interesting to study the impact of pandemic in the investment cashflow relationship and study the pre covid 19 and post covid 19 financial market. This test can be a great source of insights in academics and similar tests can be done in the future with green investment, which may provide new insights about the relationship of cash flow and firms who are investing in green ventures.

7.1 Contributions and Limitations

Although there have been extensive studies done before to analyze the relationship between cash-flow and investment, this study has made a unique contribution in the field of finance by focusing on the Chinese market and comparing this relationship in the pre-and-post fintech era context. This study would not only raise awareness among the investors who are willing to invest in the Chinese market, but also would help companies in taking informed decision regarding the cash flow management.

However, there are certain limitations of this study which are highlighted as followed. Firstly, the study is limited to only one country – the Chinese market. In today's globalized economies, investors rarely restrict their investments in one country. Further, the data set involves 1,177 companies and a panel from 2000 to 2020. Due to this long time-period some data were not available which may impact the final output. Investment is a vast subject, and it can be affected by other variables which was not the part of this study. Qualitative research also could have helped uncover a more descriptive, nuanced, and in-depth understanding of the relationship between investment and cash flow. The data for this research is collected from the third party data provider and the reliability of this study is based on the reputation and reliability of the data provider because the data is not cross verified from any other source. Finally, the Chinese market is a socialist market economy and there is a high possibility that the findings from this study cannot be generalized to any other economies, even at times to other emerging economies in the East, whereas a study conducted in a Western context can be extrapolated in similar contexts.

7.2 Further Studies

The study has immense scope for further reserch in terms of covering some other sector-based analysis to get an in-depth report on the impact of cash flow on investment decisions. As the trend of sustainable investing is rising this study can focus on only high-rated Environmental, Social, and Governance (ESG) companies to evaluate the impact of cash flow because the ESG investments involve capital expenditure and the investigation on these companies can bring more insightful results. Additional variables can be incorporated in the study that can increase the overall impact and provide information on which variable has a higher impact on investment decisions. Apart from China, the study can be expanded to other Asian countries to cover the entire region. Further, the sample data can also be expanded for further studies to include more companies to increase the overall market capitalization or free float of sample data. The periods can also be expanded to test the effect of year change. This inclusion of more years can provide information on how the impact of cash flow changed over multiple decades by assigning dummy variables to a batch of one decade. Research has taken independent or explanatory variables as net cash flow, leverage, Tobin's Q, and revenue however, the study has future scope to expand these variables by taking financial ratios and ESG pillars because saving the earth is a great concern for all the countries. Moving further, the scope of the study can also be expanded by adding additional questions for the research, such as, is there any bidirectional relationship between the variables or how an internal investment impacts the investment flow. Finally, a critical evaluation can also be conducted in the future instead of an empirical study, the researcher can critically evaluate any other similar studies for a conclusion. Over time, as the new data releases, the study requires regular revisions to keep testing the sample after periodic intervals to assess any changes in results.

Section 8: Reference List

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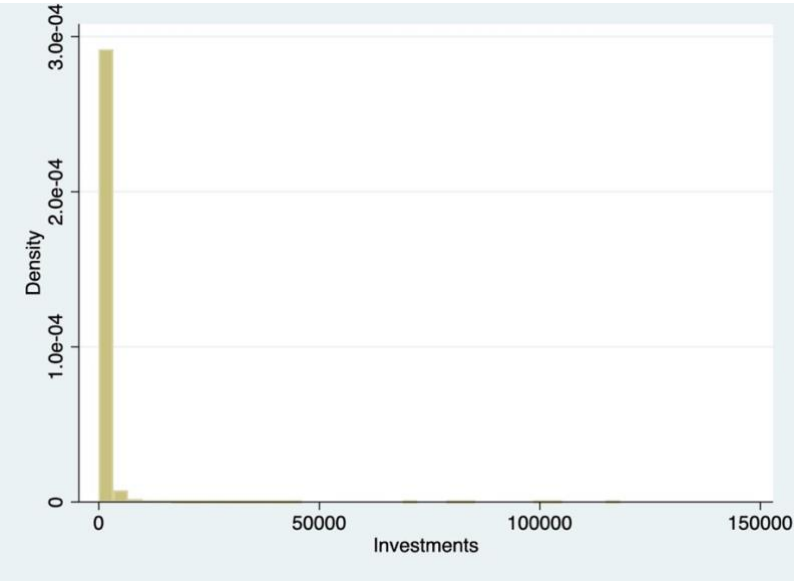
Section 9: Figures and Tables

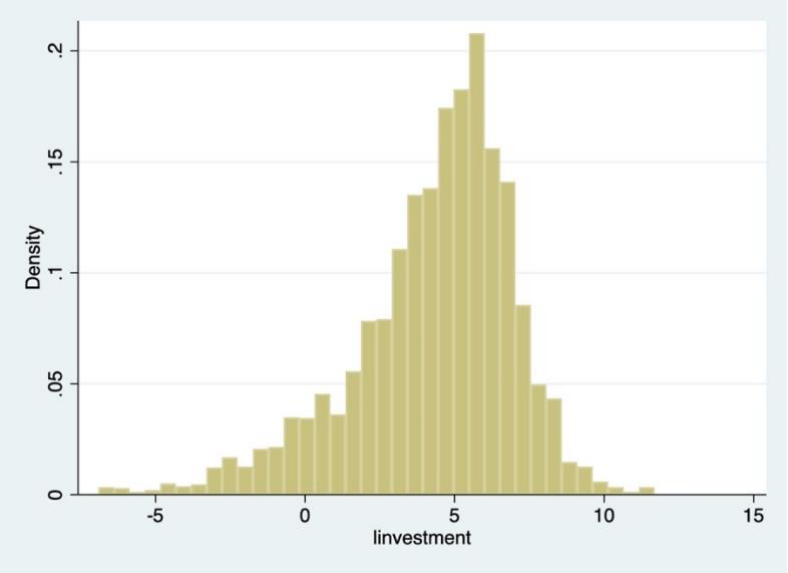
Figure

Figure 6: Histogram graph of Investment



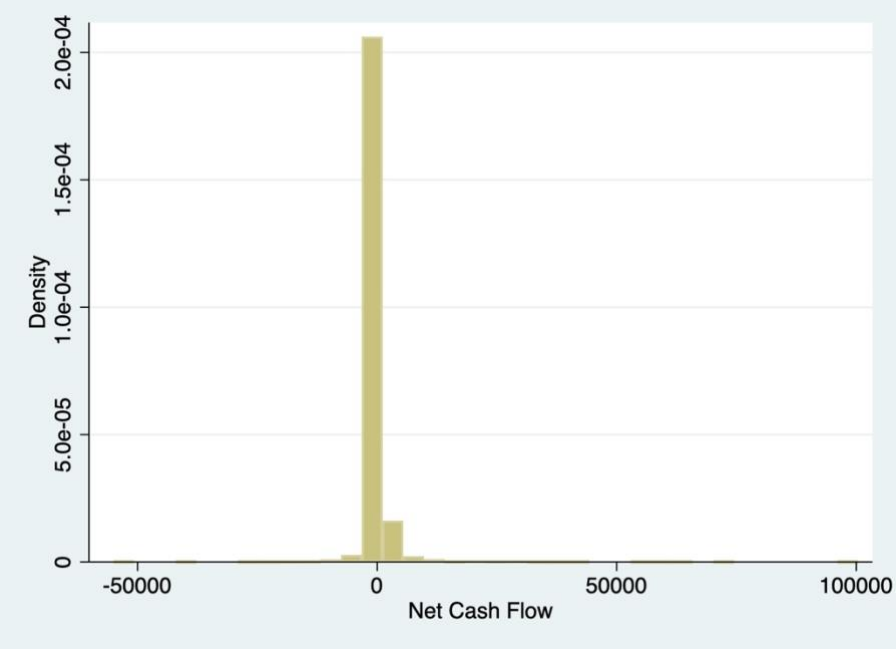
Note: 1 From this graph we see that this is not a normal distribution and skewed to the left

Figure 7 Histogram graph of Log of Investment



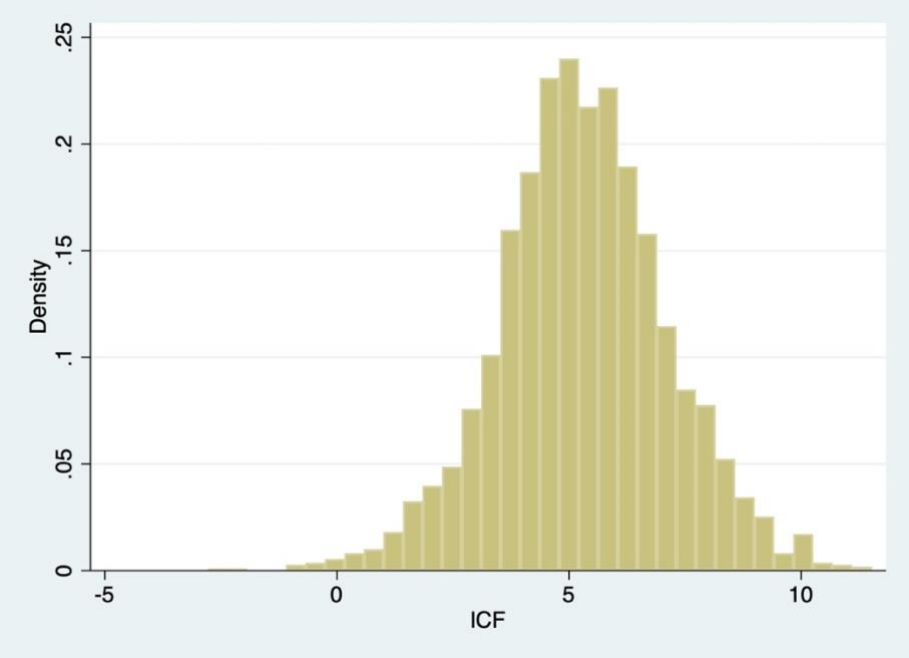
Note: 2 From this graph we see that the distribution looks more symmetric

Figure 8 Histogram graph of Net cashflow



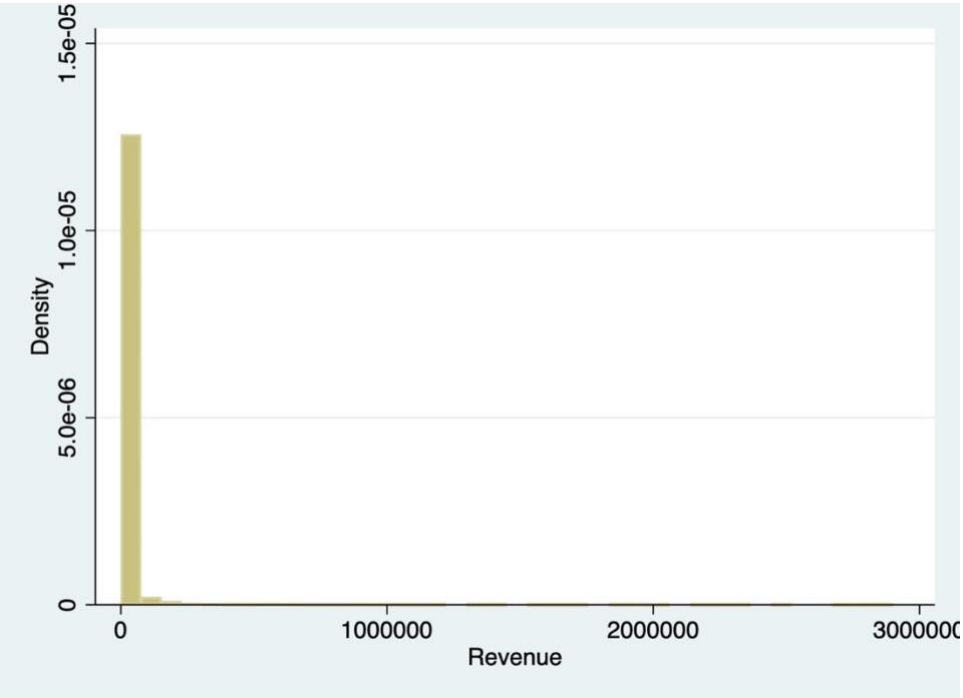
Note: 3 From this graph we see that this is not a normal distribution and skewed to the left

Figure 9 Histogram graph of log of Net cashflow



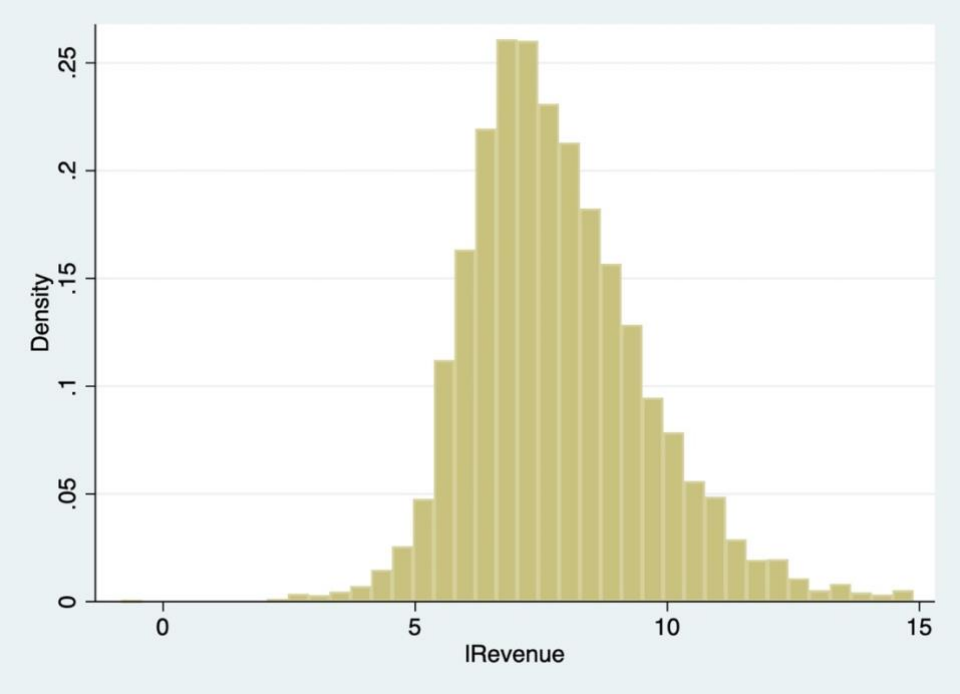
Note: 4 From this graph we see that the distribution looks more symmetric

Figure 10 Histogram graph of Revenue



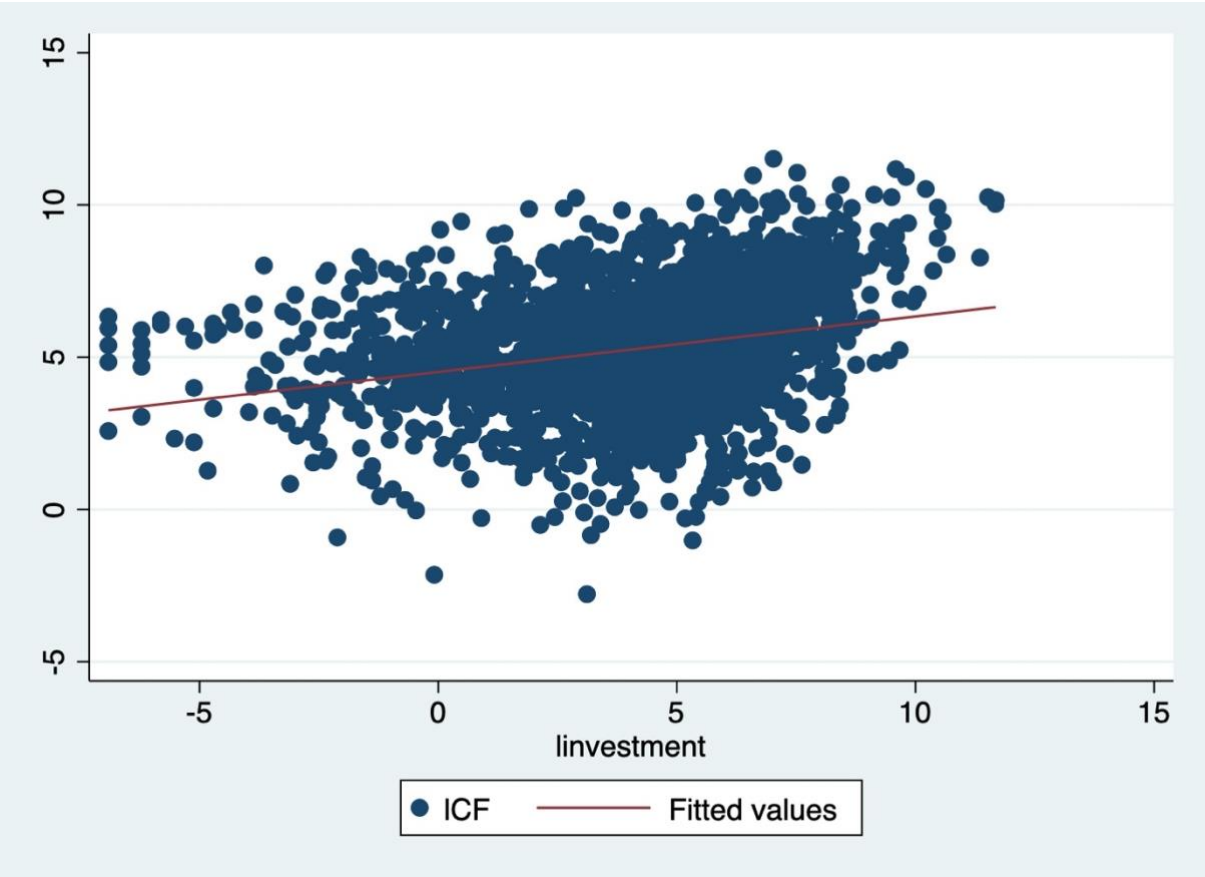
Note: 5 From this graph we see that this is not a normal distribution and skewed to the left

Figure 11 Histogram graph of log of Revenue



Note: 6 From this graph we see that the distribution looks more symmetric

Figure 12 Homoskedasticity Test



Note: 7 From this figure we see that actual observations are equally distributed around the fitted values

Tables

Table 1 Sample Distribution

Year		Investment	Net Cashflow	Leverage	Tobin's Q	Revenue
Pre Fintech era: Year 2000-2010	Mean	174.820	235.870	0.060	0.2	12,584.190
	Median	8.500	14.420	0.020	0.2	1,106.450
	St Dev	1,194.580	3,001.830	0.100	0.1	82,107.270
	Max	34,617.000	69,675.000	2.000	2.6	18,80,000.000
	Min	-	(41,450.000)	(0.020)	-	-
	N	2,797.000	2,797.000	2,797.000	2,797.000	2,797.000
Post Fintech Era: Year 2011-2020	Mean	830.690	321.330	0.060	0.1	29,318.080
	Median	118.000	29.220	0.010	0.1	2,658.050
	St Dev	4,618.970	3,752.470	0.090	0.2	1,69,168.440
	Max	1,18,199.590	1,00,400.970	0.670	7.2	29,00,000.000
	Min	-	(54,994.110)	-	-	(127.720)
	N	4,601.000	4,601.000	4,601.000	4,601.000	4,601.000
Total	Mean	582.720	289.020	0.060	0.2	22,991.410
	Median	48.260	21.090	0.010	0.1	1,968.220
	St Dev	3,729.370	3,487.750	0.090	0.2	1,42,866.640
	Max	1,18,199.590	1,00,400.970	2.000	7.2	29,00,000.000
	Min	-	(54,994.110)	(0.020)	-	(127.720)
	N	7,398.000	7,398.000	7,398.000	7,398.000	7,398.000

Note: 8 This table shares the sample distribution of the variables: Investment, Cashflow, revenue, leverage and Tobin's Q. Estimates are calculated from annual data, 2000–2020, for 1177 Firms listed in Shanghai Stock Exchange (a total of 7398 observations) and include a set of year dummies. Standard errors are given in parentheses. S.E.R. is the standard error of regression. From this table we see that our explanatory variable log of cash flow is highly statistically significant at 99% confidence level, where log of investment is the dependent variable. The data has been taken from WRDS Wharton Research Data Services. "WRDS" wrds.wharton.upenn.edu, accessed 2021-05-28

Table 2 Descriptive statistics across Industry Category

Industry		Agricultural,Forestry, Fishing	Construction	Manufacturing	Mining	Public Administration	Retail Trade	Services	Transportation & Public Utilities	Wholesale Trade	Total
Investment	Mean	133.420	981.020	490.410	1,523.550	80.320	1,684.970	306.140	753.540	261.130	582.720
	SD	418.000	3,004.680	3,165.350	6,241.960	174.270	10,520.070	586.110	3,575.590	706.470	3,729.370
	Max	2,187.000	35,044.000	118,199.590	71,709.000	1,240.000	102,982.000	4,784.700	42,115.860	5,668.300	118,199.590
	Min	-	0	-	-	-	0.010	-	-	-	-
	N	110.000	267.000	4,719.000	245.000	94.000	294.000	435.000	789.000	445.000	7,398.000
Net Cashflow	Mean	8.280	2,643.320	197.130	604.180	84.700	337.150	88.700	173.500	158.830	289.020
	SD	231.070	10,623.070	2,515.980	6,491.830	671.670	6,059.850	693.400	2,824.090	1,439.450	3,487.750
	Max	967.110	100,400.970	69,675.000	71,258.000	4,164.450	58,176.000	5,086.010	38,714.320	21,119.610	100,400.970
	Min	(885.150)	(54,994.110)	(41,450.000)	(20,373.000)	(1,390.940)	(51,756.000)	(3,472.170)	(26,299.680)	(7,318.870)	(54,994.110)
	N	110.000	267.000	4,719.000	245.000	94.000	294.000	435.000	789.000	445.000	7,398.000
Leverage	Mean	0.050	0.100	0.050	0.130	0.070	0.050	0.020	0.140	0.050	0.060
	SD	0.080	0.100	0.070	0.170	0.090	0.070	0.050	0.150	0.070	0.090
	Max	0.600	0.410	0.490	2.000	0.400	0.390	0.390	0.670	0.490	2.000
	Min	-	-	-	-	-	-	-	(0.020)	-	(0.020)
	N	110.000	267.000	4,719.000	245.000	94.000	294.000	435.000	789.000	445.000	7,398.000
Tobin's Q	Mean	0.210	0.100	0.160	0.190		0.130	0.150	0.150	0.140	0.150
	SD	0.140	0.110	0.210	0.200	0.160	0.090	0.120	0.100	0.100	0.180
	Max	1.140	0.930	7.160	1.920	0.760	0.690	0.820	0.910	0.700	7.160
	Min	-	-	-	-	-	-	-	-	-	-
	N	110.000	267.000	4,719.000	245.000	94.000	294.000	435.000	789.000	445.000	7,398.000
Revenue	Mean	1,310.350	133,353.500	15,098.790	27,131.890	2,056.550	125,129.960	3,530.220	14,509.220	14,556.190	22,991.410
	SD	1,784.760	255,985.150	107,655.560	50,006.690	2,707.020	486,589.800	6,045.060	40,483.860	37,157.240	142,866.640
	Max	13,304.71	1,610,000.000	2,460,000.000	283,797.00	10,164.010	2,900,000.00	38,399.510	336,692.750	432,131.34	2,900,000.00
	Min	-	-	(127.720)	-	23.530	161.020	-	-	-	(127.720)
	N	110.000	267.000	4,719.000	245.000	94.000	294.000	435.000	789.000	445.000	7,398.000

Note: 9 Number of firms is 1177 listed in the Shanghai Stock Exchange. The data has been taken from WRDS Wharton Research Data Services. "WRDS" wrds.wharton.upenn.edu, accessed 2021-05-2

Table 3 Pearson's Correlation Table

	linvestment	lCF	lRevenue	Leverage	Tobinsq
linvestment	1.000				
lCF	0.334*	1.000			
lRevenue	0.338*	0.650*	1.000		
Leverage	0.012	0.283*	0.270*	1.000	
Tobinsq	-0.093*	-0.206*	-0.313*	-0.112*	1.000

Note: 10 Correlation table to measure the correlation of the dependent variable with our explanatory variables. Number of firms is 1177 listed in the Shanghai Stock Exchange. The data has been taken from WRDS Wharton Research Data Services. "WRDS" wrds.wharton.upenn.edu, accessed 2021-05-28.

Table 4 Regression Analysis

	A	B	C	D
VARIABLES	linvestment	linvestment	linvestment	linvestment
lCF	0.542***	0.568***	0.554***	0.346***
	(0.024)	(0.025)	(0.025)	(0.031)
Leverage		-1.904***	-1.988***	-2.811***
		(0.498)	(0.499)	(0.496)
Tobins Q			-0.716***	-0.234
			(0.230)	(0.231)
lRevenue				0.367***
				(0.033)
Constant	0.684***	0.661***	0.844***	-1.031***
	(0.127)	(0.127)	(0.140)	(0.217)
Observations	4,204	4,204	4,204	4,202
R-squared	0.111	0.115	0.117	0.142

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: 11 Regression Analysis with our main explanatory variable Log of Investment. We have taken other variables step by step to see the regression result with our dependent variable. Number of firms is 1177 listed in the Shanghai Stock Exchange. The data has been taken from WRDS Wharton Research Data Services. "WRDS" wrds.wharton.upenn.edu, accessed 2021-05-28.

Table 5 Breusch-Pagan Test & White Test

Panel A: Breusch-Pagan Test

Ho: Constant variance

Variables: fitted values of linvestment

Homoskedasticity Test	Test Stastistic	P-Value	Decision
Stata test (F-test)	0.267	0.2238	Fail to Reject

Panel B: White Test

White's test for Ho: homoskedasticity

Against Ha: unrestricted heteroskedasticity

Source	chi2	df	p
Heteroskedasticity	16.7	14	0.2723
Skewness	244.03	4	0
Kurtosis	10.9	1	0.001
Total	271.63	19	0

Homoskedasticity Test	Test Stastistic	P-Value	Decision
Stata test (Chi-squared)	16.7	0.2723	Fail to Reject

Note: 11 We have done the Breusch-Pagan Test & White Test to test the heteroskedasticity of the variable. Estimates are calculated from annual data, 2000–2020, for 1177 Firms listed in Shanghai Stock Exchange (a total of 7398 observations) and include a set of year dummies. Standard errors are given in parentheses. S.E.R. is the standard error of regression. From this table we see that our explanatory variable log of cash flow is highly statistically significant at 99% confidence level, where log of investment is the dependent variable. The data has been taken from WRDS Wharton Research Data Services. "WRDS" wrds.wharton.upenn.edu, accessed 2021-05-28.

Table 6 Regression Analysis with Interaction term Prefintech Era and Log of Cashflow

Source	SS	df	MS	Number of obs	=	4,202.000
				F(5, 4196)	=	219.220
Model	7,617.908	5.000	1,523.582	Prob > F	=	0
Residual	29,161.928	4,196.000	6.950	R-squared	=	0.207
				Adj R-squared	=	0.206
Total	36,779.836	4,201.000	8.755	Root MSE	=	2.636

linvestment	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
lCF	0.436***	0.030	14.550	0.000	0.377	0.495
lRevenue	0.290***	0.032	9.160	0.000	0.228	0.352
leverage	-2.193***	0.478	-4.590	0.000	-3.130	-1.255
tobinsq	0.063	0.223	0.280	0.778	-0.374	0.499
Y1lCF	-0.307***	0.017	-18.570	0.000	-0.339	-0.274
_cons	-0.427**	0.211	-2.020	0.043	-0.841	-0.013

Note: 12 Regression Analysis is done with interaction term Prefintech era and log of cashflow. The other interaction term postfintech era and log of cashflow is omitted by stata due to multicollinearity, hence not showing in the result. Estimates are calculated from annual data, 2000–2020, for 1177 Firms listed in Shanghai Stock Exchange (a total of 7398 observations) and include a set of year dummies. Standard errors are given in parentheses. S.E.R. is the standard error of regression. From this table we see that our explanatory variable log of cash flow is highly statistically significant at 99% confidence level, where log of investment is the dependent variable. The data has been taken from WRDS Wharton Research Data Services. "WRDS" wrds.wharton.upenn.edu, accessed 2021-05-28.

Table 7 Regression Analysis and Robustness check

VARIABLES	POLS linvestment	POLS linvestment	POLS (Robust) linvestment	POLS (Cluster Robust) linvestment
lCF	0.346***	0.247***	0.247***	0.247***
	(0.031)	(0.028)	(0.029)	(0.029)
Leverage	-2.811***	-2.384***	-2.384***	-2.384***
	(0.496)	(0.474)	(0.495)	(0.501)
Tobins Q	-0.234	0.205	0.205	0.205
	(0.231)	(0.207)	(0.157)	(0.160)
lRevenue	0.367***	0.400***	0.400***	0.400***
	(0.033)	(0.031)	(0.032)	(0.034)
Constant	-1.031***	-3.262***	-3.262***	-3.262***
	(0.217)	(0.477)	(0.452)	(0.453)
Year Effect	No	Yes	Yes	Yes
Industry Effect	No	Yes	Yes	Yes
Observations	4,202	4,202	4,202	4,202
R-squared	0.142	0.329	0.329	0.329

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: 13 We have declared our data as panel data to Stata and tested the pooled OLS with Year and Industry dummy variables and checked the robustness and cluster robustness. Estimates are calculated from annual data, 2000–2020, for 1177 Firms listed in Shanghai Stock Exchange (a total of 7398 observations) and include a set of year dummies. Standard errors are given in parentheses. S.E.R. is the standard error of regression. From this table we see that our explanatory variable log of cash flow is highly statistically significant at 99% confidence level, where log of investment is the dependent variable. The data has been taken from WRDS Wharton Research Data Services. "WRDS" wrds.wharton.upenn.edu, accessed 2021-05-28.

Table 8 Regression Analysis using various methods

	FD	FE	RE
	J	K	L
VARIABLES	D.linvestment	linvestment	linvestment
lCF	0.068**	0.153***	0.202***
	(0.034)	(0.032)	(0.030)
Leverage	0.757	-0.779	-1.232**
	(1.253)	(0.812)	(0.622)
Tobin's Q	0.676	0.125	0.124
	(0.856)	(0.288)	(0.167)
lRevenue	0.035	0.025	0.292***
	(0.200)	(0.112)	(0.048)
Constant	0.409	1.058	1.211***
	(0.254)	(0.965)	(0.346)
Year Effect	Yes	Yes	Yes
Industry Dummy Effect	FD	FE	RE
Observations	1,498	4,202	4,202
R-squared	0.039	0.278	
Number of Industry		1,090	1,090
Robust standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Note: 14 Regression Analysis has been done to see if which one describes our data better among First differencing, fixed effects and random effect. Estimates are calculated from annual data, 2000–2020, for 1177 Firms listed in Shanghai Stock Exchange (a total of 7398 observations) and include a set of year dummies. Standard errors are given in parentheses. S.E.R. is the standard error of regression. From this table we see that our explanatory variable log of cash flow is highly statistically significant at 99% confidence level, where log of investment is the dependent variableThe data has been taken from WRDS Wharton Research Data Services. "WRDS" wrds.wharton.upenn.edu, accessed 2021-05-28.

Table 9 Hausman Test between Fixed Effect & Random Effect method

Haussman test

Test: Ho: difference in coefficients not systematic

chi2(13) = (b-B)'[(V_b-V_B)^(-1)](b-B)

= 77.53

Haussman test	Chi2	P-Value	Decision
Stata test (F-test)	77.53	0.0000	Reject the Null

Note: 15 Hausman test to check which method is better among Fixed Effect and Random effect. Estimates are calculated from annual data, 2000–2020, for 1177 Firms listed in Shanghai Stock Exchange (a total of 7398 observations) and include a set of year dummies. Standard errors are given in parentheses. S.E.R. is the standard error of regression. From this table we see that our explanatory variable log of cash flow is highly statistically significant at 99% confidence level, where log of investment is the dependent variable. The data has been taken from WRDS Wharton Research Data Services. "WRDS" wrds.wharton.upenn.edu, accessed 2021-05-28.

Section 10: Appendix

Table 10 Omitted Variable Bias Table

	Corr(x1, x2) > 0	Corr(x1, x2) < 0
β2 > 0	Positive Bias	Negative Bias
β2 < 0	Negative Bias	Positive Bias

Table 11 Definitions of the Variables

Variable	Definition	Calculated as
Investment*	cash paid by the company towards the purchase of fixed assets (property, plant or equipment).	Investments = Total Investment
Cash Flow*	the amount of cash (currency) that is generated or consumed in the firm	Net Cash Flow = Total of Financing activities, Investing activities and Operating Activities
Revenue**	sales of goods and services to third parties relating to the normal industrial activities of the company.	Net sales, as reported in annual financial statements
Leverage***	the amount of debt used to finance assets	Total debt/Total Asset
Tobin's Q****	Tobin's Q is the log of Market value of assets/Assets, where market value of assets is defined as (Assets – Book value of equity + Market value of equity).	Log(Total market value of firm+Liabilities/Total Asset value of firm)

*Note: 17 *The definitions are based on Carpenter and Guariglia (2007)*

*** The definition is based on Rajan and Zingales (1995)*

**** The definition is based on Lang et al. (1996)*

*****The definition is based on Prefect and Wiles (1994)*