

Essays in Empirical Finance

by

Thi Xuan Nhu Nguyen

A thesis submitted for the award of the Degree of

Doctor of Philosophy

at the

Department of Accountancy and Finance

Otago Business School, University of Otago

Dunedin, New Zealand

April 2020

Abstract

We are all aware of the recent world health crisis, namely COVID-19. Every single person experiences the direct impact of this pandemic on their personal life and day-to-day activities. For the first time in our lives, we see government intervention at a global scale with nationwide lockdowns and other preventive measures that may change people's habits and behaviors. As never before, we feel the immense role of government in our lives that impacts our future. Therefore, the topic of state ownership and political connectedness found throughout this thesis is worthwhile for investigation to embrace the role of national government and its relationship to company performance through share prices, firm-level innovation for future growth and sustainability, liquidity and survival opportunities.

From an economic perspective, we see many small businesses collapsing without government support, and we have witnessed the historic price crash on the futures contract for WTI crude oil to as low as -$37.63 per barrel on April 21, 2020 due to travel bans. We have also experienced share prices plummeting due to worldwide instability. Differences in the countries' policies have resulted in different outcomes for each country. Surprisingly enough, neither Europe nor the US is dealing with the crisis better than smaller countries that have prompt support from government (for example, New Zealand) or Asian countries (e.g., Vietnam) with its records of strong involvement into company

operations. In this sense, the current reality has proven that there is something to learn from smaller countries that deserve attention from academics as a prospective viable economic model where the government has significant influence on businesses. Vietnam is a good example of a small resilient country, going through multiple financial crises with minimal impacts and fast post-crisis recovery. China is chosen for its significant influence on the world's economic map. Both countries feature prominent government involvement into company operations and represent an emerging market in Asia with impressive economic growth in recent years.

This thesis comprises three empirical essays that explore asset pricing models (Chapters 2 and 3) and firms' value in the emerging markets of Asia where the state is involved actively in financial market development and capital allocation (Chapter 4). Starting from Chapter 2 with different factor models and state ownership, this thesis further explores asset pricing models with time-varying factor loading in Chapter 3 and extends the understanding of state ownership to political connectedness in Chapter 4.

Chapter 2 investigates the applicability of different Fama-French (FF) factor models in Vietnam, examines the value factor redundancy and explores the choice of the profitability factor. Empirical evidence shows that the FF five-factor model has more explanatory power than the FF three-factor model. The value factor remains important after inclusion of profitability and investment factors. Operating profitability performs

better than cash and ROE profitability as a proxy for the profitability factor in the FF factor modeling. The value factor and operating profitability have the biggest marginal contribution to a maximum squared Sharpe ratio for the five-factor model's factors, highlighting HML non-redundancy in describing the stock returns in Vietnam.

Chapter 3 studies factor models using both the time-series factors of the Fama and French (2015) approach and cross-sectional factors from the Fama-Macbeth (1973) methodology. The work provides evidence that the cross-sectional factor models have less explanatory power than the time-series factor models with time-varying factor loadings. The superiority of the time series models with time-varying loadings is still prevalent for the Vietnamese market regardless of the profitability factor choice. Chapter 2 is further supported by Chapter 3, as the latter shows that operating profitability still performs better than cash and ROE profitability as a proxy for the profitability factor in the models with time-series and cross-sectional factors.

Chapter 4 extends the understanding of state ownership by exploring state impact on company performance and value. Using innovation value-added growth (IVAG), this chapter studies how political connectedness affects firm's efficiency of capital allocation. By differentiating different forms of political connectedness, the study shows that companies with strong informal political ties take less financial leverage than firms with weak connections, but it is the formal political connection that determines the survivability of a company. By

designing a comprehensive innovation index for innovation activities this study provides evidence that informal political interference has stronger influence on corporate innovation activities than formal political ties. By exploring the differences between internally driven innovation activities and market-led innovation performance, this study documents the stronger effects of political connectedness on innovation activities than on innovation performance. This chapter also sheds light on capital allocation by providing evidence that Chinese firms without government-appointed CEOs appear to allocate capital more efficiently than the firms with government-appointed CEOs.

Acknowledgement

First of all, I would like to express my sincere gratitude to my supervisors, Professor Jin E. Zhang, Dr. Jing A. Zhang and Dr. Xinfeng Ruan. Thank you for your understanding, your encouragement and for challenging me to be my best. I would not now be finishing my thesis without your continuous guidance and endless support.

Secondly, I would like to convey my appreciation to my colleagues at the Department of Accounting and Finance for their support and their always helpful comments and suggestions. These include, among others, Associate Professor Rosalind Whiting, Professor Timothy Falcon Crack, Dr. Gumeet Bhabra, Dr. Helen Roberts, Dr. Eric Tan, Dr. Dinithi Ranasinghe, and Dr. Duminda Kuruppuarachchi, as well as group members, Fang Zhen, Sebastian Gehricke and Tian Yue, and proof editor, Marianne Lown.

Thirdly, I would like to earnestly thank my colleagues at Pacific International Hotel Management School (PIHMS) for their encouragement, educational leave and financial support for my final year of the PhD study. These include PIHMS CEO Bill McCallum, Board of Directors member Christine McCallum, Deputy CEO James Cunningham, HR Manager Rose Ellis, Dr. Jan Lockett-Kay, Jon Walsh, Murray Thompson, and Mary Hutching. Without your understanding and support, it would not have been possible to complete this journey.

Fourthly, my heartfelt gratefulness to my friends, Thanh Phuong Cao and Nga Blanchard, who provided every support they could to help me during my most challenging times in New Zealand.

Lastly, I wish to acknowledge my family members, who have supported and encouraged me through these years of study. A great appreciation to my mother for her patience and my dear sister for taking care of our mother, who suffered from dementia, while I was far away. A deep gratitude extended to my uncle, Thanh Lich Le, and my aunt, Thi Mai Huong Phan, for their emotional and financial support during my settlement in New Zealand. A special thanks extended to my son Huy Khoa Ha for being my primary motivation to study. I am so proud of the young man he has become. And finally to my husband, Richard R. Ryan, for the encouragement, patience and support which allowed me to entirely concentrate on my PhD thesis during the final months of intense research.

Contents

Abstract ..... **i**

Acknowledgement ..... **iv**

1 Introduction **1**

1.1 Background 1

1.2 Structure of this PhD thesis 4

1.3 Contribution of this PhD thesis 6

2 Choosing Factors for the Vietnamese Market **9**

2.1 Introduction 9

2.2 Vietnam's stock market and its unique feature 17

2.3 Data and methodology 18

2.3.1 Data 18

2.3.2 Fama-French five-factor construction 20

2.3.2.1 *Market factor (MKT)* 21

2.3.2.2 *Size factor (SMB)* 21

2.3.2.3 *Value factor (HML)* 21

2.3.2.4 *Operating, cash and ROE profitability factors (RMW, RMWC and RMWR)* 22

2.3.2.5 *Investment factor (CMA)* 23

2.3.3 Factor model tests 24

2.3.3.1 *Left-hand-side (LHS) approach for nested models* 24

2.3.3.2 *Right-hand-side (RHS) approach for non-nested models* 26

2.3.4 Left-hand-side (LHS) portfolio characteristics 27

2.4 Empirical results on asset pricing tests 30
2.5 Is the value factor (HML) redundant? 35
2.6 Operating, cash or ROE profitability? 37
2.7 Robustness tests 40
2.8 Conclusion 42

3 Comparing Cross-Section and Time-Series Factor Models in Vietnam 60

3.1 Introduction 60
3.2 Factor model framework 67
3.2.1 Application of the Fama-Macbeth cross-sectional approach to the Fama-French time-series regression setting 67
3.2.2 Test metrics 71
3.3 Data selection, factor design and portfolio construction 73
3.3.1 Data 73
3.3.2 Cross-section factor construction 75
3.3.2.1 *Portfolio characteristics – MC, BM, Profit and INV* 75
3.3.2.2 *Returns on a standard portfolio (Rz)* 76
3.3.2.3 *Returns on size factor, value factor and investment factor* 77
3.3.2.4 *Returns on operating, cash and ROE profitability factors* ...77
3.3.3 Time-series factor design 77
3.3.3.1 *Market factor (MKT)* 77
3.3.3.2 *Size factor (SMB)* 78
3.3.3.3 *Value factor (HML)* 78
3.3.3.4 *Operating, cash and ROE profitability factors (RMW, RMWC and RMWR)* 78
3.3.3.5 *Investment factor (CMA)* 79

3.3.4 Left-hand-side (LHS) portfolios 80
3.4 Empirical results on asset pricing tests 82
3.5 Operating, cash or ROE profitability? 87
3.6 Conclusion 89

4 How Do Firms Derive Value From Political Connectedness? The Effect of Capital Allocation and Innovation 104

4.1 Introduction 104
4.2 Literature review and hypothesis development 110
4.2.1 Political connectedness and innovation 113
4.2.2 Political connectedness and capital allocation 118
4.2.3 Political connectedness and firm performance 122
4.3 Sample and variable operationalization 130
4.3.1 Data and sample 130
4.3.2 Measures of political connectedness 131
4.3.3 Company performance measures, innovation index and other variables 134
4.3.4 Empirical model for political connectedness, innovation and company performance 139
4.3.5 Innovation value-added growth (IVAG), investment model setup for capital allocation and political connectedness 140
4.4 Empirical findings 144
4.4.1 Political connectedness and innovation 144
4.4.2 Political connectedness and the efficiency of capital allocation . 145
4.4.3 Political connectedness and company performance 147
4.4.3.1 *Political connectedness and leverage* 147
4.4.3.2 *Political connectedness and likelihood of survival* 149

4.5 Conclusion 151

5 Conclusion 172

BIBLIOGRAPHY 176

List of Tables

Table 2.1 Sample coverage for the Vietnamese stock market 44

Table 2.2 Summary statistics for Fama-French factors for Vietnamese stocks 45

Table 2.3 Characteristics of value-weighted single-sorted portfolios 47

Table 2.4 Characteristics of double-sorted portfolios 48

Table 2.5 Summary results of the factor models 50

Table 2.6 Testing a Fama-French factor by regressing the remaining variables of the five-factor model 53

Table 2.7 Characteristics of portfolios sorted on a combination of size and operating profitability, cash profitability or ROE profitability 54

Table 2.8 Summary of regression results using cash profitability and ROE profitability factors 55

Table 2.9 Testing the profitability factors 57

Table 2.10 Testing the redundancy of the value factor using cash profitability (Fama and French, 2018; Ball et al., 2015) and ROE profitability (Hou et al., 2019) 58

Table 3.1 Sample coverage for the Vietnamese stock market 91

Table 3.2 Summary statistics for Fama-French time-series and cross-section factors for Vietnamese stocks 92

Table 3.3 Explaining excess returns of 27 characteristic portfolios....94

Table 3.4 Explaining returns of each set of characteristic portfolios in excess *of Rf*....97

Table 3.5 Explaining returns of each set of characteristic portfolios in excess *of Rz*....101

Table 4.1 Univariate statistics for the pooled sample....154

Table 4.2 Univariate statistics by political connectedness....156

Table 4.3 Political connectedness and innovation activities 158

Table 4.4 Political connectedness and innovation performance....161

Table 4.5 The effect of political connectedness on capital allocation....164

Table 4.6 Political connectedness and leverage....166

Table 4.7 Political connectedness and likelihood of survival169

CHAPTER 1

INTRODUCTION

1.1 Background

Since they were introduced over the past 50 years, Fama-Macbeth cross-sectional regressions have become a standard tool in asset pricing testing that links the average stock returns to its characteristics. Thirty years later, Fama and French (1993) introduced time-series three-factor models to explain the variation in stock returns. Until recently, it has become clear that there is a wide array of asset pricing anomalies that these models cannot explain. The new five-factor model (Fama and French, 2015) tries to explain the relationship between these new factors (profitability and investment) and stock expected returns. There are now debates over which factors to use in the asset pricing models (Fama and French, 2018; Hou et al., 2019, Ball et al., 2015), especially with regard to the controversy around the choice of a proxy for the profitability factor and the issue of value factor redundancy (Fama and French, 2015). What is more, findings of Fama and French (2017) suggest that Japanese stock returns have little relation to new factors. Cakici (2015) reports similar results and concludes that with the inclusion of the two new factors, the value factor becomes redundant in North American, European and

global portfolios, but not in the Asia Pacific region. All of the aforementioned literature lends this work grounds to believe that the performance of the factor models and the choice of a superior factor model are specific to a country or a region.

I am particularly interested in the Vietnamese stock market since there is no research exploring factor models for an emerging market; Chapter 2 addresses this gap in current asset pricing literature. My research provides new evidence on value factor non-redundancy, operating profitability supremacy and Fama-French five-factor model superiority for the region. There also has not been much research in the context of state ownership and stock returns, which I consider as an important factor for a transitional economy, like Vietnam, that is not fully integrated with the global financial market. Hence, I also investigate state ownership in conjunction with factor models in Chapter 1 of this thesis.

In Chapter 3, following the latest development in the asset pricing literature (Fama and French, 2019), I extend factor models to allow time-varying factor loadings for the purpose of assessment of different model performance in predicting stock returns. A new technique of testing the Fama-Macbeth (1973) approach and the Fama-French (2015) methodology will be applied for testing the Vietnamese stock market. The Fama-French five-factor model (2015, 2018) with time-series factors will be challenged against the models that use cross-section factors. Because this methodology of testing cross-setional factors in time-series models has been developed in 2019 and tested only on the US market (Fama and French, 2019), this research will provide further evidence on the models in an emerging market of Asia.

Given a special interest in state-owned enterprises (SOEs) due to my previous work experience as an expert in the R&D Department of the Hanoi Stock Exchange, I decided to extend Chapter 2 to analyze state interference into firms' business. Hence, Chapter 4 of my thesis focuses on political connectedness, firms' value, innovation and capital allocation.

In recent decades, the effects of political connections to the business world have attracted substantial attention from the public, academics and regulators. It is believed that corporate connectedness with government plays a significant role in a firm's value creation process and its performance outcomes, which in turn, have macroeconomic implications for the country's long-term growth. In this study, I examine different types of political connections, ranging from formal relationships (CEO appointment by government and state ownership) to informal ties with government. There is no prior study that has investigated such aspects of political interference and this approach allows me to precisely identify which form of political connectedness is affecting company performance and its magnitude.

Although the topic of resource allocation has been extensively explored in the past, researchers have had challenges in developing methodologies to measure unobservable capital investment efficiency. In addition, the study of whether government direct or indirect interference distorts corporate investment behavior and affects firms' innovation activities and performance has not been explored yet. Given the scarce literature in this area, I investgate the value that Chinese firms can derive from political influence, particularly innovation and other company performance.

1.2 Structure of this PhD thesis

The thesis consists of five chapters that cover three empirical studies. The structure of the thesis is outlined in Figure 1.1.

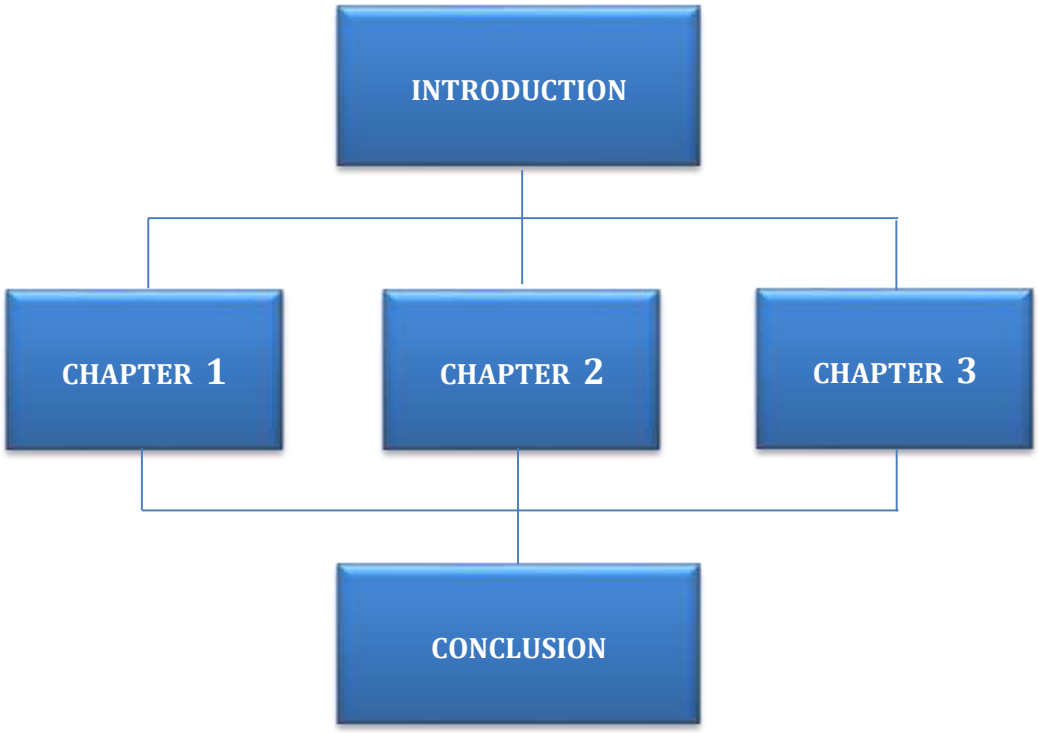


Figure 1.1: Structure of this PhD thesis

Chapter 1 provides the overview of the thesis, including research background and contribution, as well as the structure of the entire thesis. Chapters 2 to 4 comprise three empirical studies related to the emerging markets in Asia, i.e., China and Vietnam.

Chapter 2 and Chapter 3 decide which asset pricing model would provide the best description of average returns of Vietnamese equities among all

factor models analyzed, with the former focusing on determining which type of an asset pricing model and the latter on the methodology of constructing model's factors and their associated factor loadings. The discussion of the value factor redundancy and the investigation of different measures of the profitability factors will be conducted in both chapters.

Chapter 2 and Chapter 4 are tied by the examination of political connectedness, with the former focusing on formal political connections, i.e., state ownership, and the latter extending the analysis to both formal and informal forms of political linkage.

Major findings and overall conclusions are summarized in Chapter 5.

1.3 Contribution of this PhD thesis

Chapter 2 makes several contributions to the current asset pricing literature. First, this is a study on the explanatory power of the FF five-factor model as compared with the traditional model of asset pricing of the Fama and French three-factor model in the context of an emerging stock market in Vietnam. Second, the study reveals some new evidence on the ongoing controversy regarding the redundancy of the value factor in the presence of profitability and investment factors in the model (Fama and French, 2015, 2017, 2018; Cakici, 2015; Chiah et al., 2016). Third, this research provides further evidence on the controversy regarding the choice of a profitability proxy to construct the profitability factor in the five-factor model (Fama and French, 2017, 2018; Ball et al., 2015; Hou, Mo, Xue and Zhang, 2019) for Asia. Lastly, this study provides new evidence on the performance of the asset pricing models using different profitability measures for state owned entreprises. There also has not been much research in the context of state ownership with the respect to stock returns, which I consider as an important factor for a transitional economy, like Vietnam. It is crucial to test this market as an example of the emerging stock market in order to come up with the conclusion of whether the FF (2015) five-factor model's superior performance is consistent regardless of the capital market development stage, economic conditions and political system.

Chapter 3 makes two contributions to the current asset pricing literature. First, this study presents new evidence about the superiority of the time-series factor models with cross-sectional factor loadings in an emerging market. These results urge the need of further verification of results evident in developed countries to be applied to developing markets (Fama and French, 2019). Second, the study provides further evidence regarding the choice of the profitability factor in the presence of different approaches of testing the factor models (Fama and French, 2006, 2017, 2018; Ball et al., 2015; Hou, Mo, Xue and Zhang, 2019). My results show that operating profitability is superior in the Fama-French five-factor model for Vietnamese asset pricing testing regardless of the choice between time-series or cross-sectional factors for the models with constant regression slope factor loadings and time-varying factor loadings.

By distinguishing different forms of political connections, Chapter 4 extends the analysis in Chapter 2 on state ownership to include analysis of informal political ties. With the focus on the value that firms can obtain from political connectedness, this chapter provides evidence on the dynamics of an informal political network on firm performance and risk-taking behavior, including innovation, leverage and likelihood of survival. By augmenting the existing investment models to measure the quality of value-added growth through innovation, this study delivers empirical results on the investment efficiency and capital allocation of Chinese firms. The results show the misallocation of resources by the

firms that have a CEO appointed by the government. By distiguishing various forms of political connectedness, this study shows different effects of political interference on the risk-taking behavior and performance of a firm, represented by leverage (short-term risk), innovation (medium-term risk) and survivability (long-term risk). The findings of Chapter 4 provide important implications for policy makers to improve market-oriented innovation mechanisms through informal channels of government interference with firms that lead to more successful outcomes for companies in Asia.

CHAPTER 2

CHOOSING FACTORS FOR THE VIETNAMESE STOCK MARKET

This chapter supersedes the prior working paper titled "Fama French Five-Factor Model: Evidence from Vietnam" presented at the 2016 New Zealand Finance Colloquium, 11-12 February 2016, University of Otago, Queenstown, New Zealand (https://www.nzfc.ac.nz/archives/2016/papers/updated/49.pdf).

2.1 Introduction

Motivated by the recent Fama and French's (2018) analysis of a metric for ranking asset pricing models, this chapter examines the Fama-French (FF hereafter) multi-factor models (Fama and French, 1993, 2015) in asset pricing for the equity market of Vietnam. This new approach is supposed to overcome the challenge in choosing the best model among competing models with different factors in light of different anomalies previously discovered in international markets. This study adds to current literature further empirical evidence from a developing country that the FF five-factor model (Fama and French, 2015) outperforms the traditional FF three-factor model (Fama and French, 1993), which is consistent with Fama and French's (2017)

findings in the stock markets of 25 developed countries. However, this study's findings are contrary to Fama and French's (2015, 2018) conclusion about the redundancy of the value factor (i.e., the book-to-market ratio) in the new five-factor model and the superiority of the cash profitability factor as the variable used to construct profitability factors. This study aims to add to the international empirical literature on asset pricing tests with a detailed investigation of the Vietnamese stock market, the youngest in the ASEAN region, where the economy has gone through a massive privatization process over the past decade. This work entails a study of all major asset pricing models, both traditional and new, for the fast-growing market of Vietnam that features different financial market development conditions as well as a different political system. It is crucial to test this market as an example of the emerging stock market in order to come up with the conclusion of whether the FF (2015) five-factor model's superior performance is consistent regardless of the capital market development stage, economic conditions and political system.

Over the past 20 years of the FF three-factor model, it has become clear that there is a wide array of asset pricing anomalies that these models cannot explain. Among the anomalies – such as momentum (Jegadeesh and Titman, 1993), return reversal (Huang, Liu, Rhee and Zhang, 2010), liquidity risk (Pastor and Stambaugh, 2003) and idiosyncratic volatility (Ang, Hodrick, Xing, and Zhang, 2006) – there are profitability and investment patterns that burden different models from explaining the

cross-sectional variation in expected returns (Hou, Xue & Zhang, 2015; Novy-Marx, 2013; Titman et al., 2004). Hou et al. (2015, 2019) provide evidence that the *q*-factor model (with profitability and investment factors) outperforms the FF three-factor (1993) and Carhart four-factor (1997) models in explaining the returns of a broad list of anomalies.

The new five-factor model (Fama and French, 2015) tries to explain the relationship between these new variables and stock expected returns from the dividend discount model perspective and the valuation theory. Fama and French (2015) suggest using profitability and investment factors, in addition to existing factors (market, size and value), to capture patterns in average stock returns. Fama and French's (2015) findings also suggest that the value factor (i.e., the book-to-market ratio) is redundant for explaining returns in the five-factor model that performs better in terms of describing the expected stock returns.

However, when testing on international markets, Fama and French (2017) find evidence that the five-factor model performs better in North America and Europe and for big stocks. Their findings also suggest that Japanese stock returns have little relation to new factors. Cakici (2015) reports similar results. Cakici compares the three-factor, four-factor and five-factor models on 23 developed stock markets and finds strong evidence for the five-factor model in North America, Europe and the global market. The author concludes that with the inclusion of the two new factors, the value factor becomes redundant in North American, European and global portfolios, but not in the Asia Pacific region. Hence,

it is more appropriate to assess the performance of the FF five-factor model at the country or regional level. Fama and French (2018) argue that the performance of the five-factor model is sensitive to the choice of the profitability factor, which improves the description of average portfolio returns. They provide evidence that cash profitability (Ball et al., 2015) would be more appropriate than operating profitability in the five-factor model. On the other hand, Hou, Mo, Xue and Zhang (2019) suggest that the *q*-factor model outperforms the FF five-factor model (2015).

Fama and French (2018) using the maximum squared Sharpe ratio of intercepts and a model's factors (Barillas and Shanken, 2017) document the superiority of cash profitability over operating profitability in the five-factor modeling. Furthermore, their results provide evidence that the value factor adds no marginal contribution to the maximum squared Sharpe ratio of the five-factor model's model with the cash profitability factor.

Little, if any, has been published on the choice of the value and profitability factors for an emerging market and the explanatory power of the FF five-factor model. Heaney, Koh and Lan's (2016) findings show that the correlation between asset returns and the market-to-book firm characteristic is sensitive to an asset pricing model used in risk adjustment and this firm property is absorbed by the FF five-factor model, suggesting the latter model might be a better choice for asset pricing tests for the Australian equity market. Yet, there is no research

exploring the question of the choice of factors in FF multi-factor models over the traditional models for an emerging market; hence, this chapter addresses this gap in the literature.

Despite the considerable literature on emerging asset pricing with CAPM, there is limited empirical research that has applied the three-factor model to emerging markets. Notably, there is a study on ASEAN markets that uses Fama-French three-factor model in the analysis of five markets, namely Malaysia, Singapore, Thailand, Indonesia, and the Philippines (Nartea, Bert and Lee, 2011). By providing evidence of a positive relationship between idiosyncratic volatility and stock returns in Malaysia, Singapore, Thailand and Indonesia, the authors claim that generalizing empirical results obtained in developed stock markets to new and emerging markets could be potentially misleading. Nartea, Wu and Liu (2013) also suggest verifying the findings evident in developed countries for emerging markets at a country level due to distinctive features of each country when analyzing idiosyncratic volatility for the Chinese stock market. There are other papers that deal with the asset pricing issue in Asian markets. Momentum and information uncertainty have been identified as pricing factors (Cheema and Nartea, 2014). Volatility or MAX effect are also under the three-factor model's analysis for Hong Kong (Nartea, 2013) and South Korean markets (Nartea, 2014), respectively. There is no evidence of the superiority of the newly established five-factor model (Fama and French, 2015) in South East Asia or any investigation on a factor modeling in a setting for a country

in Asia. This study provides new evidence on the value factor non-redundancy, operating profitability (Novy-Max, 2013) supremacy and Fama-French five-factor model superiority for the region.

Literature studying Vietnam's stock market is sparse. Fang, Wu and Nguyen (2017) study the three-factor model for the stock market in Vietnam using idiosyncratic risk-sorted portfolios. Notably, they only test the three-factor model on portfolios formed on size and book-to-market. While their study finds support for the three-factor model, the methodology of creating three factors does not follow Fama and French's (1993) methodology. In addition, their model's test results suggest that size and value factors fail to explain the returns of value-weighted portfolios sorted on idiosyncratic risk. As with most findings in the finance literature, some studies also document other capital anomalies, such as liquidity, in Vietnam. Batten et al. (2014) show a positive relationship between liquidity and Vietnamese stock returns during the global financial crisis.

There also has not been much research in the context of state ownership and stock returns for a transitional economy. Empirical studies provide mixed or contradictory evidence from developed countries, developing markets or transitional economies. Fama and Jensen (1983) show that an increase in managerial ownership would lead to increased entrenchment of managers. McConnell and Servaes (1990) and Cornet (2010) analyze the linkage between ownership structure and the performance of firms (measured by ROA and ROE). Lin and Zhang

(2009) provide evidence that the "Big Four" state-owned commercial banks in China are less profitable and less efficient and have a lower quality of assets than other types of banks.

Our research deals with the following questions: 1) Which multi-factor model (FF three-factor, FF four-factor or FF five-factor) best describes the behavior of the stock market of Vietnam? 2) Does the value factor become redundant for explaining the stock returns in a developing economy after including new factors into the asset pricing model? 3) Is the new five-factor model (Fama and French, 2015) sensitive to the choice of the profitability factor in the context of the Vietnamese market? 4) How do the asset pricing models perform under different ownership structures?

This study makes four contributions to the current asset pricing literature. First, this study reveals new evidence on the forecasting power of the FF factor models in the context of an emerging stock market featuring state dominant role in the society. This study presents further evidence supporting Fama and French's (2017) claim about the superiority of the five-factor model for a liberalized market where a country is dominated by individual investors.

Second, the study provides further evidence on the controversy regarding the redundancy of the value factor in the presence of profitability and investment factors in the model (Fama and French, 2015, 2017, 2018; Cakici, 2015; Chiah et al., 2016). The results urge the

need of developing market verification of results evident in developed countries.

Third, this study provides new evidence on the controversy regarding the choice of a profitability factor in the five-factor model (Fama and French, 2017, 2018; Ball et al., 2015; Hou, Mo, Xue and Zhang, 2019; Novy-Max, 2013).

Lastly, this study reveals further findings on the performance of the asset pricing models using different profitability measures for state-owned entreprises listed in Vietnamese stock market.

The remainder of this chapter is organized as follows. Section 2.2 provides an overview of the Vietnamese stock market, with a description of its distinctive features. Section 2.3 describes the data and methodology used in this analysis, including factor design and construction of test portfolios, with a detailed analysis of the state ownership–stock return relationship in Vietnam. Section 2.4 delivers empirical results on the FF five-factor model (2015) as compared with the three-factor framework (Fama and French, 1993), with a focus on the state ownership structure of listed firms. Section 2.5 verifies whether the value factor is redundant for explaining expected stock returns in Vietnam. Section 2.6 investigates different measures for a profitability factor in the five-factor model. Section 2.7 offers further results of the value factor non-redundancy and the choice of a profitability factor. Section 2.8 concludes the findings.

2.2 Vietnam's stock market and its unique feature

The Hochiminh Stock Exchange, under a government initiative, was established on 28 July 2000. During the 2000–2005 period, the stock market had very few listings. In 2005, there were 44 listed companies with a total market capitalisation of VND 5 trillion. With the establishment of the Hanoi Stock Exchange in the same year and the country's favorable economic conditions, by the end of 2009 there were 541 listed companies with total market capitalisation of VND 620.5 trillion, equivalent to 40% GDP. During that year, Vietnam established a third stock market (UPCoM) to provide a pathway for small companies to trade their shares on an exchange, thus limiting the over-the-counter market and thereby increasing transparency and liquidity for Vietnamese firms.

After persistent and robust growth during the 2006–2007 period, the stock market of Vietnam was hit by the global financial crisis and affected by the government's tightening monetary policies to control inflation and stabilize the economy, leading to a continuous and significant drop in stock prices. The stock market of Vietnam has been gradually stabilizing since 2008.

The first listed companies were primarily state-owned enterprises (SOEs). According to the Business Innovation and Development Committee, in August 2009 the country had more than 1500 enterprises fully owned by the state. With the goal to restructure Vietnam's economy

and increase the efficiency of SOEs' performance through privatization of government-owned companies,[1] the state gradually sold its stake in SOEs through initial public offerings (IPOs) and listing on stock exchanges. However, the government still keeps the largest ownership proportion in many listed companies. Motivated by this idea, a special attention is devoted to SOEs which are considered as a separate group in the analysis. This work presents new empirical evidence on the relationship between a state-ownership structure and stock returns in a country with distinctive political and economic regimes. The effects of state ownership are important for policymakers who focus on stock market regulation and for investors who want to understand stock price behavior for portfolio management.

2.3 Data and methodology

2.3.1 Data

The analysis in this study is conducted for all common stocks traded on the Hochiminh and Hanoi Stock Exchanges (inclusive of UPCoM) at a monthly frequency from August 2007 to July 2015.[2] The source of data is the Thomson Reuters database, which includes daily data of adjusted closing prices, trading volume, market-to-book ratios, market capitalisation, total assets as well as annual information of revenue,

[1] State-owned banks operated less profitably, held less core capital and had greater credit risk than private firms, but had more stable operations during unfavorable market conditions and survived better during the financial crisis (Cornet, 2010).
[2] For UPCoM, stock prices are obtained as at the end of 2014.

administrative expense, interest expense, cost of goods sold and state ownership. An interbank offer rate is also extracted monthly from Datastream and used as the risk-free rate in this study to be consistent with previous studies on Vietnam.

To be in the sample for the analysis, all stocks must have daily returns of no greater than 50% in absolute terms and monthly returns of no more than 200% to avoid stocks with abnormal trading or price errors on the Datastream system. To reduce the impact of infrequent trading[3], all stocks with no return data for the previous 10 consecutive business days are excluded from the analysis in that specific month. In addition, stocks with no return data for more than 10 business days in a month are omitted from the sample during that month.[4] This study also excludes all stocks with negative book-to-market ratios from the sample to be consistent with Fama and French's (1993, 2015) methodology. To be in the sample on a specific date, in addition to having required accounting data[5] as prescribed by Fama and French (1993, 2015), companies must have a valid trade and not have been delisted prior to the formation period.

[3] Infrequent abnormal trading is a very prominent issue in young stock markets, like Vietnam. To eliminate the distortion of our empirical results, this study applies data filtering as other conventional literature dealing with new markets with illiquid stocks the prices of which can be manipulated by large investors.

[4] Angelides (2010) removes all the stocks that have fewer than five observations during a month.

[5] To reduce the noise in computing variables, several stocks with extreme values of book-to-market ratio (higher than 8.0), operating profitability ratio (more than 100%) and investment ratio (higher than 4.0) are excluded.

Table 2.1 presents the coverage of stocks used in the sample. Hence, this study has 135 stocks in December 2007 and 438 stocks in 2015, accounting for 1,113,948 daily and 50,112 monthly observations in total. The sample covers about 60% of the population of ordinary stocks in the Datastream database and represents 89% and 73% of the market in terms of total trading value and market capitalisation, respectively, over the sample period.[6] On average, there are 56 state-owned enterprises (SOEs) in a year, equivalent to 16.32% of the average annual stock number in the sample.

By applying the Fama and French (1993, 2015) methodology, for inclusion in a portfolio in July of each year (annual rebalancing) a stock must have market equity data for December of the previous year and June of the current year; a non-missing (positive) book-to-market ratio for December of the previous year; non-missing revenues and at least one of the following: cost of goods sold, sales, general and administrative expenses, or interest expense at the end of the fiscal year (December) ending in the previous year; and total assets data at the end of the fiscal year ending in year t-1 and t-2.

2.3.2 Fama-French five-factor construction

[6] It is important to note that stocks are not removed completely from the entire sample. They are omitted for the specific month when they have inadequate trading (no return data for the previous 10 consecutive business days or no return data for more than 10 business days in total during a month), and they are included again whenever they satisfy the criteria on trading activities.

This study follows the FF methodology in constructing risk factors (Fama and French, 1993, 2015).

2.3.2.1 Market factor (MKT)

MKT is the average excess return on a market portfolio constructed from the sample of stocks. MKT is value-weighted using market capitalisation as at the end of month *t*-1. The excess return of each stock is calculated as a monthly percentage change in a stock's price less the interbank offer rate in Vietnam.

2.3.2.2 Size factor (SMB)

To form a size portfolio in July of year *t*, stocks are sorted by the market equity as at the end of June of each year *t*. The stocks are allocated to two size portfolios (small and large), depending on whether their market equity is above or below the median. These two portfolios are annually rebalanced, with average returns calculated under a value-weighted approach. The size factor (SMB) is the return difference between the average returns on the small firms' portfolios and the average returns on big firms' portfolios.

2.3.2.3 Value factor (HML)

The book-to-market sort uses the book-to-market ratio for the fiscal year ending in calendar year *t*-1 (at the end of December of *t*-1). Three portfolios are formed using breakpoints at the 30th to 70th percentiles. These portfolios are annually rebalanced, with average returns

calculated under a value-weighted approach. From the independent sorting, I construct six portfolios from the intersection of two size and three book-to-market portfolios. The value factor (HML) is the return difference between the high book-to-market portfolios and the low book-to-market portfolios.

2.3.2.4 Operating, cash and ROE profitability factors (RMW, RMWC and RMWR)

RMW uses accounting data for the fiscal year ending in calendar year *t*-1. For portfolios formed in June of year *t*, operating profitability is defined as annual revenues minus cost of goods sold, interest expense, and selling, general and administrative expenses, all divided by book equity (Fama and French, 2015; Novy-Marx, 2013). Three portfolios are formed using the breakpoints of 30% and 70%. These portfolios are annually rebalanced, with average returns calculated using the value-weighted approach. I construct six portfolios from the intersection of two size and three profitability portfolios. The RMW factor is the return difference between the average returns on the high (robust) profitability portfolios and the average returns on the low (weak) profitability portfolios.

Cash profitability (RMWC) suggested by Fama and French (2018) and Ball et al. (2015) and the ROE profitability (RMWR) of Hou, Mo, Xue and Zhang (2019) are used in the factor testing to determine which profitability definition would be best to use in the FF five-factor model

to describe the stock returns. However, to make the analysis on different profitability factors more comparable, one-year-lagged book equity is used to calculate ROE profitability [7] and conventional double (2x3) sorting on size and profitability.

2.3.2.5 Investment factor (CMA)

For portfolios formed in June of year *t*, CMA uses the change in total book equity in the fiscal year *t*–1 compared with the fiscal year *t*–2. Three portfolios are formed using the breakpoints of 30% and 70%. These portfolios are annually rebalanced, with average returns calculated using the value-weighted approach. Six portfolios are constructed from the intersection of two size and three investment portfolios. The CMA factor is the return difference between the average returns on the conservative investment portfolios and the average returns on the aggressive investment portfolios.

Table 2.2 presents the summary statistics of all factors. Panel A shows that the factors have a negative market premium, consistent with Fang et al. (2017). The market premium (mean MKT) for Vietnam is -0.65% per month, the size premium (mean SMB) and the value premium (mean SMB) is 0.38% and 0.61%, respectively. The monthly premium for profitability and investment has the value of 0.34% and 0.095% during the 2008–2015 period.

[7] This study follows Fama and French's (2015, 2016, 2017) methodology of one-year-lagged book equity as opposed to Hou, Mo, Xue and Zhang's (2018) approach that uses one-quarter-lagged book equity in the calculation of the profitability factor.

Panel B of Table 2.2 shows the correlations between the factors. Consistent with Fama and French (2015), profitability (RMW) is negatively correlated with all factors. There is a negative and high correlation between RMW with SMB and HML, suggesting smaller-sized companies tend to be high book-to-market (B/M) firms and they seem to be less profitable. There is a positive and high correlation between HML and CMA, indicating companies with high book-to-market (B/M) values tend to be low-investment firms. While RMW and CMA are each negatively correlated with MKT as Fama and French (2015) report, there is no correlation between SMB and MKT, similar to that of Australia (Chiah et al., 2016).

2.3.3 Factor model tests

Following Fama and French (2018), this study applies two approaches to deal with the task of the factor choice.

2.3.3.1 Left-hand-side (LHS) approach for nested models

The first approach, the LHS approach, is used to assess competing models with distinct factors (i.e., nested models) to capture excess returns of different sets of LHS stock portfolios.

Given it is impossible to make meaningful statistical inference of 316 factors (Harvey et al., 2015), Fama and French (2018) suggest using a limited number of factors in a model testing and a short list of model alternatives for comparison purposes. Hence, this study investigates the

performance of three multi-factor models of Fama and French (1993, 2015):

Three-factor model:

$$R_{p,t} = \alpha_p + b_p MKT_t + s_p SMB_t + h_p HML_t + \varepsilon_{p,t} \quad (1)$$

Four-factor model (five-factor model without HML):

$$R_{p,t} = \alpha_p + b_p MKT_t + s_p SMB_t + r_p RMW_t + c_p CMA_t + \varepsilon_{p,t} , \quad (2)$$

Five-factor model:

$$R_{p,t} = \alpha_p + b_p MKT_t + s_p SMB_t + h_p HML_t + r_p RMW_t + c_p CMA_t + \varepsilon_{p,t} \quad (3)$$

where $R_{p,t}$ is the returns of portfolio p in month t; SMB_t, HML_t, RMW_t and CMA_t are the factor-mimicking portfolios for size, value, profitability and investment of Vietnamese equities; and MKT_t is the monthly excess returns on Vietnam's stock market portfolio.

This work investigates the explanatory power of the new five-factor model on the variation of stock returns by looking at the average adjusted R^2, GRS test statistics and its p-value (Gibbons, Ross and Shanken, 1989), the average value of absolute intercepts, $A|\alpha|$, the Sharpe ratio for the intercept, $Sh(\alpha)$, the maximum squared Sharpe ratio for intercepts, $Sh^2(\alpha)$ (Fama and French, 2018), and the maximum squared Sharpe ratio for a model's factors, $Sh^2(f)$, (Barillas and Shanken, 2017). GRS tests whether the regression intercepts are jointly equal to zero. As Merton (1973) suggests, the intercept is indistinguishable from zero if an asset pricing model completely captures expected returns. According to Lewellen et al. (2006), the smaller $Sh(\alpha)$, the fewer unexplained average returns; hence, the better the model. In the same

manner, the study uses average absolute intercepts, $A|\alpha|$, of the portfolios under analysis to assess the performance of the models. The model that best describes the variation in stock returns across portfolios is the one that provides the lowest value of $A|\alpha|$. Fama and French (2018) suggest using the maximum squared Sharpe ratio of time-series regression's intercepts, $Sh^2(\alpha)$, and the maximum Sharpe ratio for a model's factors, $Sh^2(f)$ to overcome the limitation of other asset pricing tests when dealing with the issue of varying inferences across sets of LHS portfolios. $Sh^2(\alpha)$ and $Sh^2(f)$ assist this work in judging the competing factor models and can be used as ultimate metrics for ranking asset pricing models. The best model is the one that provides the lowest $Sh^2(\alpha)$ and whose factors have the highest $Sh^2(f)$.

2.3.3.2 Right-hand-side (RHS) approach for non-nested models

The second approach, the RHS approach, is applied to spanning regressions to assess whether a specific factor should be added to a (non-nested) model by looking at its contribution to an explanation of the average portfolio excess returns provided by a model. The marginal contribution of a factor to a model, $\alpha^2/sd^2(e)$, is calculated as the ratio of the squared intercepts in a spanning regression of the factor on the model's remaining factors and the residual variance of the same spanning regression (Fama and French, 2018). A factor that has a high value of $\alpha^2/sd^2(e)$ compared with other factors in a model is considered to have a significant contribution to the model in capturing stock average

returns. This approach enables this study to estimate the role of a factor in a specified model and decide on the relevancy or redundancy of a factor.

Since there has been controversy in the value factor role and the choice of the profitability measure, the RHS approach (Barillas and Shanken, 2017) is particularly useful in investigating the value factor and proxies for the profitability factor.

2.3.4 Left-hand-side (LHS) portfolio characteristics

Three sets of 3x3 portfolios are formed to test asset pricing models. All stocks are allocated to three different portfolios at the end of December of each year based on market capitalisation using breakpoints at the 33rd and 67th percentiles. In the second sort, further sorting of each size portfolio into three sub-portfolios is executed based on book-to-market, profitability and investment. The average portfolio monthly returns are calculated from July of year t+1 using a value-weighted approach. The portfolios are rebalanced on an annual basis.

For the investigation of the return and other characteristics of state-owned equities (SOEs), two sub-portfolios for each size portfolio using an approach similar to the above are formed, with one sub-portfolio containing all firms that have a government stake in shares and the other sub-portfolio containing the firms that are entirely private.

Table 2.3 reports the characteristics of the single-sorted portfolios. The highest-earning portfolio is the one with average book-to-market. The

loser portfolio over the sample period is the portfolio with an average investment ratio or with a weak profitability ratio.

The results in Table 2.3 provide the 3x3 single-sorted portfolio characteristics consistent with factor characteristics in Panel B of Table 2.2. Firms with a low book-to-market ratio have high profitability and invest more than those with low book-to-market values.

One interesting finding from this ownership structure analysis shows that SOEs have significantly higher average excess returns, though they invest less aggressively and have lower profitability and book-to-market ratios compared with private (non-SOE) firms. One potential explanation is that investors prefer SOEs that are backed by government and have more stable operations during unfavorable market conditions and survived better through the economic recession (Cornet, 2010).

Table 2.4 provides detailed summary statistics for three sets of nine double-sorted portfolios to be used in asset pricing tests. The two last columns show the sort on size and state-ownership structure of the firm. Panel A shows the monthly excess returns for each portfolio. Panel B reports the average B/M ratio for a portfolio, while Panels C and D show the profitability and investment ratios of each portfolio.

Panel A of Table 2.4 reports no obvious univariate relationship between the average excess returns and the B/M, profitability and investment of listed firms across all portfolios. Fama and French (2015, 2017) report

that the five-factor model fails to capture the low average return on small stocks.

The size effect is found in all portfolios, except for the return characteristics of large-cap firms with an average book-to-market ratio, with an average profitability ratio and a high investment ratio (Panel A of Table 2.4) as well as the investment characteristics of portfolios sorted on size-profitablity (Panel D of Table 2.4). Small firms have higher average returns and B/M values despite the evidence that they are, on average, less profitable and invest less than large-cap firms.[8] The winner portfolio for each set of sorting would be all small-cap firms, either with average B/M, high profitability or low investment ratio or belong to the SOE group. However, the best performer among all portfolios is the small-cap SOEs with an average excess return of 1.23% per month. Multivariate regressions would provide a clearer picture on the average return behavior in the Vietnamese market.

The study also performs sorting on the state holdings of a firm and suggests that there is a return premium for state entities, with small-cap firms having the highest returns. There is a size effect in all characteristics of portfolios sorted on size-non-SOEs. The portfolio of private firms has the higher B/M, profitability and investment ratios compared with that of state-owned entities (except the small-sized portfolio sorted on profitability and investment).

[8] Except for the cases when small-sized SOEs invest more than large-cap SOEs.

There is strong evidence of the similar size patterns of different characteristics for SOEs and non-SOEs except for investment characteristics of portfolios based on ownership sorting.

Although the FF sort does not provide much information on the univariate characteristics of portfolios sorted on size and B/M, profitability and investment, the sort on ownership structure provides some interesting findings. Profitable private firms (non-SOEs) tend to provide lower returns to investors than their counterparts. Mid- and large-cap non-SOEs tend to have higher profits and invest more aggressively than SOEs of the same size.

2.4 Empirical results on asset pricing tests

Table 2.5 reports the summary results of asset pricing tests. For brevity, the study reports the average adjusted R-squared, GRS test statistics and its *p*-values, the average values of absolute intercepts, Sharpe ratios for intercepts, the maximum squared Sharpe ratio for intercepts and model factors (Fama and French, 2018). The tests report the results of three asset pricing models, namely FF three-factor, FF four-factor (i.e., FF five-factor without HML) and FF five-factor.

Overall, the test statistics show that the new model can account for more asset pricing anomalies than the traditional asset pricing models of CAPM, the three-factor and the four-factor. Consistent with Fama and French's results (2015), the five-factor model tested on the Vietnamese

stock market performs best in relation to explaining the average returns of three sets of nine portfolios sorted by B/M, profitability and investment (Column All of each panel). The average of adjusted R-squared for all double-sorted portfolios (Column All of Panel A) improves from 89.58% (the three-factor model) to 90.49% (the five-factor model), with the lowest performing (four-factor) model at 89.49% average adjusted R-squared. This result is consistent with average adjusted R-squared for the Asia Pacific region (Fama and French, 2017). Similar results of superiority of the five-factor model over the three-factor are found for the Australian stock market (Chiah et al., 2016).

Looking at each set of portfolios, the five-factor model still outperforms all other models in explaining the expected returns of portfolios with each sorted on size and either book-to-market, profitability or investment. The average adjusted R-squared for size-B/M sorted portfolios (Column B/M of Panel A), size-profitability portfolios (Column OP of Panel A) and size-investment portfolios (Column Inv of Panel A) is 91.0%, 90.9% and 89.6% for the five-factor model, respectively.

Table 2.5 shows consistent results of the Fama-French five-factor model's superiority as evidenced in the tests of Panels A to G for all 27 portfolios (Column A of all panels) and for three sets of 9 portfolios with each sorted on size and a combination of B/M (Column B/M of all panels), operating profitability (Column OP of all panels) and investment (Column Inv of all panels). Despite there being different rankings for the three- and four-factor models among the portfolios, all results

consistently show the superiority of the five-factor model (Columns All, B/M, OP and Inv of Panel D).

In relation to portfolios sorted on state ownership, the obtained results of the average adjusted R-squared for SOEs (Column SOE of Panel A) contradict with that of the remaining tests. Although the average value of absolute intercepts, the value of Sharpe ratio, GRS test statistics and its *p*-value extend the preference to the five-factor model for the size-SOE portfolios, the average adjusted R-squared shows the preference for the four-factor model. Referring to the results of the maximum squared Sharpe ratio for intercepts (Fama and French, 2018), this study concludes that the five-factor is the best model to capture stock returns on the SOE portfolio sorted on size (Column SOE of Panel F).

Referring to the results of non-SOEs, it is found that the average adjusted R-squared prefers the five-factor model, but GRS test statistics and the tests for intercepts (Column non-SOE in Panels B, D and E) point out the priority of the three-factor model. Based on the maximum squared Sharpe ratio for intercepts, $Sh^2(\alpha)$, it is concluded that the three-factor still takes the place as the best model to explain the non-SOE portfolio sorted on size (Column non-SOE of Panel F).[9] The study arrives at the conclusion that the three-factor model best explains the variation in returns of non-SOEs and the five-factor model is most

[9] The unreported results on the maximum squared Sharpe ratio for intercepts with the cash profitability factor provide supporting evidence for the Fama-French five-factor model's superiority for all 6 portfolios sorted on size and state ownership as well as for 3 SOE portfolios sorted on size. The three-factor model is preferred over other models for non-SOE portfolios sorted on size.

preferred for all porftolios sorted on size and state ownership as well as SOE portfolios sorted on size from the results of the maximum squared Sharpe ratio for intercepts (Columns SOE and non-SOE of Panel F).

Notably, Fama and French (2015) report that the five-factor model produces lower GRS statistics than the original three-factor model (the lowest GRS test statistic as compared with the three-factor model is produced by the five-factor model in the portfolio sorted on size and profitability). The results in Table 2.5 show that the GRS test statistic is at its lowest of 0.78 for the portfolio sorted on size and investment (Inv) with the highest *p*-value of 0.64 for GRS. The average value of absolute intercepts also shows that the largest improvement of the five-factor model is produced for the size-investment portfolios, consistent with GRS test values. Additional tests are conducted to decide on the explanatory power of Fama-French multi-factor models: the maximum squared Sharpe ratio for intercepts ($Sh^2(\alpha)$) and the maximum squared Sharpe ratio for factors ($Sh^2(f)$). Both tests show the superiority of the five-factor model consistent over all types of portfolio testing, with the exception of the non-SOE portfolios sorted on size. Overall, the results of Table 2.5 show that the five-factor model is the preferred model for all portfolios sorted on size and a combination of B/M, profitability and investment, taken together or standalone, and for the portfolios sorted on size-SOE.

Fama and French (2015) report that HML is redundant for describing U.S. average returns during the 1962–2013 period, but it is not

redundant for explaining average returns in any region during the 1990–2014 period (Fama and French, 2017). They observe a strong positive relationship between the book-to-market ratio and average returns of Japanese equities. Consistent with Fama and French's (2017) findings in Europe, Japan and the Asia Pacific region, this study provides evidence that HML is not redundant in Vietnam. The results on the Vietnamese stock market provide evidence that without the value factor (HML), the asset pricing model with only market, size, profitability and investment factors performs worse than the traditional three-factor model with market, size and value factors (Panels A, D, E and F). The value factor became even more important under the five-factor model. The five-factor model minimizes the intercept effects for all portfolios through a large difference in average mean intercepts between the four-factor and five-factor models. Hence, the study suggests that some anomalies can be eliminated from previous versions of asset pricing models by including the value factor. There is only one portfolio, the SOE portfolio sorted on size, that has no obvious difference in average absolute intercepts between the four- and five-factor models. However, the maximum squared Sharpe ratio provides evidence that the five-factor model is the best one to explain the SOE returns. Table 2.7 will provide further investigation of the value factor redundancy.

Overall, Table 2.5 shows that the five-factor model performs relatively well in explaining the expected returns of 27 portfolios with each 9 portfolios sorted on either book-to-market, profitability or investment.

GRS fails to reject all of the models, providing the preference for the five-factor model as the best one among all tested. The maximum squared Sharpe ratio for intercepts gives a preference to the five-factor model with the exception of the non-SOE portfolios sorted on size. The maximum squared Sharpe ratio for factors shows that the five-factor model is superior to the three- and four-factor models in explaining the stock returns.

2.5 Is the value factor (HML) redundant?

As the previous asset pricing tests suggest, the FF five-factor model works best and has superiority over the three-factor model when HML is included in the model. To further test the hypothesis of HML redundancy and to see the relationship of the factors, regressions of each factor on the other four remaining are conducted to find whether the explanatory variables can absorb the factor or not. Table 2.6 shows the results of five spanning regressions (in columns) with MKT, SMB and HML, RMW and CMA as the dependent variable in each of the regressions. In the first model where the dependent variable is the return on market portfolio (MKT), the average market returns being left unexplained by the model are negligible, as the effect is absorbed by the HML (0.61% per month, *t*-stat=2.34) and CMA (-0.97% per month, *t*-stat=-2.24) factors. The same happens when running the test on HML; that is, the value effect is absorbed by both market (MKT) and

investment (CMA) factors. Consistent with the results from Panel B of Table 2.2 where the correlation between HML and CMA is found to be highest, the average HML returns are captured by the exposures of HML to CMA and MKT. However, unlike Fama and French's results that show CMA and RMW absorbing all the effects of HML, the test reports that the average CMA return is captured to a greater extent by its exposure to HML; RMW cannot absorb HML. Notably, a similar controversy is discovered about the RMW and SMB with the largest negative correlation (Panel B of Table 2.2). Table 2.6 shows that in the non-nested model regression, RMW largely absorbs the SMB effect. Hence, the evidence suggests that in Vietnam, adding HML improves the mean-variance efficient tangency portfolio produced by combining the risk-free asset, the market, size, profitability and investment portfolios. One possible explanation for the value factor non-redundancy in Vietnam can be the strong correlation between the profitability and value factors (-0.49) as opposed to the US market (Fama and French, 2015). Cakici (2015) also highlights the similar evidence on the correlation of these two factors for Japan which is different from other regions in the world.

To further verify the findings on the HML redundancy, this study follows Fama and French (2018) to deconstruct the maximum squared Sharpe ratio for a model's factors, $Sh^2(f)$, in Table 2.5 by analyzing the extent of marginal contribution of a factor to $Sh^2(f)$, $\alpha^2/sd^2(e)$, defined as the squared intercept over the variance of the regression residuals, and *t*-

statistics for the intercept (t(α)) in a factor-spanning regression. The factor's intercept (α) is close to zero and/or the residual standard error, s(e), is large if the factor's expected return is well explained by the remaining factors in a model. Hence, a factor is considered to be redundant if its marginal contribution to a model's maximum squared Sharpe ratio is small. The results of $\alpha^2/sd^2(e)$ in Table 2.6 report that RMW and HML are by far the biggest marginal contributions to $Sh^2(f)$, which further supports the finding on the value factor in Table 2.5. Therefore, the value factor is confirmed to be non-redundant in the factor models for the Vietnamese stock market.

2.6 Operating, cash or ROE profitability?

Fama and French (2018) provide evidence that the five-factor model (Fama and French, 2015) is sensitive to the choice of the profitability factor. More specifically, the cash profitability suggested by Ball, Gerakos, Linnainmaa and Nikolaev (2015) improves the description of the average returns for portfolios of different sorts.

Cash profitability (RMWC) is the cash profits without accruals (i.e., before interest) scaled by total assets in the 2x3 portfolios sorted on size and profitability. Using cash profitability (Ball et al., 2015), Fama and French (2018) try to explain small stocks with returns that behave like those of firms that invest a lot despite low profitability (Fama and French, 2015, 2017). Although this study does not have a similar issue,

the focus is on the choice of profitability factor that would be best for the five-factor model to explain the variation in the Vietnamese stock market. Table 2.7 shows the hypothesis that higher profitability leads to higher expected returns is only correct for large stocks with ROE profitability (Hou, Mo, Xue and Zhang, 2019). This hypothesis is also true for small and medium equities if cash profitability (Ball et al., 2015) is used. The size effect is evident in returns of all double-sorted portfolios, except for portfolios with average operating profitability (Novy-Max, 2013), average cash profitability (Ball et al., 2015) and low profitability (Hou, Mo, Xue and Zhang, 2019).

Panel B of Table 2.7 shows the identical size patterns for B/M regardless of the choice for profitability factor, that is, smaller firms tend to have higher book-to-market ratios. Panel C of Table 2.7 shows an opposite size pattern for cash profitability as compared with portfolios calculated using operating and ROE profitability. One explanation would be that small firms rely more on equity capital and have lower access to borrowing. Hence, such contradictory results are observed.

Table 2.8 is the direct comparison of the FF multi-factor model performance when using different profitability ratios. The model with Ball et al.'s (2015) cash profitability factor, RMWC (Panel A), outperforms the model with RMW (Fama and French, 2015; Novy-Max, 2013) and the model with ROE profitability, RMWR (Hou, Xue and Zhang, 2015; Hou, Mo, Xue and Zhang, 2019), in the tests of the average adjusted R-squared performed on all portfolios (Columns All of Panels A,

B and C). However, Sh(α), *p*-value of GRS, the average value of absolute intercepts, A|α|, show preference for RMW. The GRS test values for the five-factor model further complicate the analysis providing very low results for size-BM, size-Inv portfolios using operating profitability in Panel C and showing RMWC is the best model among four-factor models. Therefore, the maximum squared Sharpe ratio, $Sh^2(\alpha)$, is chosen to determine which profitability measure suits best for the four-factor and five-factor models. The results indicate RMWC is equally good when testing for all 27 portfolios taken together (Column All of $Sh^2(\alpha)$ in Table 2.8) and RMW is superior to all other models when it comes to explain the variation of each of the three sets of portfolios sorted on size and a combination of value, profitability and investment (Columns B/M, Profit and Inv of $Sh^2(\alpha)$ in Table 2.8).

Contradicting results are detected in the choice of profitability factor when turning attention to the comparison of the four-factor models. $Sh^2(\alpha)$ indicates the superiority of cash profitability (RMWC) when testing all 27 portfolios but not for each set of double-sorted portfolios (the FF 4-factor model of Columns B/M, Profit and Inv in Table 2.8).

What is consistent across all tests is the results showing that regardless of profitability factor choice, the superiority of the five-factor model in explaining the average returns as compared with the four-factor models in Table 2.8 across all profitability factors.

To further testify the results on profitability measures, a test of profitability factors is conducted similar to the test applied to the value

factor for redundancy. Given inconclusive results over the choice of profitability factors in Table 2.8, Table 2.9 with $\alpha^2/sd^2(e)$ confirms the superiority of the operating profitability (Fama and French, 2015; Novy-Max, 2013) over the cash (Ball et al., 2015) and ROE profitability (Hou et al., 2019) factors, with the RMW intercepts having slightly more incremental information about the average returns under the tests. Operating profitability (RMW) is likely to perform better than cash profitability (RMWC) and ROE profitability (RMWR).

Similar to Fama and French (2018), this study provides evidence that changing the profitability from an operating one to cash profitability does not change the conclusion that all the factors have explanatory power. In addition, the returns of RMWR are found to be largely absorbed by SMB and HML. Although it is evident that there are strong negative slopes on SMB for RMW under both tests with RMWC and RMWR, as discussed earlier, SMB cannot absorb RMW as shown in the results of Table 2.6. Robustness tests in Section 2.7 confirm these findings.

2.7 Robustness tests

By re-testing the five-factor model with cash profitability and ROE profitability as profitability proxies (Table 2.10), this study reconfirms the HML non-redundancy.[10] Both panels of Table 2.10 report that the intercept in the spanning regression using cash profitability (RMWC)

[10] Fama and French (2015) find that HML is redundant for the US stock market when using operating profitability (Novy-Max, 2013).

and ROE profitability (RMWR) to explain HML is 0.01% per month (*t*-statistics=1.63) and 0.01% per month (*t*-statistics=1.50), the highest value for the *t*-statistics among all the models under both profitability versions.

The results of $\alpha^2/sd^2(e)$ for Panel A provide evidence that the value factor contributes most to the $Sh^2(f)$ of the five-factor model using cash profitability (0.034). The returns of SMB and CMA are absorbed by strong positive slopes on HML. Cash profitability is another significant marginal contributor to $Sh^2(f)$ with $\alpha^2/sd^2(e)$ of 0.029. The returns of MKT are absorbed by this factor.

Panel B provides persistent results for HML non-redundancy with the value factor having the highest marginal contribution to $Sh^2(f)$ of the five-factor model using ROE profitability (0.027). RMWR does not contribute much to $Sh^2(f)$, supporting the findings in Table 2.8. SMB can be well explained by RMWR. The returns of CMA and RMWR are absorbed by MKT. The MKT, RMWR and CMA returns are absorbed by strong slopes on HML.

The values of $Sh^2(f)$ as indicated in Tables 2.6 and 2.10 for the five-factor model with RMW, RMWC and RMWR are 0.073, 0.062 and 0.037, respectively. These results further indicate the preference for operating profitability (RMW) when testing the maximum squared Sharpe ratio for the five-factor model's factors with different profitability proxies.

2.8 Conclusion

This chapter empirically examines three FF factor models for the Vietnamese stock market during the 2008–2015 period. Similar to Japan (Fama and French, 2017), the GRS test cannot reject all the asset pricing models in their power of capturing the average returns of Vietnamese equities. Test results point out the superiority of the FF five-factor model over the three-factor and four-factor models in explaining the returns of portfolios sorted on size and a combination of book-to-market, profitability and investment. While the three-factor model is a preferred model in explaining the returns of non-SOEs sorted on size, the FF five-factor model is still superior for SOE sorted on size. The study also reports evidence of the return premium on state-owned equities in Vietnam; that is, state-owned enterprises have significantly higher average returns than private firms, although the former invest less aggressively and have lower profitability and book-to-market ratios than private (non-SOE) firms. Profitable private firms (non-SOEs) tend to provide lower returns to investors and invest more aggressively than SOEs. The findings also show that investors holding the portfolio with small-cap SOEs during the sample period would realize the highest returns during the sample period. The loser portfolio over the sample period is the one that contains large-sized stocks with an average investment ratio.

The findings suggest that the value factor (HML) has a relationship with portfolio returns, and its effect is not absorbed by profitability and investment factors newly included in the traditional three-factor model (Fama and Fama, 2015). In contrast to Fama and French's (2018) findings on HML value, it is not redundant in the Vietnamese stock market after considering different measures for the profitability factor. The value factor and operating profitability have the biggest marginal contribution to the maximum squared Sharpe ratio for the five-factor model's factors (Barillas and Shanken, 2017), implying HML is important in describing the stock returns in Vietnam.

The operating profitability (Novy-Max, 2013) used in the FF five-factor model performs better than cash profitability (Ball et al., 2015) and ROE profitability (Hou, Xue and Zhang, 2015; Hou, Mo, Xue and Zhang, 2019), indicating its intercepts have more incremental information about the average returns. All the tests provide consistent results on the superiority of the FF five-factor model over other traditional asset pricing models, regardless of the profitability factor choice.

Table 2.1 Sample coverage for the Vietnamese stock market

Co is the number of listed companies during a year. MCap is market capitalisation in trillions of Vietnamese Dong (VND) as at the end of a year. Value and Volume are annual trading value (in trillions of VND) and trading volume (in millions of shares) of all stocks. OP, CP and RP are the average value of operating profitability ratio, cash profitability ratio and ROE profitability ratio per stock, respectively, using Fama and French (2015, 2018, 2019), Ball et al. (2015) and Hou, Mo, Xue and Zhang (2019) profitability definition. INV is the average investment ratio per stock, respectively, as defined using Fama-French methodology (2015). BM is the average book-to-market ratio per stock. SOE is the number of listed companies that have state share of ownership. Data are obtained from Datastream from July 2007 to August 2015.

Year	Co	MCap	Value	Volume	OP	CP	RP	INV	BM	SOE
2007	135	334.5	267.6	2.610	0.0523	0.102	0.157	0.689	0.442	31
2008	189	148.3	120.5	5.261	0.0563	0.100	0.051	0.278	0.885	44
2009	279	371.0	445.9	18.79	0.0579	0.088	0.094	0.331	0.928	54
2010	400	453.1	408.0	19.12	0.0655	0.089	0.100	0.342	0.813	64
2011	421	308.9	137.6	11.27	0.0709	0.092	0.069	0.151	1.488	67
2012	442	383.4	193.2	18.77	0.0770	0.090	0.049	0.046	1.879	70
2013	425	446.9	229.7	22.09	0.0747	0.086	0.049	0.069	1.939	62
2014	460	542.2	523.1	40.16	0.0783	0.087	0.066	0.125	1.416	62
2015	438	623.1	255.8	18.83	n/a	n/a	n/a	n/a	1.319	47

Table 2.2 Summary statistics for Fama-French factors for Vietnamese stocks

Panel A reports the summary statistics for the Fama-French's monthly risk factors. Panel B reports the time-series correlation between the factors.

In July of year *t*, two size portfolios are formed based on market capitalisation as at the end of year *t*-1 and use the median as the breakpoint. These two portfolios are calculated using monthly returns and rebalanced annually. The size factor (SMB) is the return difference between the average returns on the small firm portfolios and the average returns on the portfolios containing large firms. Six portfolios are then constructed from the intersection of two size and three book-to-market portfolios (SL, SN, SH, BL, BN, BH) based on the 30th and 70th percentiles. The value factor (HML) is the return difference between the average returns on the high book-to-market portfolios and the average returns on the low book-to-market portfolios. Similarly, six portfolios are constructed from the intersection of two size and three profitability portfolios (SR, SN, SW, BR, BN and BW). Profitability factor (RMW) is the return difference between the average returns on the robust profitability portfolios and the average returns on the weak profitability portfolios. Six portfolios are from the intersection of two size and three investment portfolios (SC, SN, SA, BC, BN and BA). Investment factor (CMA) factor is the return difference between the average returns on the conservative investment portfolios and the average returns on the aggressive investment portfolios. All portfolios are value-weighted and returns are in percentages. MKT is the value-weighted excess return on the market portfolio of all sample stocks minus the one-month interbank offer rate. Statistics reported are the mean, median, standard deviation (st.dev), maximum (max), minimum (min), skewness and kurtosis. The sample is from September 2008 to July 2015.

Panel A: Summary statistics

	Mean	Std. dev.	Skewness	Kurtosis	Min	Max
MKT	-0.0065	0.0843	-0.0244	3.7537	-0.2457	0.2390
SMB	0.0038	0.0540	0.0002	3.9358	-0.1388	0.1704
HML	0.0061	0.0464	0.9480	5.9929	-0.0978	0.1774
RMW	0.0034	0.0378	-0.1730	5.3969	-0.1249	0.1277
CMA	0.0010	0.0349	-0.4653	3.5054	-0.1004	0.0792

Table 2.2 Continued

Panel B: Correlation

	MKT	SMB	HML	RMW	CMA
MKT	1				
SMB	-0.0640	1			
HML	0.1287	0.3821	1		
RMW	-0.0844	-0.5832	-0.4928	1	
CMA	-0.2159	0.1076	0.4888	-0.2730	1

The factors are calculated as follows (Fama and French, 2015) with S and B denoting small- and big-sized portfolios, H, N and L for high, medium and low B/M, R, N and W for robust, medium and weak profitability, and C, N and A for conservative, medium and aggressive investment:

$$SMB = \frac{SH+SN+SL}{3} - \frac{BH+BN+BL}{3} + \frac{SR+SN+SW}{3} - \frac{BR+BN+BW}{3} + \frac{SC+SN+SA}{3} - \frac{BC+BN+BA}{3}$$

$$HML = \frac{(SH-SL)+(BH-BL)}{2}; RMW = \frac{(SR-SW)+(BR-BW)}{2}; CMA = \frac{(SC-SA)+(BC-BA)}{2}$$

Table 2.3 Characteristics of value-weighted single-sorted portfolios

The table provides time-series averages of average percentage monthly excess returns, book-to-market (B/M), profitability (OP) and investment (Inv) ratios in July of year *t* to June of year *t*+1 for portfolios formed in December of year *t*-1 on a single sort of book-to-market, profitability or investment. Portfolio breakpoints are the 33rd and 67th percentiles. Each of the ratios for a portfolio in a given year is the value-weighted average of the ratios for the firms in the portfolios. Firms in the columns Ownership are sorted on (state) ownership structure. Column Low (under Book-to-market) is the characteristics for portfolios of stocks with low book-to-market ratio. Column Ave shows the characteristics for portfolios of stocks with average book-to-market ratio. Column High shows the characteristics for portfolios of stocks with high book-to-market ratio. Column Weak (under Profitability) shows the characteristics for portfolios of stocks with low profitability ratio. Column Ave (under Profitability) shows characteristics for portfolios of stocks with average profitability ratio. Column Robust shows the characteristics for portfolios of stocks with high profitability ratio. Column Conserv (under Investment) shows the characteristics for portfolios of stocks with low investment ratio. Column Ave shows characteristics for portfolios of stocks with average investment ratio. Column Aggr shows characteristics for portfolios of stocks with high investment ratio. The sample is from September 2008 to July 2015.

	Book-to-market			Profitability			Investment			Ownership	
	Low	Ave	High	Weak	Ave	Robust	Conserv	Ave	Aggr	SOE	non-SOE
Excess returns	-0.66	-0.09	-0.14	-0.99	-0.53	-0.55	-0.69	-1.00	-0.22	-0.21	-0.59
B/M	0.57	1.18	1.64	1.23	1.07	0.66	1.01	0.88	0.65	0.67	0.78
OP	0.29	0.15	0.08	0.02	0.04	0.31	0.18	0.21	0.27	0.22	0.25
Inv	0.24	0.19	0.11	0.13	0.18	0.23	0.13	0.16	0.27	0.14	0.23

Table 2.4 Characteristics of double-sorted portfolios

The table provides time-series averages of average percentage monthly excess returns, book-to-market, profitability and investment ratios in July of year t to June of year t+1 for portfolios formed in December of year t-1 on double sort of size and a combination of book-to-market, profitability and investment. The portfolio formation and book-to-market, profitability and investment ratios follow Fama-French (2015) methodology. Each of the ratios for a portfolio in a given year is the value-weighted average of the ratios for the firms in the portfolios. Firms in the columns Ownership are sorted on size and ownership structure. Panel A provides time-series averages of monthly returns in excess of Vietnam's interbank offer rate (in percentages). Panel B, C and D show the book-to-market, profitability and investment times-series averages for a portfolio. Column Low (below Book-to-market) shows characteristics for portfolios of stocks sorted on size (Small, Medium and Large) and low book-to-market ratio. Column Ave shows characteristics for portfolios of stocks sorted on size (Small, Medium and Large) and average book-to-market ratio. Column High shows the characteristics for portfolios of stocks sorted on size (Small, Medium and Large) and high book-to-market ratio. Column Weak (below Profitability) shows characteristics for portfolios of stocks sorted on size (Small, Medium and Large) and low profitability ratio. Column Ave shows characteristics for portfolios of stocks sorted on size (Small, Medium and Large) and average profitability ratio. Column Robust shows characteristics for portfolios of stocks sorted on size (Small, Medium and Large) and high profitability ratio. Column Conserv (below Investment) shows characteristics for portfolios of stocks sorted on size (Small, Medium and Large) and low investment ratio. Column Ave shows characteristics for portfolios of stocks sorted on size (Small, Medium and Large) and average investment ratio. Column Aggr shows characteristics for portfolios of stocks sorted on size (Small, Medium and Large) and high investment ratio. The sample is from September 2008 to July 2015.

	Book-to-market			Profitability			Investment			Ownership	
	Low	Ave	High	Weak	Ave	Robust	Conserv	Ave	Aggr	SOE	non-SOE
Panel A: Excess returns											
Small	0.29	0.43	0.28	0.27	-0.22	0.65	0.68	-0.10	0.36	1.23	0.13
Medium	-0.83	-0.20	-0.18	-0.17	-0.63	-0.31	-0.01	-0.56	-0.43	-0.34	-0.43
Large	-0.88	0.24	-0.38	-0.87	-0.37	-0.53	-0.80	-0.91	-0.33	-0.24	-0.62

Table 2.4 Continued

Panel B: Book-to-market											
Small	1.16	1.52	1.98	1.55	1.54	1.51	1.52	1.61	1.48	1.44	1.50
Medium	0.89	1.23	1.69	1.28	1.28	1.27	1.36	1.31	1.16	1.19	1.26
Large	0.49	0.85	1.37	1.09	0.86	0.59	0.92	0.75	0.61	0.63	0.71
Panel C: Profitability											
Small	0.03	0.03	0.04	0.01	0.02	0.06	0.04	0.02	0.04	0.05	0.03
Medium	0.08	0.09	0.08	0.01	0.04	0.17	0.08	0.08	0.09	0.06	0.09
Large	0.32	0.23	0.13	0.03	0.08	0.37	0.21	0.26	0.28	0.23	0.27
Panel D: Investment											
Small	0.20	0.20	0.10	0.18	0.14	0.18	0.11	0.19	0.21	0.19	0.16
Medium	0.26	0.17	0.12	0.12	0.22	0.19	0.11	0.19	0.23	0.15	0.18
Large	0.27	0.18	0.15	0.16	0.20	0.24	0.14	0.18	0.27	0.13	0.24

Table 2.5 Summary results of the factor models

The table provides the summary results of the multivariate regressions for portfolios formed by size and a combination of book-to-market (B/M), profitability (OP), investment (Inv), SOE and non-SOEs. Portfolios are formed in July of year t to June of year t+1 from stock sorted in December of year t-1. The portfolio formation and book-to-market (HML), profitability (RMW) and investment (CMA) factor construction follows Fama-French's (1993, 2015) methodology.

Summary results show the average value of all adjusted R-squared and the absolute intercepts ($A|\alpha|$) of all portfolios from the respective regressions in Panels A to D of Table 6. GRS is the Gibbons, Ross and Shanken's (1989) test statistic and its p-value, $p(GRS)$. Sh(α), Sh^2(α) and Sh^2(f) are the Sharpe ratio for intercepts, its maximum squared value and the maximum squared Sharpe ratio for the model's factors, respectively. These five tests are applied to all portfolios (All) and portfolios formed by size and a combination of book-to-market (B/M), profitability (OP), investment (Inv). The tests also show the results for the portfolios sorted on size and a combination of SOEs and non-SOEs.

Fama-French 3-factor model: $R_{p,t} = a_p + b_p MKT_t + s_p SMB_t + h_p HML_t + e_{i,t}$.

Fama-French 4-factor model (without HML): $R_{p,t} = a_p + b_p MKT_t + s_p SMB_t + r_p RMW_t + c_p CMA_t + e_{i,t}$.

Fama- French 5-factor model: $R_{p,t} = a_p + b_p MKT_t + s_p SMB_t + h_p HML_t + r_p RMW_t + c_p CMA_t + e_{i,t}$. The sample is from September 2008 to July 2015.

Panel A: Adjusted $\bar{R}^2$	All	B/M	OP	Inv	SOE	non-SOE
Fama-French 3-factor	0.8958	0.9080	0.8969	0.8825	0.6721	0.9618
Fama-French 4-factor	0.8949	0.8904	0.9044	0.8898	0.6755	0.9570
Fama-French 5-factor	0.9049	0.9097	0.9091	0.8960	0.6715	0.9630

Panel B: GRS	All	B/M	OP	Inv	SOE	non-SOE
Fama-French 3-factor	1.5629	1.0278	1.4262	0.9739	4.2280	9.9838
Fama-French 4-factor	1.5403	1.1892	1.3022	1.0858	3.9507	11.7091
Fama-French 5-factor	1.4003	0.9157	1.0259	0.7789	3.7389	10.8280

Table 2.5 Continued

Panel C: p(GRS)	All	B/M	OP	Inv	SOE	non-SOE
Fama-French 3-factor	0.0822	0.4268	0.1935	0.4689	0.0080	0.0000
Fama-French 4-factor	0.0902	0.3157	0.2516	0.3843	0.0113	0.0000
Fama-French 5-factor	0.1484	0.5170	0.4286	0.6363	0.0146	0.0000

Panel D: A|α|	All	B/M	OP	Inv	SOE	non-SOE
Fama-French 3-factor	0.0033	0.0032	0.0032	0.0034	0.0137	0.0072
Fama-French 4-factor	0.0043	0.0051	0.0039	0.0038	0.0135	0.0086
Fama-French 5-factor	0.0029	0.0030	0.0031	0.0026	0.0135	0.0073

Panel E: Sh(α)	All	B/M	OP	Inv	SOE	non-SOE
Fama-French 3-factor	0.9040	0.3657	0.4307	0.3559	0.4112	0.6318
Fama-French 4-factor	0.9102	0.3980	0.4165	0.3803	0.4019	0.6920
Fama-French 5-factor	0.8913	0.3578	0.3787	0.3300	0.4003	0.6813

Table 2.5 Continued

Panel F: $Sh^2(\alpha)$	All	B/M	OP	Inv	SOE	non-SOE
Fama-French 3-factor	0.8171	0.1337	0.1855	0.1267	0.1691	0.3992
Fama-French 4-factor	0.8285	0.1584	0.1734	0.1446	0.1616	0.4788
Fama-French 5-factor	0.7944	0.1280	0.1434	0.1088	0.1603	0.4642

Panel G: $Sh^2(f)$	All
Fama-French 3-factor	0.0266
Fama-French 4-factor	0.0363
Fama-French 5-factor	0.0725

Table 2.6 Testing a Fama-French factor by regressing the remaining variables of the five-factor model

The table reports the results of time-series regressions with each of the variables being regressed by the remaining of the five factors. MKT is the value-weighted excess return on the market portfolio, and SMB is average return on the portfolio sorted on size. HML is the value factor with size and book-to-market sort. RMW is the profitability factor. CMA is the investment factor. All factors are 2x3 portfolios constructed using Fama-French's (1993, 2015) methodology. $Sh^2(f)$ is the maximum squared Sharpe ratio for a model's factors from Table 5. α, $s(e)$ and $\alpha^2/sd^2(e)$ are the factor's intercept, residual standard error from spanning regressions and the marginal contribution of a factor to a model's $Sh^2(f)$, respectively. The Newey-West *t*-statistic is given in parentheses. The sample is from September 2008 to July 2015.

	MKT	**SMB**	**HML**	**RMW**	**CMA**
MKT		-0.12	0.12**	-0.05	-0.13**
		(-1.63)	(2.06)	(-0.96)	(-2.29)
SMB	-0.39		0.19*	-0.34***	-0.13
	(-1.39)		(1.67)	(-3.73)	(-1.18)
HML	0.61**	0.27*		-0.18	0.40***
	(2.34)	(1.84)		(-1.30)	(4.56)
RMW	-0.39	-0.76***	-0.28		-0.15
	(-0.99)	(-5.14)	(-1.25)		(-0.94)
CMA	-0.97**	-0.30	0.60***	-0.15	
	(-2.24)	(-1.22)	(4.25)	(-0.89)	
α	-0.01	0.00	0.01	0.01*	-0.00
	(-0.66)	(0.92)	(1.57)	(1.84)	(-0.36)
Adj.R^2	0.117	0.362	0.414	0.415	0.314
$Sh^2(f)$	0.073	0.073	0.073	0.073	0.073
$s(e)$	0.008	0.005	0.004	0.006	0.003
$\alpha^2/sd^2(e)$	0.006	0.010	0.036	0.040	0.000

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2.7 Characteristics of portfolios sorted on a combination of size and operating profitability, cash profitability or ROE profitability

The table provides time-series averages of excess returns, book-to-market, profitability and investment ratios in July of year t to June of year t+1 for portfolios formed in December of year t-1 on double sort of size and a combination of cash profitability (Ball et al., 2015; Fama and French, 2018), ROE profitability (Hou et al., 2015, 2019) and operating profitability (from Table 4). The portfolio formation and book-to-market, profitability and investment ratios follow the Fama-French (2015) methodology. Each of the ratios for a portfolio in a given year is the value-weighted average of the ratios for the firms in the portfolios. Panel A provides time-series averages of monthly returns in excess of the Vietnam's interbank offer rate (in percentages). Panels B, C, D show the book-to-market, profitability and investment times-series averages for a portfolio. Column Weak shows characteristics for portfolios of stocks sorted on size (Small, Medium and Large) and low profitability ratio. Column Average shows characteristics for portfolios of stocks sorted on size (Small, Medium and Large) and average profitability ratio. Column Robust shows characteristics for portfolios of stocks sorted on size (Small, Medium and Large) and high profitability ratio. The sample is from September 2008 to July 2015.

	Operating Profitability			Cash Profitability			ROE Profitability		
	Weak	Average	Robust	Weak	Average	Robust	Weak	Average	Robust
Panel A: Excess returns									
Small	0.27	-0.22	0.65	0.14	0.15	0.53	0.22	0.20	0.45
Medium	-0.17	-0.63	-0.31	-0.42	-0.35	-0.30	-0.36	-0.26	-0.48
Large	-0.87	-0.37	-0.53	-0.79	-0.22	-0.43	0.54	-0.63	-0.79
Panel B: Book-to-market									
Small	1.55	1.54	1.51	1.66	1.62	1.33	1.81	1.61	1.32
Medium	1.28	1.28	1.27	1.40	1.34	1.11	1.60	1.30	1.06
Large	1.09	0.86	0.59	0.74	0.70	0.71	1.19	1.02	0.59
Panel C: Profitability									
Small	0.01	0.02	0.06	0.04	0.08	0.18	0.00	0.01	0.02
Medium	0.01	0.04	0.17	0.03	0.08	0.19	0.02	0.03	0.09
Large	0.03	0.08	0.37	0.01	0.04	0.12	0.28	0.43	0.81
Panel D: Investment									
Small	0.18	0.14	0.18	0.19	0.17	0.16	0.07	0.19	0.21
Medium	0.12	0.22	0.19	0.14	0.19	0.20	0.12	0.16	0.23
Large	0.16	0.20	0.24	0.17	0.27	0.22	0.23	0.21	0.21

Table 2.8 Summary of regression results using cash profitability and ROE profitability factors

Panel A of this table describes the average adjusted R-squared of all portfolios sorted by size and a combination of B/M, profitability, investment and the average adjusted R-squared of size-All (All), size-SOE (SOE) and size-non-SOE sorted (non-SOE) portfolios. The portfolio formation and book-to-market (HML), cash profitability (RMWC) and investment (CMA) factor construction follow Fama-French (1993, 2015, 2018) methodology. Summary results show the average value of all adjusted R-squared (Adj.R^2) and the absolute intercepts ($A|\alpha|$) of all portfolios from the respective regressions in Panels A to D of Table 6. GRS is the Gibbons, Ross and Shanken's (1989) test statistic and its p-value, $p(GRS)$. Sh(α) and Sh^2(α) are the Sharpe ratio for intercepts and its maximum squared value, respectively. These five tests are applied to all portfolios (All) and portfolios formed by size and a combination of book-to-market (B/M), profitability (OP), investment (Inv). Column "SOE" shows the results for companies classified as state-owned and "non-SOE" column reports the results on the privately owned group of listed firms. The Fama-French five-factor model with cash profitability: $\mathbf{R_{p,t}} = a_p + b_p\,\mathrm{MKT}_\mathbf{t} + s_p\,\mathrm{SMB}_\mathbf{t} + h_p\,\mathrm{HML}_\mathbf{t} + \mathbf{r_p}\,\mathrm{RMWC}_\mathbf{t} + c_p\,\mathrm{CMA}_\mathbf{t} + e_{\mathbf{i,t}}$. Fama-French four-factor model (without HML): $\mathbf{R_{p,t}} = a_p + b_p\,\mathrm{MKT}_\mathbf{t} + s_p\,\mathrm{SMB}_\mathbf{t} + \mathbf{r_p}\,\mathrm{RMWC}_\mathbf{t} + c_p\,\mathrm{CMA}_\mathbf{t} + e_{\mathbf{i,t}}$. The sample is from September 2008 to July 2015.

Panel B follows the same data and methodology as in Panel A with the ROE profitability, RMWR, (Hou, Zue and Zhang, 2015; Hou, Mo, Xue and Zhang, 2019) as the proxy for a profitability factor. The Fama-French five-factor model with RMWR: $\mathbf{R_{p,t}} = a_p + b_p\,\mathrm{MKT}_\mathbf{t} + s_p\,\mathrm{SMB}_\mathbf{t} + h_p\,\mathrm{HML}_\mathbf{t} + \mathbf{r_p}\,\mathrm{RMWR}_\mathbf{t} + c_p\,\mathrm{CMA}_\mathbf{t} + e_{\mathbf{i,t}}$. Fama-French four-factor model (without HML): $\mathbf{R_{p,t}} = a_p + b_p\,\mathrm{MKT}_\mathbf{t} + s_p\,\mathrm{SMB}_\mathbf{t} + \mathbf{r_p}\,\mathrm{RMWR}_\mathbf{t} + c_p\,\mathrm{CMA}_\mathbf{t} + e_{\mathbf{i,t}}$. The sample is from September 2008 to July 2015. Panel C displays the summary results of Table 2.5 with operating profitability (RMW) in the models.

Summary results of models	***Adjusted $\bar{R}^2$***			***GRS***				***Sh(α)***			
	All	SOE	non-SOE	All	B/M	Profit	Inv	All	B/M	Profit	Inv
Panel A: Using RMWC as the profitability factor (Profit)											
Fama-French 4-factor	0.8952	0.6943	0.9590	1.53	1.22	1.42	1.37	0.90	0.40	0.43	0.42
Fama-French 5-factor	0.9096	0.6946	0.9678	1.41	1.04	1.22	1.09	0.89	0.38	0.42	0.39
Panel B: Using RMWR as the profitability factor (Profit)											
Fama-French 4-factor	0.8929	0.6809	0.9566	1.76	1.19	1.52	1.37	0.96	0.39	0.44	0.42
Fama-French 5-factor	0.9061	0.6837	0.9649	1.65	1.02	1.32	1.14	0.95	0.37	0.42	0.39
Panel C: Using RMW as the profitability factor (Profit)											
Fama-French 4-factor	0.8949	0.6755	0.9570	1.54	1.19	1.30	1.09	0.67	0.40	0.42	0.38
Fama-French 5-factor	0.9049	0.6715	0.9630	1.40	0.92	1.03	0.78	0.66	0.36	0.38	0.33

Table 2.8 Continued

Summary results of models	$A\|\alpha\|$			$p(GRS)$				$Sh^2(\alpha)$			
	All	SOE	non-SOE	All	B/M	Profit	Inv	All	B/M	Profit	Inv
Panel A: Using RMWC as the profitability factor (Profit)											
Fama-French 4-factor	0.0038	0.0129	0.0061	0.09	0.30	0.28	0.22	0.82	0.16	0.19	0.18
Fama-French 5-factor	0.0034	0.0126	0.0076	0.14	0.42	0.29	0.38	0.79	0.14	0.17	0.15
Panel B: Using RMWR as the profitability factor (Profit)											
Fama-French 4-factor	0.0039	0.0139	0.0080	0.04	0.31	0.16	0.22	0.92	0.15	0.19	0.18
Fama-French 5-factor	0.0031	0.0133	0.0067	0.06	0.43	0.24	0.35	0.90	0.14	0.18	0.15
Panel C: Using RMW as the profitability factor (Profit)											
Fama-French 4-factor	0.0043	0.0135	0.0086	0.09	0.32	0.25	0.38	0.83	0.16	0.17	0.14
Fama-French 5-factor	0.0029	0.0135	0.0073	0.15	0.52	0.43	0.64	0.79	0.13	0.14	0.11

Table 2.9 Testing the profitability factors

The table reports the results of time-series regressions with each of the profitability variables (operating profitability (RMW), cash profitability (RMWC) and ROE profitability (RMWR)) being regressed by the remaining of the five factors. MKT is the value-weighted excess return on the market portfolio, and SMB is average return on the portfolio sorted on size. HML is the value factor with size and book-to-market sort. RMW is the operating profitability factor (Fama and French, 2015). RMWC is the cash profitability factor (Fama and French, 2018; Ball et al., 2015). RMWR is the ROE profitability factor (Hou, Xue and Zhang, 2015; Hou, Mo, Xue and Zhang, 2019). CMA is the investment factor. All factors are 2x3 portfolios constructed using the Fama-French (1993, 2015) methodology. $Sh^2(f)$ is the maximum squared Sharpe ratio for a model's all 6 factors. α, $s(e)$ and $\alpha^2/sd^2(e)$ are the factor's intercept, residual standard error from spanning regressions and the marginal contribution of a factor to a model's $Sh^2(f)$, respectively. Newey-West *t*-statistic is given in parentheses. The sample is from September 2008 to July 2015.

	RMW	**RMWC**	**RMW**	**RMWR**
MKT	-0.03	-0.11*	-0.05	0.08*
	(-0.47)	(-1.84)	(-1.00)	(1.94)
SMB	-0.35***	0.16	-0.35***	-0.28***
	(-3.78)	(1.31)	(-3.10)	(-3.28)
HML	-0.13	-0.17	-0.19	-0.37***
	(-1.10)	(-1.58)	(-1.35)	(-3.56)
RMW		0.33***		-0.01
		(2.87)		(-0.09)
RMWC/RMWR	0.21***		-0.01	
	(2.67)		(-0.09)	
CMA	-0.13	-0.05	-0.15	-0.09
	(-0.81)	(-0.34)	(-0.87)	(-0.61)
α	0.00	0.00	0.01*	0.00
	(1.33)	(1.10)	(1.84)	(0.70)
Adj.R^2	0.448	0.188	0.407	0.509
$Sh^2(f)$	0.085	0.085	0.063	0.063
$s(e)$	0.003	0.004	0.003	0.003
$\alpha^2/sd^2(e)$	0.025	0.015	0.040	0.005

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2.10 Testing the redundancy of the value factor using cash profitability (Fama and French, 2018; Ball et al., 2015) and ROE profitability (Hou et al., 2019)

This table reports the results of time-series regressions with each of the variables being regressed by the remaining of the five factors. MKT is the value-weighted excess return on the market portfolio, and SMB is average return on the portfolio sorted on size. HML is the value factor with size and book-to-market sort. CMA is the investment factor. All factors are 2x3 portfolios constructed using the Fama-French (1993, 2015) methodology. $Sh^2(f)$ is the maximum squared Sharpe ratio for a model's factors. α and $\alpha^2/sd^2(e)$ are the factor's intercept from spanning regressions and the marginal contribution of a factor to a model's $Sh^2(f)$, respectively. The Newey-West *t*-statistic is given in parentheses. The sample is from September 2008 to July 2015. Panel A shows the analysis with respect to the cash profitability factor (RMWC) by Fama and French (2018) and Ball et al.(2015). Panel B describes the ROE profitability factor (RMWR) calculated using Hou, Mo, Xue and Zhang's (2019) definition.

Panel A: Cash Profitability (RMWC)

	MKT	**SMB**	**HML**	**RMWC**	**CMA**
MKT		-0.09	0.11*	-0.13**	-0.13**
		(-0.97)	(1.89)	(-2.12)	(-2.20)
SMB	-0.22		0.29***	0.05	-0.08
	(-0.93)		(3.59)	(0.47)	(-0.90)
HML	0.51*	0.58***		-0.23*	0.42***
	(1.86)	(4.30)		(-1.74)	(4.85)
RMWC	-0.56*	0.09	-0.22		-0.06
	(-1.90)	(0.50)	(-1.50)		(-0.61)
CMA	-0.92**	-0.24	0.62***	-0.10	
	(-2.13)	(-0.90)	(4.76)	(-0.58)	
α	-0.00	-0.00	0.01	0.01	-0.00
	(-0.49)	(-0.10)	(1.63)	(1.50)	(-0.49)
Adj. R^2	0.162	0.138	0.415	0.139	0.303
$Sh^2(f)$	0.062	0.062	0.062	0.062	0.062
$\alpha^2/sd^2(e)$	0.004	0.000	0.034	0.029	0.004

t-statistics in parentheses

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

Table 2.10 Continued

Panel B: ROE Profitability (RMWR)

	MKT	**SMB**	**HML**	**RMWR**	**CMA**
MKT		-0.02	0.16***	0.08**	-0.11**
		(-0.31)	(2.92)	(1.98)	(-2.05)
SMB	-0.06		0.09	-0.28***	-0.11
	(-0.31)		(0.81)	(-3.01)	(-0.90)
HML	0.90***	0.17		-0.37***	0.39***
	(3.36)	(0.73)		(-3.68)	(3.02)
RMWR	0.67*	-0.75**	-0.53***		-0.10
	(1.93)	(-2.41)	(-2.70)		(-0.51)
CMA	-0.82**	-0.27	0.50***	-0.09	
	(-2.24)	(-0.97)	(3.28)	(-0.56)	
α	-0.01	0.00	0.01	0.00	-0.00
	(-1.01)	(0.25)	(1.50)	(0.63)	(-0.55)
Adj. R^2	0.147	0.315	0.503	0.515	0.305
$Sh^2(f)$	0.037	0.037	0.037	0.037	0.037
$\alpha^2/sd^2(e)$	0.016	0.001	0.027	0.005	0.005

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

CHAPTER 3

COMPARING CROSS-SECTION AND TIME-SERIES FACTOR MODELS IN VIETNAM

3.1 Introduction

Motivated by the recent Fama and French's (2019) paper on the application of Fama and Macbeth's (1973) cross-sectional approach to extract factors for time-series asset price testing, this chapter examines the factor models using a different methodology of factor construction (Fama and French, 1993, 2015, 2018; Fama and Macbeth, 1973) in asset pricing for the equity market of Vietnam. This new approach using Fama-Macbeth cross-sectional factors in Fama-French time-series model testing is supposed to help in choosing the best factor model among competing methods of constructing factors in light of different methodologies previously developed in asset pricing literature.

Over the past 50 years, Fama and Macbeth's (FM 1973) cross-sectional regressions have become a standard tool in asset pricing testing that link the average stock returns to its characteristics. Much previous research has used this methodology in testifying the asset returns and verifying asset pricing hypotheses (Fama and French, 2006; Lewellen,

2015; and Bessembinder, Cooper and Zhang, 2019). By extending this model to allow time-varying factor loadings, Fama and French (2019) show the application of the FM approach to a time-series model setting for the purpose of assessing performance of different models in predicting stock returns.

Following the FM two-stage approach, the development of asset pricing testing is extended to the factor models using a time-series methodology that is based on the FM (1973) cross-sectional regression findings that asset returns were associated with its characteristics.

Later development in empirical asset pricing includes the work of Fama and French (1992) on the ability of size (i.e., market capitalisation) and book-to-market ratio (BM) to explain the variation in average stock returns uncaptured by the capital asset pricing model (CAPM) of Sharpe (1964) and Lintner (1965), providing grounds for Fama and French (1993) to establish the time-series three-factor models to describe stock returns.

The Fama-French (FF) three-factor model was later challenged by the evidence of a wide array of anomalies that this model cannot explain. To name few, momentum (Jegadeesh and Titman, 1993) and idiosyncratic volatility (Ang, Hodrick, Xing, and Zhang, 2006) made it clear that the model needs to be modified for a better description of average stock returns. In recent years, Fama and French introduced the five-factor model in response to the findings of Titman, Wei and Xie (2004), Hou,

Xue & Zhang (2015) and Novy-Marx (2013) that profitability and investment characteristics hinder FF three-factor models from explaining the cross-sectional variation in expected returns. Hou, Xue and Zhang (2015) use the q-factor model to show that profitability and investment factors outperform the FF three-factor (1993) in explaining the returns of a broad list of anomalies.

The dividend discount model and the valuation theory form the conceptual framework for the FF five-factor model (Fama and French, 2015) to be developed with new variables of profitability and investment to be included into the existing FF model with market, size and value factors. In the same paper, Fama and French (2015) provide evidence that the value factor (i.e., the book-to-market ratio) becomes redundant in capturing patterns of average stock returns in the US market. An extensive research has been done over the international markets (Fama and French, 2017) that confirms the superiority of the FF five-factor model. The controversy on the redundancy of the value factor continues with the Cakici (2015) findings that the value factor becomes redundant in North American, European and global portfolios, but not in the Asia Pacific region. The debate has been further extended to the choice of the proxy for the profitability factor that would improve the performance of the FF five-factor model in explaining the relationship between the time-series factors and stock expected returns. Ball, Gerakos, Kinnainmaa and Nikolaev (2015) suggest to use cash profitability for the profitability

factor. Fama and French (2018) provide supporting evidence of the FF factor model with cash profitability replacing operating profitability which improves the description of average portfolio returns. In the same paper, Fama and French document no marginal contribution of the value factor to the maximum squared Sharpe ratio (Barillas and Shanken, 2017) of the five-factor model's model.

Although Fama-Macbeth's cross-sectional regressions have been used recently in asset pricing tests of Fama and French (2006), Lewellen (2015), Heaney, Koh and Lan (2016) and Bessembinder, Cooper and Zhang (2019), there is a study of Back, Kapadia and Ostdiek (2013, 2015) that uses FM constant slopes as factors in time-series regressions. The latest study of Fama and French (2019) extends this work by linking the cross-sectional factors and their time-varying loadings to the current time-series factor models to enhance the description of the expected returns of US equities.

At a regional level, there are some studies that analyze the FF factor models in emerging markets. Nartea, Bert and Lee (2011) uses the Fama-French three-factor model in the analysis of five markets, namely Malaysia, Singapore, Thailand, Indonesia, and the Philippines, to discover the relationship between idiosyncratic volatility and stock returns in ASEAN markets. Nartea, Wu and Liu (2013) direct academic attention to the Chinese stock market featuring distinctive characteristics not evident in developed countries when analyzing

idiosyncratic volatility. The asset pricing literature for Asian markets also includes momentum and information uncertainty as a mispricing factor (Cheema and Nartea, 2014), the volatility effect for Hong Kong (Nartea, 2013) and South Korean markets (Nartea, 2014) using the FF three-factor model.

No prior empirical investigation is found on factor loadings and the application of FM cross-section factors in a time-series model setting for a country in Asia. By extending the research on the Vietnamese stock market following Chapter 2, this study provides new evidence on the time-varying factor loadings from cross-section factors applied to a time-series model for a country other than the US. This study also extends an understanding of different profitability measures in a model under a cross-sectional and time-series setting for the Vietnamese stock market. There are very limited studies on Vietnam's equities market. Fang, Wu and Nguyen (2017) use the three-factor model when analyzing idiosyncratic risk in Vietnam. Batten et al. (2014) analyzes the association between liquidity and Vietnamese stock returns in the crisis period. None has been published on the time-varying factor loadings in a country other than the US; hence, Vietnam is the natural choice of this research following Chapter 2. In addition, the explanatory power of the FF five-factor model is still under question for further empirical verification. There is no research exploring the question of the choice of factors in the FF multi-factor models over the traditional models for an

emerging market; hence, this work addresses this gap in the literature. The question of value redundancy and choice of a profitability measure have not been analyzed for any Asian market.

This study provides new empirical evidence from a developing country that the FF factor model (Fama and French, 2019) with time-varying loading outperforms the traditional FF factor models that use constant regression slopes (Fama and French, 1993, 2015). These findings are contrary to Fama and French's (2019) conclusion about the superiority of the time-series factor model with cross-sectional factor returns over the same one that uses time-series factors. This work also provides evidence that time-varying characteristics used as factor loadings in the FF five-factor model significantly improves the description of the average stock returns. This study also supports the evidence in Chapter 2 that operating profitability (Novy-Max, 2013) is still the preferred profitability factor in both factor models with cross-sectional and time-series factors.

This chapter studies factor models with time-varying factor loadings, both with time series factors and cross-sectional factors, for the emerging market of Vietnam. It is crucial to test another market to make sure the Fama and French (2019) findings on the US stock market are applicable to another market regardless of its capital market development stage, economic conditions and political system.

This research deals with the following questions: 1) Which factor model (with Fama-French time-series factors, or Fama-Macbeth cross-sectional factors) best describes the return variation of Vietnamese equities? 2) Is the factor model sensitive to the choice of factor loadings (constant regression slope and prescribed time-varying characteristics)? 3) Which proxy for a profitability factor would be best for the new factor model with cross-sectional factors (Fama and French, 2019)?

This study makes two contributions to the current asset pricing literature. First, this study analyzes the performance of the asset pricing models using factor loadings and provides new evidence about the superiority of the time-series factor models with cross-sectional factor loadings in an emerging market. The results presented in this chapter urge the need of developing market verification of results evident in developed countries. Second, the study provides further evidence on the controversy regarding the choice of the profitability factor in the presence of different approaches of testing the factor models (Fama and French, 2006, 2017, 2018; Ball et al., 2015; Hou, Mo, Xue and Zhang, 2019; Novy-Max, 2013).

The remainder of this chapter is organized as follows. Section 3.2 provides a framework of the methodology used in this analysis. Section 3.3 describes the data, factor design and construction of test portfolios. Section 3.4 delivers empirical results on the cross-sectional factor models (Fama and French, 2019) as compared with the time-series factor

models (Fama and French, 1993, 2015, 2018). Section 3.5 investigates different measures for the profitability factor in the cross-sectional factor models and verifies the ability of the factor models with cash profitability and the ROE profitability proxies in explaining expected stock returns in Vietnam. Section 3.6 provides final conclusion on the findings.

3.2 Factor model framework

3.2.1 Application of the Fama-Macbeth cross-sectional approach to the Fama-French time-series regression setting

In the latest paper of Fama and French (2019), the authors revisit the Fama Macbeth (FM hereafter) methodology and argue that FM cross-section regressions are a type of factor model:

$$R_{p,t} = R_{Z,t} + R_{MC,t}MC_{p,t-1} + R_{BM,t}BM_{p,t-1} + R_{OP,t}OP_{p,t-1} + R_{INV,t}INV_{p,t-1} + \varepsilon_{p,t}, (1)$$

where $MC_{p,t-1}$, $BM_{p,t-1}$, $OP_{p,t-1}$ and $INV_{p,t-1}$ are the predetermined portfolio characteristics of market capitalisation, book-to-market value and stock growth rate used to construct the factors in month *t-1* (Fama and French, 1993, 2015, 2019). In FM Model (1), $R_{p,t}$ is the returns of portfolio p in month t; $R_{Z,t}$ is the cross-sectional level return of standard portfolio Z with equal weight on all portofolio p in month t that is not captured by the regression explanatory variables.

The slopes $R_{MC,t}, R_{BM,t}, R_{OP,t}$ and $R_{INV,t}$ are MC, BM, OP and INV portfolio returns, respectively, that can be considered as factors. Fama (1976) shows that the slopes are actually the returns on each portfolio of the left-hand-side (LHS) portfolios with weights for portfolios (that determine its monthly *t-1* value of the corresponding variable MC, BM, OP or INV) to one and zero out each explanatory variable. The slope portfolios assume no net investment, i.e., long positions in an LHS portfolio are financed by short positions in other LHS portfolios. Thus, $R_{Z,t}$ sets the average of the regression's predicted returns of all portfolios *p* for the month equal to the average of the realized portfolio returns.

The logic is that Model (1) stacked across time *t* will allow the FM cross-section regressions to turn into an asset pricing model for testing in a time-series approach. Model (1) can be rewritten as a four-factor model to explain the portfolio returns in excess of $R_{Z,t}$ by rearranging portfolio characteristics and factors and shifting $R_{Z,t}$ to the LHS of the equation:

$$R_{p,t} - R_{Z,t} = MC_{p,t-1}R_{MC,t} + BM_{p,t-1}R_{BM,t} + OP_{p,t-1}R_{OP,t} + INV_{p,t-1}R_{INV,t} + \varepsilon_{p,t}. \quad (2)$$

The slopes $R_{MC,t}, R_{BM,t}, R_{OP,t}$ and $R_{INV,t}$ in Model (1) become the factors in Model (2) and the portfolio characteristics MC_{t-1}, BM_{t-1}, OP_{t-1} and INV_{t-1} in Model (1) are the time-varying factor loadings in Model (2). This time-series model that uses FM cross-section factor returns will be used to compare with FF regressions with time-series factors:

$$R_{p,t} - R_{f,t} = \alpha_p + b_p MKT_t + s_p SMB_t + h_p HML_t + r_p RMW_t + c_p CMA_t + \varepsilon_{p,t}, \quad (3)$$

where $R_{p,t}$ is the excess returns of portfolio p in month t; SMB_t, HML_t, RMW_t and CMA_t are the factor-mimicking portfolios for size, value, profitability and investment, respectively; and MKT_t is the monthly excess returns on stock market portfolio (Fama and French, 2015). Given the evidence provided in Chapter 2 that the Fama-French five-factor model has more explanatory power than the three- and four-factor models, this analysis conducts the testing using all five factors of Fama and French (2015) for the models[11] with both cross-sectional and time-series factors and different profitability measures for RMW_t (Hou, Mo, Xue and Zhang, 2019; Fama and French, 2018; Ball, Gerakos, Linnainmaa and Nikolaev, 2015; Novy-Max, 2013).

Although it is seen that the pricing error for portfolio p is the intercept α_p in Model (3) and the average value across t of the residual $\varepsilon_{p,t}$ in Model (2), respectively, the factors in Model (2) are optimized to the specified time-varying factor loadings and LHS portfolio returns, i.e., the factor loadings that drive month-by-month optimization of the factors in Model (1). In Model (3), however, the constant factor loadings in Model (3) are optimized in a time-series regression instead of the factors as in Model (2). Hence, there is no necessity to reestimate the factor loadings in Model (2) as they adjust themselves when the factors (i.e., portfolio characteristics MC_{t-1}, BM_{t-1}, OP_{t-1} and INV_{t-1}) change. Therefore, this

[11] The findings of Chapter 2 show that the value factor (HML) and operating profitability (RMW) have a major role in explaining the expected stock returns for an emerging market.

study does not have the issue of factor loading change through the time as highlighted by some studies (Shanken, 1990; Ferson and Harvey, 1991; Ferson and Schadt, 1996; Jagannathan and Wang, 1996; Fama and French, 1997; Avramov and Chordia, 2006).

Looking at the factors of Model (2), it can be used to construct the mimicking portfolios for the Fama-French five-factor model (Fama and French, 2015) by considering cross-sectional factors $R_{MC,t}, R_{BM,t}, R_{OP,t}$ and $R_{INV,t}$ in Model (2) as the size, value, profitability and investment factors in Model (3). In this case, the following time-series regression of the Fama-French five-factor model that uses cross-sectional factors $R_{MC,t}, R_{BM,t}, R_{OP,t}$ and $R_{INV,t}$ of Model (2) is obtained:

$$R_{p,t} - R_{f,t} = b_p + m_p MKT_t + s_p R_{MC,t} + v_p R_{BM,t} + p_p R_{OP,t} + i_p R_{INV,t} + \varepsilon_{p,t}. \qquad (4)$$

Although Model (4) will be tested against other models in this Chapter, the criticism of this approach by Back, Kapadia and Ostdiek (2013, 2015) is that the uniqueness of the time-varying nature of the factor loadings in cross-sectional Model (2) for enhancement of the description of average stock returns is omitted in Model (4) with constant factor loadings. We expect this model to perform worst out of all models under analysis since no optimization is achieved in both factors and factor loadings.

By including the assumption that average returns can vary with stock size and other characteristics (Fama and French, 1992, 1993, 1997),

Model (3) is augmented with interaction variables to allow time-varying loadings for the Fama-French five factors:

$$R_{p,t} - R_{f,t} = \alpha_p + b_p MKT_t + s_p SMB_t + h_p HML_t + r_p RMW_t + c_p CMA_t +$$
$$s_{p2} MC_{p,t-1} SMB_t + h_{p2} BM_{p,t-1} HML_t + r_{p2} OP_{p,t-1} RMW_t + c_{p2} INV_{p,t-1} CMA_t + \varepsilon_{p,t}. \quad (5)$$

Recent papers argue that the performance of the models is subject to profitability choice. The focus is to investigate model performance with different profitability measures used. This study takes further steps to investigate the variants of models (1) to (5) with operating profitability (Fama and French, 2015, 2017; Novy-Max, 2013) cash profitability (Fama and French, 2018; Ball et al., 2015) and ROE profitability (Hou et al., 2015, 2019) as proxies for the profitability factor.

3.2.2 Test metrics

This study investigates the explanatory power of the cross-sectional four-factor model (2) and the five-factor models (3), (4) and (5) on the variation of stock returns by looking at the GRS test statistics and its *p*-value (Gibbons, Ross and Shanken, 1989), the average value of absolute pricing errors, $A|\alpha|$, the average value of absolute *t*-statistic for pricing errors, $A|t(\alpha)|$, the average squared pricing error over the cross-sectional variance of the average returns on the test portfolios, $A\alpha^2/\bar{Vr}$, the average difference between each squared pricing error and its squared standard error divided by the cross-sectional variance of the average returns on the test portfolios, $A\lambda^2/\bar{Vr}$ (Fama and French, 2019),

the average standard error of pricing errors, *As(α)*, the average standard deviation of the residuals, *Asd(e)*, and the maximum squared Sharpe ratio for pricing errors, $Sh^2(\alpha)$ (Fama and French, 2018; Barillas and Shanken, 2017).

GRS statistic and *p*-value test whether the regression intercepts (the pricing errors) of a model are jointly equal to zero. As Merton (1973) suggests, the intercept is indistinguishable from zero if an asset pricing model completely captures expected returns. GRS tests can only be conducted for the models that have time-series regression intercepts and constant factor loadings. Hence, this work uses *F*-statistic and *p*-value of Hotelling T^2 for the models without an intercept and constant factor models. Although GRS nor Hotelling T^2 tests are useful in comparing models with constant factor loadings, this test metrics does not work for Model (5) and Model (2) with time-varying factor loadings (Fama and French, 2019). Hence, this study applies neither GRS nor Hotelling T^2 for the models of a time-varing factor loading nature.

This work also provides additional test metrics to judge the performance of factor models. The study uses average absolute intercepts, $A|\alpha|$, as one of the main metrics. The model that best describes the variation in stock returns across portfolios is the one that provides the lowest value of $A|\alpha|$. The second model assessment approach is to investigate the cross-sectional dispersion in average returns missed by a model, $A\alpha^2/\bar{Vr}$, and noise-adjusted $A\lambda^2/\bar{Vr}$. The low values of these two metrics suggest

low intercept dispersion relative to the dispersion of LHS portfolio average returns (Fama and French, 2019). The last measures of regression fit are the average precision of pricing errors, Ase(α), and the average of time-series standard errors of unexplained LHS returns, Asd(e), that will assist this chapter in the assessment of the explanatory power of the models.

Unlike GRS and $Sh^2(\alpha)$ that show the magnitude of regression intercepts that account for covariances, all other test metrics weigh each regression equally. This work does not provide the regression adjusted R-squared since it cannot be used in Model (2) where the LHS portfolio returns are in excess of the standard portfolio returns, Rz. The best model is the one that provides the lowest values across the test metrics.

3.3 Data selection, factor design and portfolio construction

3.3.1 Data

To be consistent with previous studies on Vietnam asset pricing testing, in this analysis the same data as in Chapter 2 are used for consistency of test results. The analysis is conducted for all common stocks traded on the Hochiminh and Hanoi Stock Exchanges (inclusive of UPCoM) at a monthly frequency from August 2007 to July 2015.[12] The source of data

[12] For UPCoM, stocks prices are available until the end of 2014.

is the Datastream database, which includes information on adjusted closing prices, trading volume, market-to-book ratios, market capitalisation, revenue, administrative expense, interest expense, cost of goods sold, total assets and state ownership. An interbank offer rate is used as the risk-free rate.

To avoid stocks with abnormal trading or price errors on Datastream as well as reduce the impact of infrequent trading, this study applies the same stock screening as in Chapter 2, i.e., all stocks with daily returns of more than 50% in absolute terms, monthly returns of more than 200% and no return or trading data for the 10 business days will be excluded from the sample for the analysis in that specific month.[13] Companies must also have a valid trade and not have been delisted prior to the formation period. Consistent with Fama and French's (1993, 2015) methodology, all stocks with negative book-to-market ratios are excluded from the sample and they should have required accounting data[14] as prescribed by Fama and French (1993, 2015).

By applying the Fama and French (1993, 2015) methodology, for inclusion in a portfolio in July of each year (annual rebalancing) a stock must have market equity data for December of the previous year and June of the current year; a non-missing (positive) book-to-market ratio

[13] Angelides (2010) removes all the stocks that have fewer than five observations during a month.

[14] To reduce the noise in computing variables, several stocks that have extreme values of book-to-market ratio (higher than 8.0), operating profitability ratio (more than 100%) and investment ratio (higher than 4.0) are excluded.

for December of the previous year; non-missing revenues and at least one of the following: cost of goods sold, sales, general and administrative expenses, or interest expense at the end of the fiscal year (December) ending in the previous year; and total assets data at the end of the fiscal year ending in year *t*-1 and *t*-2.

Table 3.1 presents the coverage of stocks used in the sample including the total trading value, volume and market capitalisation, over the sample period.[15] This table also provides statistics for cash and operating profitability measures. On average, this study has 346 companies over the entire sample period. The average values for BM and INV are 1.233 and 0.254, respectively, over all years under analysis. Average OP, CP and RP are sitting at 0.067, 0.092 and 0.079, respectively.

3.3.2 Cross-section factor construction

This research follows the Fama and French (2019) methodology in constructing cross-sectional factors (Fama and Macbeth, 1973).

3.3.2.1 Portfolio characteristics – MC, BM, Profit and INV

The characteristics are computed on 18 portfolios that make up the Fama-French five factors. MC is the natural log of market cap and BM

[15] It is important to note that stocks are not removed completely from the entire sample. They are omitted for the specific month when they have inadequate trading (no return data for the previous 10 consecutive business days or no return data for more than 10 business days in total during a month) and included again in the sample whenever they satisfy the criteria on trading activities.

is the market-to-book ratio. For the Profit measure, three proxies are used: operating profitability, cash profitability and ROE profitability. Operating profitability (OP) is defined as annual revenues minus cost of goods sold, interest expense, and selling, general and administrative expenses, all divided by book equity (Fama and French, 2015; Novy-Marx, 2013) in the models that use OP in the testing. Cash profitability (CP) follows Ball et al.'s (2015) definition. ROE profitability (RP) uses Hou, Mo, Xue and Zhang's (2019) definition. The rate of growth of total assets or investment (INV) is the natural log of total assets in year *t*-2 over total assets of year *t*-1. MC and BM are updated monthly, whereas Profit and INV are updated annually. All factor portfolios are formed at the end of June in each year *t* in the 2x3 format from the double-sort of three stock characteristics: size and value, profitability or investment. The portfolio characteristics will be used in deriving the cross-section factor returns and Fama-French time-series factors discussed in the next part of this section.

3.3.2.2 Returns on a standard portfolio (Rz)

R_Z extracted from Model (1) and used in Model (2) is the level return on a standard portfolio with equal weights on all LHS portfolios. Monthly R_Z are obtained in a form of intercept of the first-stage cross-sectional regressions (Fama and Macbeth, 1973) for all 18 factor portfolios in each month *t*.

3.3.2.3 Returns on size factor, value factor and investment factor

Monthly returns on size factor (R_{MC}), value factor (R_{BM}) and investment factor (R_{INV}) are the loadings on MC, BM and INV characteristics, respectively, after regressing 18 factor portfolios on a monthly basis against the characteristics (MC, BM, Profit, INV) of those portfolios using the first-stage of Fama and Macbeth methodology (1973).

3.3.2.4 Returns on operating, cash and ROE profitability factors

Similarly, returns on operating profitability factor (R_{OP}), cash profitability factor (R_{CP}) and ROE profitability factor (R_{RP}) are extracted from loadings on OP, CP and RP after running the first-stage cross-sectional regressions (Fama and Macbeth, 1973) with each of the profit proxies OP, CP or RP.

Monthly cross-section returns, R_{MC}, R_{BM}, R_{INV}, R_{OP}, R_{CP} and R_{RP}, after being extracted from Model (1), will be used as factors in Model (2) and Model (4) to compare with other models.

3.3.3 Time-series factor design

This study follows the FF methodology in constructing risk factors (Fama and French, 1993, 2015) and uses the same dataset as in Chapter 2. All portfolios are formed in June of year *t*.

3.3.3.1 Market factor (MKT)

MKT is the monthly average return on a market portfolio of the sample stocks in excess of the interbank offer rate in Vietnam. MKT is value-weighted using market capitalisation as at the end of month *t*-1.

3.3.3.2 Size factor (SMB)

To form a size portfolio in July of year *t*, stocks are assigned into either small or large size portfolios based on the market cap median threshold. These two value-weighted portfolios are annually rebalanced. The size factor (SMB) is the return difference between the average returns on the small firms' portfolios and the average returns on big firms' portfolios.

3.3.3.3 Value factor (HML)

The book-to-market sort uses the book-to-market ratio for the fiscal year ending in calendar year *t*-1 (at the end of December of *t*-1) and breakpoints at the 30th to 70th percentiles. Annual rebalancing and a value-weighted approach are applied to these portfolios. Six portfolios are constructed from the intersection of two size and three book-to-market portfolios. The value factor (HML) is the return difference between the high book-to-market portfolios and the low book-to-market portfolios.

3.3.3.4 Operating, cash and ROE profitability factors (RMW, RMWC and RMWR)

Profitability factor uses accounting data for the fiscal year ending in calendar year t-1. Portfolios are formed in June of year t using the breakpoints of 30% and 70%. Annual rebalancing and a value-weighted approach are applied to these portfolios. Six portfolios are formed from the intersection of two size and three profitability portfolios. The RMW factor is the return difference between the average returns on the high (robust) OP portfolios and the average returns on the low (weak) OP portfolios. The RMWC factor is the return difference between the average returns on the high (robust) CP portfolios and the average returns on the low (weak) CP portfolios. The RMWR factor is the return difference between the average returns on the high (robust) RP portfolios and the average returns on the low (weak) RP portfolios. In order to make the analysis of different profitability factors comparable and consistent for the purpose of determining which profitability proxy would be best in the FF five-factor model to describe the stock returns, one-year-lagged book equity is used to calculate ROE profitability[16] and conventional double (2x3) sorting on size and RP.

3.3.3.5 Investment factor (CMA)

Three value-weighted portfolios are formed using the breakpoints of 30% and 70% and annually rebalanced. Six portfolios are constructed from

[16] Fama and French's (2015, 2016, 2017, 2018, 2019) method of one-year-lagged book equity is used in contrast to Hou et. al. (2015, 2019) RP definition that uses a one-quarter-lagged book.

the intersection of two size and three investment portfolios. The CMA factor is the return difference between the average returns on the conservative investment portfolios and the average returns on the aggressive investment portfolios.

For the purpose of testing the time-series (TS) versus the cross-section (CS) factors in the five-factor models, it is important to use the same portfolios (2x3 sorts) to produce TS and CS factors to address the central question of whether the optimized CS factors enhances the description of stock returns for the test portfolios (three sets of nine double-sorted portfolios).

3.3.4 Left-hand-side (LHS) portfolios

Three sets of 3x3 portfolios are formed to test the models. All stocks are allocated to three different portfolios at the end of December of each year based on market capitalisation using breakpoints at the 33rd and 67th percentiles. In the second sort, each portfolio is allocated into three portfolios based on book-to-market, profitability and investment. The average portfolio monthly returns are rebalanced on an annual basis and calculated from July of year t+1 using a value-weighted approach. Profitability factor uses either OP, CP or RP in the calculations (Fama and French, 2018; Novy-Max, 2013; Ball et al., 2015; Hou et al., 2019).

Table 3.2 presents the summary statistics of all factors. Cross-section regressions with different profitability measures (Panels A to C) produces three different sets of CS factor returns, unlike the TS factors

in Panel D. The results show that the CS factors are arbitrary, consistent with Fama and French (2019).

Panel D of Table 3.2 shows that all factors except TS investment factor (CMA) have statistically significant average returns. Panels A to C, instead, show a contradicting result with the only statistically important factor is CS investment factor (R_{INV}). Consistent with Fama and French (2019), the sign of the mean values of TS factor returns (SMB) is opposite that of CS factor returns (R_{MC}). The results also show the opposite sign for TS RMWR and CS R_{RP}. In contrast to the same study, no difference in sign for CMA and R_{INV} is observed; however, there are differences in *t*-statistics for TS and CS factors. This is in line with the later findings that a time-series model works better in explaining the variation in stock returns. All CS factors' *t*-statistics (with the exception of R_{INV}) are insignificant regardless of profitability choice. By using RP as the profitability factor (Panel C), the *t*-statistic for the cross-sectional value factor return becomes significant at the 5% level.

The average TS value-weighted monthly market return, MKT (-0.65%) is higher than the averages of CS equally weighted monthly level returns on a standard portfolio, R_Z, of OP, CP and RP versions of Model (1) that are -0.76%, -2.92% and -0.75%, respectively.

3.4 Empirical results on asset pricing tests

Table 3.3 examines how well variants of Models (2), (3), (4) and (5) explain average returns on 27 portfolios sorted on size (MC) and a combination of value, profitability and investment. LHS returns of Panel A are in excess of the risk-free rate, R_f, and RHS factors include market factor (MKT), i.e., the excess market return $R_m - R_f$. Panels A1 and A2 estimate constant factor loadings using ordinary least squares (OLS) slopes as specified in Models (3) and (4).

On all metrics, Model (3) with operating and cash profitability can account for more asset pricing anomalies than Model (4) and Model (2) with constant factor loadings. Hence, there is no supporting evidence to suggest dropping time-series factors from Model (3) and replacing them with cross-sectional factors in the case of constant factor loadings.

Panel A3 shows that Model (5) slightly improves the pricing error metrics results when interaction variables are used to include time-varying factor loadings. However, the less precision of pricing errors of Model (5) with Ase(α) of 0.0038 is shown compared with that of Model (3) in the range of 0.0034 – 0.0035. In addition, the sampling-error-adjusted cross-sectional dispersion in average returns missed by a model ($A\lambda^2/\bar{Vr}$) is larger for Model (5) that uses cash and ROE profitability factors than Model (3) with corresponding factors. Regardless of the Ase(α) and $A\lambda^2/\bar{Vr}$ results, all other test metrics provide a supporting

evidence that the time-varying factor loadings systematically improve the pricing error performance of time-series factor models.

Panel B of Table 3.3 depicts summary results on the performance of variants of Model (2) where LHS returns are in excess of R_Z, the level return on a standard portfolio, and RHS factors consist of only cross-sectional factor returns extracted from Model (1) without the market factor (MKT). Panel B1 of Table 3.3 is analogous to Model (4) with constant factor OLS slopes but without the MKT factor. Despite $A\lambda^2/\bar{Vr}$, *Ase(α)* shows preference for Model (4) with MKT, all other metrics show the superiority of the same model without MKT, i.e., Model (2) in Panel B1. The test metrics $A\lambda^2/\bar{Vr}$, *Ase(e)* and *Asd(e)* that assess the noise-adjusted dispersion in average returns missed by a model and the precision of pricing errors show that Model (2) is the worst out of all models in the analysis; this model using OLS regression slope as factor loadings still performs better than Model (4) based on the test metrics $A|\alpha|$ and $Ae^2/\bar{Vr}$ implying Model (2) in Panel B1 with the returns on a standard portfolio can better describe the variation in stock returns across portfolios and have less dispersion of pricing errors relative to the dispersion of LHS portfolio average returns than Model (4).

Looking at the comparison between constant OLS slopes and a portfolio's average characteristics for the models that use cross-sectional factors, Model (2) in Panel B1 with constant regression slopes outperforms the same model with a portfolio's average characteristics as factor loadings

(Model (2) in Panel B2), but it cannot win over Models (2) in Panel B3 that use time-varying factor loadings. Hence, similar to the findings on the superiority of the factor model with time series factors and their time-varying loadings (Panel A3), the performance of the models in Panel B significantly improve when the loadings for cross-section factors are allowed to be the time-series average values of characteristics of each testing portfolio (Panel B3).

To compare the explanatory power of the models of Panels A and B, the relevant test metrics are the cross-sectional average of time-series standard deviations of unexplained LHS portfolio returns, Ase(α) in the case of Panel A and Ase(e) for Panel B that are equivalent in assessing the average precision of pricing errors. In this case, all the models that use time-series factors win the competition over their competing models with cross-sectional factors for the best model in explaining the variation of stock returns in Vietnam.

Among the two models with time-series factors and LHS returns in excess of R_f, Model (5) that allows time-varying characteristic loadings for time-series factors dominates all the models on every pricing error metric (with the exception of the precision of pricing errors discussed above for the comparing purpose of CS and TS factor models). For example, the time-series Models (3) and (5) in Panel A1 and A3 of Table 3.3 that include RMW as the RHS profitability factor and use size-OP for 9 out of 27 LHS portfolios should be compared with Models (4) and

(2) in Panel A2 and Panel B of Table 3.3 that use size-OP for 9 out of 27 LHS portfolios and R_{OP} as the RHS profitability factor in the model. The average absolute pricing error, $A|\alpha|$, is 0.0026 and 0.0029 for time-series Models (5) and (3) in Panels A3 and A1, versus $A|e|$ of 0.0047 and 0.0042 for the variants of Model (2) in Panels B3 and B1. The dispersion of pricing error, $A\alpha^2/\overline{Vr}$, is 0.51 and 0.65 for Models (5) and (3) in Panel A, compared with $Ae^2/\overline{Vr}$ of 0.31 and 0.34 for Model (2) with and without time-varying factor loadings in Panels B3 and B1, respectively. The measure of dispersion of pricing errors that accounts for covariances, $Sh^2(\alpha)$, is 0.44 and 0.79 for Models (5) and (3), versus $Sh^2(e)$ of 0.73 and 0.88 in the equivalent variants of Models (2). Hence, the conclusion is that time-varying loadings add significant value in improving the predictions of the average returns of both models with time-series and cross-sectional factors, with the former one dominating over all others in the analysis. Likewise, the models with cash profitability and ROE profitability support this claim. Thus, the superiority of Model (5) is due to both its time-series factors and their time-varying characteristics, as evident in a significant improvement of pricing error metrics when the time-series models with time-series factors and prescribed time-varying characteristic loadings are used.

Tables 3.4 and 3.5 investigating each set of 9 double-sorted portfolios also support the findings from Table 3.3. The five-factor model with time-varying loadings and time-series factors still outperforms all other

models in explaining the expected returns of portfolios, with each sorted on size and either book-to-market, profitability or investment. The average absolute pricing errors, $A|\alpha|$, for size-B/M sorted portfolios for the models with time-series factors, operating profitability and either constant regression slopes or time-varying characteristics as factor loadings are 0.003 (Panels A1 and A3 of Table 3.4), as compared with $A|e|$ of 0.0054 and 0.0043 for the same models but with cross-sectional factors (Panels A1 and A3 of Table 3.5). The dispersion of pricing error, $A\alpha^2/\bar{Vr}$, is 1.52 and 1.04 for the same portfolios in the same models, versus $Ae^2/\bar{Vr}$ of 0.0054 and 0.0043 for the same models but with cross-sectional factors. $\mathrm{Sh}^2(\alpha)$ is 0.13 and 0.10 for Models (3) and (5) in Table 3.4, versus $\mathrm{Sh}^2(e)$ of 0.16 and 0.007 in Models (2). It is observed that when analyzing each set of portfolios, the pricing error metrics improve with the inclusion of the time-varying characteristics, but the dispersion of pricing errors that account for covariances shows preference to the model with cross-sectional factors over the time-series models. A similar conclusion is drawn for the other two sets of 9 portfolios sorted on size-profit and size-investment.

Table 3.3 shows one anomaly results for the model that uses cash profitability and average characteristics as factor loadings. Table 3.5 shows that such results were routed from the sets of size-CP and size-investment portfolios (Panels B2 and C2 of Table 3.5) that would provide the best description of the average stock returns under the model with

cross-sectional factors by the maximum squared Sharpe ratio for unexplained returns.

Overall, Tables 3.4 and 3.5 support Fama-French (2019) on the cross-section factor model's superiority. The results for all 27 LHS portfolios show that using different profitability measure and different portfolios setting would provide different results on the choice of the model with cross-sectional or time-series factors. Futher investigation of this matter will be discussed in Section 3.5. Despite there being different rankings for the model performance in describing stock returns among the sets of portfolios, all results consistently show the superiority of the time-varying factor loadings over the constant loadings.

3.5 Operating, cash or ROE profitability?

Fama and French (2018) provide evidence that the five-factor model (Fama and French, 2015) is sensitive to the choice of the profitability factor. More specifically, the cash profitability suggested by Ball, Gerakos, Linnainmaa and Nikolaev (2015) improves the description of the average returns for portfolios of different sorts. Cash profitability (RMWC) is the cash profits without accruals (i.e., before interest) scaled by total assets in the 2x3 portfolios sorted on size and profitability. In Model (2) and Model (4) that include different profitability factor, all RHS factor returns change as we change profitability proxy. LHS test assets also use 3x3 portfolios sorted on size and a combination of value,

investment and either operating profitability (Novy-Max, 2013), cash profitability (Ball et al., 2015) or ROE profitability (Hou et al., 2019). Likewise, Model (2) with ROE profitability (Hou et al., 2019) uses R_{RP} and other RHS factor returns that are different from that of the same types that use OP or CP.

Chapter 2 provides an extensive analysis of profitability factors with a conclusion that operating profitability outperforms cash and ROE profitability in describing stock returns. Table 3.3 provides supporting results that operating profitability would provide the best pricing error metrics for the models with constant OLS regression slopes and time-varying characteristics as factor loadings. However, Model (4) that uses ROE profitability as a profit measure and average characteristic loadings for cross-section factors (Panel A2) and Model (2) that uses cash profitability and average characteristic loadings for cross-section factors (Panel B2) produce smaller pricing error metrics than the corresponding cross-sectional Models (4) and (2) with different profit proxies.

Tables 3.4 and 3.5 provide further insights on Models (4) and (2) with ROE and cash profitability measures discussed above. Panel B2 of Table 3.4 shows that the set of 9 portfolios sorted on size and ROE profitability is the main source for the contradictory results in Table 3.3. The 9 portfolios sorted on size-investment (Panel C2 of Table 3.4) are indifferent between operating and ROE profitability measure. The size-BM portfolio (Panel A2 of Table 3.4) gives preference for the operating

profitability to be included in Model (4) for the description of average stock returns.

Panels A2, B2 and C2 of Table 3.5 show persistent results of strong dominance of cash profitability proxies over the two remaining in describing stock returns for Model (2) with the constant average characteristics as factor loadings in each set of the double-sorted portfolios. The findings suggest that for this specific type of model with cross-sectional factors and constant average characteristic factor loadings, cash profitability is the preferred proxy.

3.6 Conclusion

This chapter investigates factor models using both cross-sectional factors from Fama-MacBeth's (1973) approach and time-series factors of Fama and French's (2015) methodology. In contrast to the US market (Fama and French, 2019), this study provides evidence that the time-series factor models have more explanatory power than the cross-section factor models. Time-varying loadings that are natural additions to the constant slope model (3) are the major source of its superior description of average returns. The superiority of Model (5) is due to both its time-series factors and their time-varying characteristics. Following Fama and French's (2019) discussion on time-varying characteristics, it is evident that in the Vietnamese market a portfolio's monthly standardized characteristics anticipate next month's factor returns,

since this study provides evidence that both Fama-French time-series factors and portfolios' time-varying characteristics largely impact the pricing error of the models.

Overall, this study shows the superiority of the five-factor model that uses time-series factors in explaining monthly returns of Vietnamese equities. The pricing error metrics provide the preference for the model with the time-varying nature of factor loadings as the best model regardless of the choice for the Fama-Macbeth (1973) approach and Fama-French (2015) methodology. The operating profitability (Novy-Max, 2013) used in the factor models is likely to perform better than cash profitability (Ball et al., 2015) and ROE profitability (Hou, Mo, Xue and Zhang, 2015).

Table 3.1 Sample coverage for the Vietnamese stock market

Co is the number of listed companies during a year. MC is market capitalisation in trillions of Vietnamese Dong (VND) as at the end of a year. Value and Volume are annual trading value (in trillions of VND) and trading volume (in millions of shares) of all stocks. BM and INV are the average book-to-market ratio and the average investment ratio per stock, respectively, as defined using Fama-French methodology (2015, 2018, 2019). OP, CP and RP are the average value of operating profitability ratio, cash profitability ratio and ROE profitability ratio per stock, respectively, using Fama and French (2015, 2018, 2019), Ball et al. (2015) and Hou, Mo, Xue and Zhang (2019) profitability definition. Data are obtained from Datastream from July 2007 to August 2015.

Year	Co	Value	Volume	MC	BM	INV	OP	CP	RP
2007	135	267.6	2.610	334.5	0.442	0.689	0.052	0.102	0.157
2008	189	120.5	5.261	148.3	0.885	0.278	0.056	0.100	0.051
2009	279	445.9	18.79	371.0	0.928	0.331	0.058	0.088	0.094
2010	400	408.0	19.12	453.1	0.813	0.342	0.066	0.089	0.100
2011	421	137.6	11.27	308.9	1.488	0.151	0.071	0.092	0.069
2012	442	193.2	18.77	383.4	1.879	0.046	0.077	0.090	0.049
2013	425	229.7	22.09	446.9	1.939	0.069	0.075	0.086	0.049
2014	460	523.1	40.16	542.2	1.416	0.125	0.078	0.087	0.066
2015	438	255.8	18.83	623.1	1.319	n/a	n/a	n/a	n/a

Table 3.2 Summary statistics for Fama-French time-series and cross-section factors for Vietnamese stocks

Panel A reports the statistics for the monthly factors extracted from the first-stage Fama-Macbeth (1973) cross-section regression: $R_{p,t} = R_{Z,t} + R_{MC,t}MC_{p,t-1} + R_{BM,t}BM_{p,t-1} + R_{OP,t}OP_{p,t-1} + R_{INV,t}INV_{p,t-1} + \varepsilon_{p,t}$. $R_{Z,t}$ is the intercept, R_{MC}, R_{BM}, R_{OPt} and R_{INV} are the slopes on *MC* (log of market cap), BM (book-to-market ratio), *OP* (operating profitability) and *INV* (investment) of the portfolios used to create Fama and French (2015) factors. Panels B and C report the statistics similar to Panel A, but using CP (cash profitability) in Ball et. al. (2015) and *RP* (ROE profitability) of Hou et. al. (2015, 2019).

Panel D reports the summary statistics for the Fama-French's monthly time-series factors (Fama and French, 2015) created using an independent sort at the end of June of each year. MKT is the difference between the value-weighted return on the market portfolio of all sample stocks and the one-month interbank offer rate. The size factor (SMB) is the return difference between the average returns on the small firm portfolios and the average returns on the big firm portfolios. Six portfolios from the intersection of two size and three book-to-market portfolios (SL, SN, SH, BL, BN, BH) based on the 30th and 70th percentiles. The book-to-market ratio and market equity is updated monthly. The value factor (HML) is the return difference between the average returns on the high book-to-market portfolios and the average returns on the low book-to-market portfolios. Six portfolios from the intersection of two size and three profitability portfolios (SR, SN, SW, BR, BN and BW). Profitability factor (RMW) is the return difference between the average returns on the robust profitability portfolios and the average returns on the weak profitability portfolios. Six portfolios are from the intersection of two size and three investment portfolios (SC, SN, SA, BC, BN and BA). Investment factor (CMA) factor is the return difference between the average returns on the conservative investment portfolios and the average returns on the aggressive investment portfolios. Profitability and investment ratios are updated annually. All portfolios are value-weighted. The factor returns are calculated as follows (Fama and French, 2015) with S and B denoting small- and big-sized portfolios, H, N and L for high, medium and low B/M, R, N and W for robust, medium and weak profitability, and C, N and A for conservative, medium and aggressive investment. Statistics reported are the mean, standard deviation (st.dev), *t*-statistics of the mean, maximum (max), minimum (min), skewness and kurtosis. The sample is from September 2008 to July 2015.

Panel A: Cross-section factor returns with operating profitability

	Mean	Std. dev.	*t*(Mean)	Skewness	Kurtosis	Min	Max
R_Z	-0.0076	0.2745	-0.2407	-0.1088	3.9236	-0.6415	0.8797
R_{MC}	-0.0005	0.0184	-0.2594	0.5162	4.0823	-0.0534	0.0550
R_{BM}	0.0101	0.0643	1.3716	0.5254	3.6323	-0.1324	0.2047
R_{OP}	0.0044	0.1873	0.2032	-0.3869	3.8930	-0.5769	0.4445
R_{INV}	0.0660	0.2281	2.5218	1.8361	12.7491	-0.5826	1.2870

Table 3.2 Continued

Panel B: Cross-section factor returns with cash profitability

	Mean	Std. dev.	*t*(Mean)	Skewness	Kurtosis	Min	Max
R_Z	-0.0292	0.3314	-0.7685	0.5928	4.1794	-0.6425	1.1765
R_{MC}	0.0009	0.0194	0.4009	-0.2895	4.3652	-0.0679	0.0520
R_{BM}	0.0083	0.0684	1.0585	0.2649	3.6522	-0.1800	0.1985
R_{CP}	0.0563	0.2669	1.8389	-0.0275	3.6029	-0.7311	0.7152
R_{INV}	0.0488	0.1663	2.5588	0.2336	3.1936	-0.3524	0.5221

Panel C: Cross-section factor returns with ROE profitability

	Mean	Std. dev.	*t*(Mean)	Skewness	Kurtosis	Min	Max
R_Z	-0.0075	0.2918	-0.2245	-0.1131	3.1148	-0.6527	0.6654
R_{MC}	-0.0011	0.0197	-0.5040	0.1727	3.3871	-0.0481	0.0464
R_{BM}	0.0150	0.0617	2.1241	0.6020	3.6222	-0.1168	0.2090
R_{RP}	0.0135	0.0778	1.5144	0.3748	5.2418	-0.1854	0.3081
R_{INV}	0.0679	0.1946	3.0431	1.0212	6.2667	-0.4239	0.8932

Panel D: Time-series factor returns

	Mean	Std. dev.	*t*(Mean)	Skewness	Kurtosis	Min	Max
MKT	-0.0065	0.0843	-3.6566	-0.0244	3.7537	-0.2457	0.2390
SMB	0.0038	0.0540	3.3195	0.0002	3.9358	-0.1388	0.1704
HML	0.0061	0.0464	6.2530	0.9480	5.9929	-0.0978	0.1774
RMW	0.0034	0.0378	4.2867	-0.1730	5.3969	-0.1249	0.1277
RMWC	0.0056	0.0392	6.7193	0.1621	4.7832	-0.1041	0.1483
RMWR	-0.0020	0.0389	-2.4811	-0.6992	4.1263	-0.1354	0.0840
CMA	0.0010	0.0349	1.2924	-0.4653	3.5054	-0.1004	0.0792

Table 3.3 Explaining excess returns of 27 characteristic portfolios

Panel A: Summary of intercepts from regressions explaining returns in excess of R_f with five-factor models (3), (4) and (5)

Model	$A\|\alpha\|$	$A\|t(\alpha)\|$	$A\alpha^2/\bar{Vr}$	$A\lambda^2/\bar{Vr}$	$Ase(\alpha)$	$Asd(e)$	$Sh^2(\alpha)$	GRS	$p(GRS)$
Panel A1: Model (3) with 27 LHS portfolios using different profitability factors; factor loadings are constant regression slopes									
(3) *MKT, SMB, HML, RMW, CMA*	0.0029	0.7837	0.6524	0.6083	0.0035	0.0301	0.7944	1.4003	0.1484
(3) *MKT, SMB, HML, RMWC, CMA*	0.0034	1.0040	0.7134	0.5106	0.0034	0.0293	0.7910	1.4079	0.1446
(3) *MKT, SMB, HML, RMWR, CMA*	0.0031	0.8705	0.6922	0.6069	0.0034	0.0298	0.9048	1.6480	0.0618
Panel A2: Model (4) with 27 LHS portfolios using different profitability measures; factor loadings are constant regression slopes									
(4) *MKT,* R_{MC}, R_{BM}, R_{OP}, R_{INV}	0.0059	0.8586	2.2349	1.324	0.0065	0.0516	1.0279	1.5091	0.1103
(4) *MKT,* R_{MC}, R_{BM}, R_{CP}, R_{INV}	0.0076	1.0832	3.6806	2.3202	0.0065	0.0514	1.0155	1.4584	0.1304
(4) *MKT,* R_{MC}, R_{BM}, R_{RP}, R_{INV}	0.0057	0.8121	2.1608	1.5014	0.0067	0.0514	0.8717	1.1652	0.3195
Panel A3: Model (5) with 27 LHS portfolios using different profitability proxies; factor loadings vary with characteristics									
(5) *MKT, SMB, HML, RMW, CMA*	0.0026	0.6920	0.5071	0.5697	0.0038	0.0284	0.4357		
(5) *MKT, SMB, HML, RMWC, CMA*	0.0024	0.6343	0.4462	0.5307	0.0038	0.0277	0.5291		
(5) *MKT, SMB, HML, RMWR, CMA*	0.0029	0.7443	0.6129	0.6384	0.0038	0.0282	0.5145		

Table 3.3 Continued

Panel B: Summary of average errors, explaining returns in excess of R_Z with four-factor model (2)

Model	$A\|e\|$	$A\|t(e)\|$	$Ae^2/\bar{Vr}$	$A\lambda^2/\bar{Vr}$	$Ase(e)$	$Asd(e)$	$Sh^2(e)$	T^2	$p(T^2)$
Panel B1: Model (2) with 27 LHS portfolios using different profitability measures; factor loadings are constant regression slopes									
(2) R_{MC}, R_{BM}, R_{OP}, R_{INV}	0.0047	0.3356	1.4041	6.5563	0.0136	0.1029	0.8757	1.3183	0.2022
(2) R_{MC}, R_{BM}, R_{CP}, R_{INV}	0.0053	0.3680	1.7333	6.9436	0.0141	0.1131	0.8720	1.2925	0.2190
(2) R_{MC}, R_{BM}, R_{RP}, R_{INV}	0.0067	0.4428	2.7979	6.5304	0.0146	0.1128	0.7199	0.9915	0.4983
Panel B2: Model (2) with 27 LHS portfolios using different profitability measures; factor loadings are average characteristic									
(2) R_{MC}, R_{BM}, R_{OP}, R_{INV}	0.0062	0.4481	2.1830	6.7277	0.0141	0.1233	0.8816	4.3011	0.0382
(2) R_{MC}, R_{BM}, R_{CP}, R_{INV}	0.0044	0.3257	1.1707	7.7017	0.0141	0.1230	0.8770	0.8318	0.3619
(2) R_{MC}, R_{BM}, R_{RP}, R_{INV}	0.0069	0.5036	2.7315	6.3557	0.0140	0.1220	0.7996	5.9393	0.0149
Panel B3: Model (2) with 27 LHS portfolios using different profitability measures; factor loadings are time-varying characteristics									
(2) R_{MC}, R_{BM}, R_{OP}, R_{INV}	0.0042	0.3067	1.0496	8.0150	0.0142	0.1234	0.7314	1.4069	0.2357
(2) R_{MC}, R_{BM}, R_{CP}, R_{INV}	0.0047	0.3403	1.3028	7.9255	0.0144	0.1243	0.5532	1.8969	0.1686
(2) R_{MC}, R_{BM}, R_{RP}, R_{INV}	0.0049	0.3495	1.5257	7.7561	0.0143	0.1239	0.6665	2.5889	0.1078

The tests use 27 left-hand-side (LHS) portfolios from independent 3x3 sorts on *MC*, *BM*, *Profit*, *INV*. For profitability factors, *OP* (operating profitability), *CP* (cash profitability) or *RP* (ROE profitability) are used in each panel. Panel A provides the results for regressions that include MKT (the market factor) and explain the excess returns of 27 portfolios sorted on size (MC) and a combination of BM, Profit and INV. The sample is from September 2008 to July 2015.

Panel A1 uses time-series factors (Fama and French, 2015) with different profitability proxies (Fama and French, 2019; Bal et al., 2015; Hou et al., 2019). Panel A2 uses cross-sectional regression intercepts and coefficients as factor returns from variants of Model (1): $R_{p,t} = R_{Z,t} + R_{MC,t}MC_{p,t-1} + R_{BM,t}BM_{p,t-1} + R_{OP,t}OP_{p,t-1} + R_{INV,t}INV_{p,t-1} + \varepsilon_{p,t}$. Panel A3 summarizes the estimates for Model (5) that combines time-varying loadings in the time-series factors of Model (3).

Panel B reports the results for the variants of Model (2) in which LHS returns are in excess of $R_{Z,t}$. Right-hand-side (RHS) factors are extracted from the variants of Model (1) coefficients similar to $R_{Z,t}$. Panel B3 provides the model results from the prescribed portfolio (size, value, profitability and investment) characteristics as time-varying factor loadings. Panel B2 provides the results where factor loadings are the time-series average

value of the time-varying characteristics. Panel B1 summarizes the results using OLS (with an intercept) regression slopes as factor loadings.

The metrics for Panel A are $A|\alpha|$ and $A|t(\alpha)|$, the average absolute intercept and the average absolute t-statistic for the intercepts; $A\alpha^2/V\bar{r}$, the average squared intercept over the cross-section variance of the average returns on the LHS portfolios, $\bar{r}$; $A\lambda^2/V\bar{r}$, the average difference between each squared intercept and its squared standard error, $s^2(\alpha)$, over the cross-section variance of the average returns on the LHS portfolios, $\bar{r}$; $Ase(\alpha)$, the average standard error of the intercepts; $Asd(\alpha)$, the average standard deviation of the residuals; $Sh^2(\alpha)$, the maximum squared Sharpe ratio for the intercepts for 27 LHS portfolios; the GRS statistic (Gibbons, Ross and Shanken, 1989) and the p-value of GRS. The metrics for Panels B2 and B3 are analogous to those in Panel A, with the exception of mean residual e replacing regression intercept a as an average model (or pricing) error and GRS statistic is replaced with F-statistic of the Hotelling T^2. The metrics for Panel B1 is identical for Panel A.

Model (2): $R_{p,t} - R_{Z,t} = MC_{p,t-1}R_{MC,t} + BM_{p,t-1}R_{BM,t} + OP_{p,t-1}R_{OP,t} + INV_{p,t-1}R_{INV,t} + \varepsilon_{p,t}$.

Model (3): $R_{p,t} - R_{f,t} = \alpha_p + b_pMKT_t + s_pSMB_t + h_pHML_t + r_pRMW_t + c_pCMA_t + \varepsilon_{p,t}$.

Model (4): $R_{p,t} - R_{f,t} = b_p + m_pMKT_t + s_pR_{MC,t} + v_pR_{BM,t} + p_pR_{OP,t} + i_pR_{INV,t} + \varepsilon_{p,t}$.

Model (5): $R_{p,t} - R_{f,t} = \alpha_p + b_pMKT_t + s_pSMB_t + h_pHML_t + r_pRMW_t + c_pCMA_t + s_{p2}MC_{p,t-1}SMB_t + h_{p2}BM_{p,t-1}HML_t + r_{p2}OP_{p,t-1}RMW_t + c_{p2}INV_{p,t-1}CMA_t + \varepsilon_{p,t}$.

Table 3.4 Explaining returns of each set of characteristic portfolios in excess of R_f

Panel A explains the excess returns of 9 portfolios from the independent size-BM sort and provides the results for regressions that include MKT (the market factor). Panel A1 uses time-series factors (Fama and French, 2015) with different profitability proxies (Fama and French, 2019; Ball et al., 2015; Hou et al., 2019). Panel A2 uses cross-sectional regression intercepts and coefficients as factor returns from variants of Model (1): $R_{p,t} = R_{Z,t} + R_{MC,t}MC_{p,t-1} + R_{BM,t}BM_{p,t-1} + R_{OP,t}OP_{p,t-1} + R_{INV,t}INV_{p,t-1} + \varepsilon_{p,t}$. Panel A3 summarizes the estimates for Model (5) that combines time-varying loadings in the time-series factors of Model (3).

Panels B and C are analogous to Panel A, with the former having size-profit sort and the latter size-investment sort. For profit measure, *OP* (operating profitability), *CP* (cash profitability) or *RP* (ROE profitability) are used. The sample is from September 2008 to July 2015.

The metrics for Panel A are $A|\alpha|$ and $A|t(\alpha)|$, the average absolute intercept and the average absolute *t*-statistic for the intercepts; $A\alpha^2/\bar{Vr}$, the average squared intercept over the cross-section variance of the average returns on the LHS portfolios, $\bar{r}$; $A\lambda^2/\bar{Vr}$, the average difference between each squared intercept and its squared standard error, $s^2(\alpha)$, over the cross-section variance of the average returns on the LHS portfolios, $\bar{r}$; $Ase(\alpha)$, the average standard error of the intercepts; $Asd(e)$, the average standard deviation of the residuals; $Sh^2(\alpha)$, the maximum squared Sharpe ratio for the intercepts for the set of LHS portfolios; the GRS statistic (Gibbons, Ross and Shanken, 1989) and the *p*-value of GRS.

Panel A: Summary of intercepts from regressions explaining returns of size-BM portfolios in excess of R_f with five-factor models (3), (4) and (5)

Model	$A\|\alpha\|$	$A\|t(\alpha)\|$	$A\alpha^2/\bar{Vr}$	$A\lambda^2/\bar{Vr}$	$Ase(\alpha)$	$Asd(e)$	$Sh^2(\alpha)$	*GRS*	*p*(*GRS*)
Panel A1: Model (3) with 9 LHS size-BM portfolios using different profitability factors; factor loadings are constant regression slopes									
(3) *MKT, SMB, HML, RMW, CMA*	0.0030	0.7750	0.7823	0.7451	0.0034	0.0293	0.1280	0.9157	0.5170
(3) *MKT, SMB, HML, RMWC, CMA*	0.0036	1.0840	0.6764	0.3203	0.0032	0.0276	0.1440	1.0402	0.4178
(3) *MKT, SMB, HML, RMWR, CMA*	0.0032	0.8801	0.7205	0.5354	0.0033	0.0282	0.1376	1.0175	0.4350
Panel A2: Model (4) with 9 LHS size-BM portfolios using different profitability measures; factor loadings are constant regression slopes									
(4) *MKT,* R_{MC}, R_{BM}, R_{OP}, R_{INV}	0.0066	1.0149	2.4017	1.3352	0.0065	0.0515	0.1787	1.1093	0.3698
(4) *MKT,* R_{MC}, R_{BM}, R_{CP}, R_{INV}	0.0083	1.2511	3.8515	2.4115	0.0065	0.0512	0.2124	1.2897	0.2607
(4) *MKT,* R_{MC}, R_{BM}, R_{RP}, R_{INV}	0.0066	0.9843	2.4067	1.5565	0.0067	0.0512	0.2328	1.3153	0.2475

Table 3.4 Continued

Model	$A\|\alpha\|$	$A\|t(\alpha)\|$	$A\alpha^2/\bar{Vr}$	$A\lambda^2/\bar{Vr}$	$Ase(\alpha)$	$Asd(e)$	$Sh^2(\alpha)$	GRS	$p(GRS)$
Panel A3: Model (5) with 9 LHS size-BM portfolios using different profitability proxies; factor loadings vary with characteristics									
(5) *MKT, SMB, HML, RMW, CMA*	0.0030	0.7555	0.6852	0.6608	0.0037	0.0278	0.0988		
(5) *MKT, SMB, HML, RMWC, CMA*	0.0029	0.7743	0.5012	0.3257	0.0035	0.0264	0.1127		
(5) *MKT, SMB, HML, RMWR, CMA*	0.0027	0.7093	0.5774	0.5666	0.0035	0.0270	0.1158		

Panel B: Summary of intercepts from regressions explaining returns of size-profit portfolios in excess of R_f with five-factor models (3), (4) and (5)

Model	$A\|\alpha\|$	$A\|t(\alpha)\|$	$A\alpha^2/\bar{Vr}$	$A\lambda^2/\bar{Vr}$	$Ase(\alpha)$	$Asd(e)$	$Sh^2(\alpha)$	GRS	$p(GRS)$
Panel B1: Model (3) with 9 LHS size-profit portfolios using different profitability factors; factor loadings are constant regression slopes									
(3) *MKT, SMB, HML, RMW, CMA*	0.0031	0.8707	0.6667	0.5162	0.0035	0.0295	0.1434	1.0259	0.4286
(3) *MKT, SMB, HML, RMWC, CMA*	0.0033	1.0104	0.7459	0.5882	0.0035	0.0299	0.1694	1.2241	0.2949
(3) *MKT, SMB, HML, RMWR, CMA*	0.0030	0.8986	0.6779	0.6452	0.0035	0.0305	0.1785	1.3194	0.2431
Panel B2: Model (4) with 9 LHS size-profit portfolios using different profitability measures; factor loadings are constant regression slopes									
(4) *MKT,* R_{MC}, R_{BM}, R_{OP}, R_{INV}	0.0051	0.7128	2.0130	1.1875	0.0064	0.0512	0.1421	0.8819	0.5462
(4) *MKT,* R_{MC}, R_{BM}, R_{CP}, R_{INV}	0.0068	0.9235	3.5657	2.4397	0.0065	0.0510	0.2003	1.2161	0.3018
(4) *MKT,* R_{MC}, R_{BM}, R_{RP}, R_{INV}	0.0047	0.6123	1.8265	1.2957	0.0067	0.0510	0.1647	0.9309	0.5051

Table 3.4 Continued

Model	$A\|\alpha\|$	$A\|t(\alpha)\|$	$A\alpha^2/\bar{Vr}$	$A\lambda^2/\bar{Vr}$	$Ase(\alpha)$	$Asd(e)$	$Sh^2(\alpha)$	GRS	$p(GRS)$
Panel B3: Model (5) with 9 LHS size-profit portfolios using different profitability proxies; factor loadings vary with characteristics									
(5) *MKT, SMB, HML, RMW, CMA*	0.0030	0.8062	0.5155	0.3593	0.0037	0.0283	0.1387		
(5) *MKT, SMB, HML, RMWC, CMA*	0.0028	0.7862	0.4575	0.4275	0.0038	0.0284	0.1153		
(5) *MKT, SMB, HML, RMWR, CMA*	0.0026	0.7086	0.4010	0.3777	0.0038	0.0287	0.1133		

Panel C: Summary of intercepts from regressions explaining returns of size-investment portfolios in excess of R_f with five-factor models (3), (4) and (5)

Model	$A\|\alpha\|$	$A\|t(\alpha)\|$	$A\alpha^2/\bar{Vr}$	$A\lambda^2/\bar{Vr}$	$Ase(\alpha)$	$Asd(e)$	$Sh^2(\alpha)$	GRS	$p(GRS)$
Panel C1: Model (3) with 9 LHS size-inv portfolios using different profitability factors; factor loadings are constant regression slopes									
(3) *MKT, SMB, HML, RMW, CMA*	0.0026	0.7054	0.4136	0.4540	0.0037	0.0314	0.1089	0.7789	0.6363
(3) *MKT, SMB, HML, RMWC, CMA*	0.0032	0.9176	0.5951	0.5264	0.0036	0.0305	0.1508	1.0895	0.3819
(3) *MKT, SMB, HML, RMWR, CMA*	0.0029	0.8327	0.5572	0.5328	0.0036	0.0308	0.1537	1.1361	0.3500
Panel C2: Model (4) with 9 LHS size-inv portfolios using different profitability measures; factor loadings are constant regression slopes									
(4) *MKT,* R_{MC}, R_{BM}, R_{OP}, R_{INV}	0.0059	0.8479	1.8692	1.1874	0.0065	0.0521	0.1442	0.8947	0.5354
(4) *MKT,* R_{MC}, R_{BM}, R_{CP}, R_{INV}	0.0077	1.0750	2.9745	1.7406	0.0066	0.0519	0.1622	0.9846	0.4618
(4) *MKT,* R_{MC}, R_{BM}, R_{RP}, R_{INV}	0.0058	0.8397	1.8265	1.3491	0.0068	0.0519	0.1480	0.8364	0.5856

Table 3.4 Continued

Model	$A\|\alpha\|$	$A\|t(\alpha)\|$	$A\alpha^2/\bar{Vr}$	$A\lambda^2/\bar{Vr}$	$Ase(\alpha)$	$Asd(e)$	$Sh^2(\alpha)$	GRS	$p(GRS)$
Panel C3: Model (5) with 9 LHS size-inv portfolios using different profitability proxies; factor loadings vary with characteristics									
(5) *MKT, SMB, HML, RMW, CMA*	0.0020	0.5143	0.2566	0.5535	0.0040	0.0293	0.0942		
(5) *MKT, SMB, HML, RMWC, CMA*	0.0025	0.6741	0.3742	0.4825	0.0038	0.0282	0.1461		
(5) *MKT, SMB, HML, RMWR, CMA*	0.0022	0.5556	0.3018	0.5483	0.0039	0.0289	0.1400		

Table 3.5 Explaining returns of each set of characteristic portfolios in excess of *Rz*

Panel A reports the results for the variants of Model (2) in which 9 LHS size-BM returns are in excess of $R_{Z,t}$. Right-hand-side (RHS) factors are extracted from the variants of Model (1) coefficients similar to $R_{Z,t}$. Panel A3 provides the model results from the prescribed portfolio (size, value, profitability and investment) characteristics as time-varying factor loadings. Panel A2 provides the results where factor loadings are the time-series average values of the time-varying characteristics. Panel A1 summarizes the results using OLS (with an intercept) regression slopes as factor loadings.

Panels B and C are analogous to Panel A, with the former having size-profit sort and the latter size-investment sort. For profit measure, *OP* (operating profitability), *CP* (cash profitability) or *RP* (ROE profitability) are used. The sample is from September 2008 to July 2015.

The metrics for Panel A are $A|e|$ and $A|t(e)|$, the average absolute value of the model's average residuals and the average absolute *t*-statistic for the model's average residuals; $Ae^2/V\bar{r}$, the cross-section average value of the squared time-series mean residual over the cross-section variance of the average returns on the LHS portfolios, $\bar{r}$; $A\lambda^2/V\bar{r}$, the average difference between each squared time-series mean residual and its squared standard error, $s^2(e)$, over the cross-section variance of the average returns on the LHS portfolios, $\bar{r}$; $Ase(e)$, the average residual standard error; $Asd(e)$, the average residual standard deviation; $Sh^2(e)$, the maximum squared Sharpe ratio for the residuals for the set of LHS portfolios; the Hotelling T^2 *F*-statistic. The exception is Panels A1, B1 and C1 where running regressions with intercept a replacing mean residual e as an average model (or pricing) error and *F*-statistic of the Hotelling T^2 is replaced with GRS statistic.

Panel A: Summary of average errors, explaining returns of size-BM portfolios in excess of *Rz* with four-factor model (2)

Model	$A\|e\|$	$A\|t(e)\|$	$Ae^2/V\bar{r}$	$A\lambda^2/V\bar{r}$	$Ase(e)$	$Asd(e)$	$Sh^2(e)$	T^2	$p(T^2)$
Panel A1: Model (2) with 9 LHS size-BM portfolios using different profitability measures; factor loadings are constant regression slopes									
(2) R_{MC}, R_{BM}, R_{OP}, R_{INV}	0.0054	0.3900	1.5203	6.0719	0.0136	0.1098	0.1590	1.0053	0.4454
(2) R_{MC}, R_{BM}, R_{CP}, R_{INV}	0.0057	0.3976	1.7639	6.5105	0.0142	0.1137	0.1928	1.2004	0.3108
(2) R_{MC}, R_{BM}, R_{RP}, R_{INV}	0.0075	0.4985	3.1783	5.7837	0.0147	0.1135	0.2097	1.2129	0.3033
Panel A2: Model (2) with 9 LHS size-BM portfolios using different profitability measures; factor loadings are average characteristic									
(2) R_{MC}, R_{BM}, R_{OP}, R_{INV}	0.0061	0.4423	2.0426	6.5404	0.0143	0.1245	0.1605	1.2344	0.2669
(2) R_{MC}, R_{BM}, R_{CP}, R_{INV}	0.0040	0.2975	1.0919	7.4546	0.0142	0.1241	0.1648	0.1498	0.6988
(2) R_{MC}, R_{BM}, R_{RP}, R_{INV}	0.0064	0.4583	2.3034	6.3266	0.0141	0.1233	0.1376	1.6696	0.1968

Table 3.5 Continued

Model	$A\|e\|$	$A\|t(e)\|$	$Ae^2/\bar{Vr}$	$A\lambda^2/\bar{Vr}$	$Ase(e)$	$Asd(e)$	$Sh^2(e)$	T^2	$p(T^2)$
(2) R_{MC}, R_{BM}, R_{OP}, R_{INV}	0.0043	0.3099	1.0364	7.6509	0.0143	0.1242	0.0749	0.3771	0.5394
(2) R_{MC}, R_{BM}, R_{CP}, R_{INV}	0.0048	0.3440	1.1815	7.6630	0.0145	0.1252	0.0884	0.4908	0.4838
(2) R_{MC}, R_{BM}, R_{RP}, R_{INV}	0.0042	0.2970	1.0354	7.7190	0.0144	0.1247	0.0350	0.6691	0.4136

Panel B: Summary of average errors, explaining returns of size-profit portfolios in excess of R_Z with four-factor model (2)

Model	$A\|e\|$	$A\|t(e)\|$	$Ae^2/\bar{Vr}$	$A\lambda^2/\bar{Vr}$	$Ase(e)$	$Asd(e)$	$Sh^2(e)$	T^2	$p(T^2)$
Panel B1: Model (2) with 9 LHS size-profit portfolios using different profitability measures; factor loadings are constant regression slopes									
(2) R_{MC}, R_{BM}, R_{OP}, R_{INV}	0.0039	0.2742	1.2088	7.7404	0.0136	0.1092	0.0860	0.5435	0.8372
(2) R_{MC}, R_{BM}, R_{CP}, R_{INV}	0.0047	0.3274	1.6085	8.1573	0.0142	0.1132	0.1335	0.8309	0.5903
(2) R_{MC}, R_{BM}, R_{RP}, R_{INV}	0.0061	0.3939	2.5747	7.8734	0.0147	0.1129	0.0984	0.5690	0.8173
Panel B2: Model (2) with 9 LHS size-profit portfolios using different profitability measures; factor loadings are average characteristic									
(2) R_{MC}, R_{BM}, R_{OP}, R_{INV}	0.0059	0.4263	2.1845	7.3562	0.0142	0.1240	0.0958	1.5418	0.2148
(2) R_{MC}, R_{BM}, R_{CP}, R_{INV}	0.0046	0.3386	1.2756	8.1980	0.0142	0.1234	0.1053	0.3955	0.5297
(2) R_{MC}, R_{BM}, R_{RP}, R_{INV}	0.0072	0.5290	3.2182	7.0058	0.0140	0.1222	0.1571	2.3519	0.1256
Panel B3: Model (2) with 9 LHS size-profit portfolios using different profitability measures; factor loadings are time-varying characteristics									
(2) R_{MC}, R_{BM}, R_{OP}, R_{INV}	0.0038	0.2748	0.9170	8.8203	0.0143	0.1242	0.0379	0.5819	0.4458
(2) R_{MC}, R_{BM}, R_{CP}, R_{INV}	0.0050	0.3645	1.5671	8.3372	0.0144	0.1249	0.0749	0.8320	0.3620
(2) R_{MC}, R_{BM}, R_{RP}, R_{INV}	0.0054	0.3852	2.2345	8.0424	0.0144	0.1248	0.0868	1.2025	0.2732

Table 3.5 Continued

Panel C: Summary of average errors, explaining returns of size-investment portfolios in excess of R_Z with four-factor model (2)

Model	$A\|e\|$	$A\|t(e)\|$	$Ae^2/\bar{Vr}$	$A\lambda^2/\bar{Vr}$	$Ase(e)$	$Asd(e)$	$Sh^2(e)$	T^2	$p(T^2)$
Panel C1: Model (2) with 9 LHS size-inv portfolios using different profitability measures; factor loadings are constant regression slopes									
(2) R_{MC}, R_{BM}, R_{OP}, R_{INV}	0.0048	0.3427	1.2071	5.0227	0.0135	0.1085	0.1381	0.8731	0.5538
(2) R_{MC}, R_{BM}, R_{CP}, R_{INV}	0.0053	0.3791	1.5027	5.2833	0.0141	0.1123	0.1702	1.0593	0.4048
(2) R_{MC}, R_{BM}, R_{RP}, R_{INV}	0.0067	0.4361	2.1645	5.1089	0.0146	0.1121	0.1396	0.8078	0.6107
Panel C2: Model (2) with 9 LHS size-inv portfolios using different profitability measures; factor loadings are average characteristic									
(2) R_{MC}, R_{BM}, R_{OP}, R_{INV}	0.0065	0.4794	1.9205	5.2215	0.0139	0.1215	0.1773	1.5350	0.2158
(2) R_{MC}, R_{BM}, R_{CP}, R_{INV}	0.0046	0.3409	0.9522	6.1790	0.0139	0.1214	0.1564	0.3186	0.5726
(2) R_{MC}, R_{BM}, R_{RP}, R_{INV}	0.0070	0.5234	2.2468	4.7608	0.0138	0.1204	0.1723	1.9446	0.1636
Panel C3: Model (2) with 9 LHS size-inv portfolios using different profitability measures; factor loadings are time-varying characteristics									
(2) R_{MC}, R_{BM}, R_{OP}, R_{INV}	0.0046	0.3355	0.9796	6.2997	0.0141	0.1218	0.1143	0.4576	0.4990
(2) R_{MC}, R_{BM}, R_{CP}, R_{INV}	0.0043	0.3125	0.9746	6.4424	0.0142	0.1228	0.1089	0.5951	0.4407
(2) R_{MC}, R_{BM}, R_{RP}, R_{INV}	0.0050	0.3662	1.1347	6.2039	0.0141	0.1223	0.1161	0.7564	0.3848

CHAPTER 4

HOW DO FIRMS DERIVE VALUE FROM POLITICAL CONNECTEDNESS? THE EFFECT OF CAPITAL ALLOCATION AND INNOVATION

4.1 Introduction

Firms in emerging market contexts have shown a rising level of competitive advantage by making substantial efforts in entrepreneurial and innovation activities (e.g., Chung & Tan, 2017; Kothari et al., 2013; Yiu & Liu, 2008). It is, therefore, not suprising that a sizable literature has built theoretical and empirical analyzes to better understand a set of factors that may affect a firm's innovation and performance. Among these factors, a firm's political connectedness with government plays a greater role in the firm's innovation and value creation (e.g., Cull, Li, Sun & Xu, 2015; Halford & Li, 2019; Li, Xia & Zajac, 2018; Tihanyi, Aguilera, Heugens, van Essen, Sauerwald, Duran & Turturea, 2019), given a weaker insititutional environment. Political connectedness is

defined as the extent to which and how firms have relationships with the government (e.g., Ridge, Ingram & Hill, 2017).

While recognizing the important role of political connectedness in explaining firm innovation and performance outcomes' value, the debates about the actual benefits and costs that political connectedness would bring to the firm are still inconclusive (e.g., Chen, Li, Luo & Zhang, 2017; Yan & Chang, 2018). On the one hand, a body of research has shown that political connectedness had a greater influence in facilitaitng innovation (e.g., Acquaah, 2012) and generated positive outcomes for the firms, such as higher firm performance (e.g., Ridge et al., 2017), easier access to regulatory resources (Boubakri et al., 2012; Liu et al., 2013), the privilege over non-connected competitors and solutions for some organizational problems, e.g., corporate bailout (Facio and Hsu, 2016) and ligitation risk (Ning, Mao and Yuan, 2019). In contrast, another strand of academics argues that the value-enhancing impact of political connectedness on innovation and performance might be eliminated by the costs associated with rent-seeking activities (e.g., Fisman, 2001; Johhson and Mitton, 2003; Kotabe et al., 2011; Liedong & Raiwani, 2018; Shleifer and Vishny, 1994). While government can offer subsidies to firms with stronger links to politicians, it will require firms to fulfill the needs of pursuing social policy goals (Aggarwal, Meschke and Wang, 2007; Faccio, 2006; Ferguson and Voth, 2008; Goldman, Rochol and So, 2009; Gulen, Cooper and Ovtchinnikov, 2010; and Roberts, 1990). These

inconsistent findings suggest a need for more research to develop an understanding of how and the extent to which political connectedness contributes to a firm's value creation. This study attempts to add to corporate finance literature with extensive examination of the performance outcomes of political connectedness and analyzing the effectiveness of different types of political connectedness through innovation and capital allocation mechanisms.

This research addresses this issue by answering three questions. First, how does political connectedness affect innovation? Second, does political connectedness help understand the efficiency of capital allocation? Third, what are the performance outcomes of political connectedness? Specifically, political connectedness is distinguished between formal and informal relationships with the government. Formal political connectedness refers to a relationship with the government that is established through CEO appointment by government and/or state ownership, while informal political connectedness is about the relationship established through connections with government officials. This study then argues that formal political connectedness and informal political connectedness have different influences on a firm's innovation, capitial allocation and performance.

Innovation is the most important driving force of a firm's competitive advantage. This study introduces a comprehensive index for innovation that includes 10 different types of innovation activities: patent grants

onshore and offshore, new products/services and new business lines, introduction of new management techniques, establishment of new production quality controls, information access to innovative products and innovation performance.

Moreover, capital allocation is at the core of the firm's resource allocation and is considered to be efficient when capital flows to its most highly valued use (Kothari, Ramanna and Skinner, 2010). Although the topic of resource allocation has been extensively explored in the past, researchers have had challenges in developing methodologies to measure unobservable capital investment efficiency. Furthermore, the relationship between political connectedness, and capital allocation has commonly been neglected. Investigating the magnitude of the political influence on investment efficiency is more notable in emerging markets like China, where key resources are controlled by the state (Li, Meng, Wang and Zhou, 2008) and businesses seek ways to establish their connections with government (Jiang and Kim, 2015; Lin, Tan, Zhao and Karim, 2015). This chapter introduces a measure derived from innovation that can better capture capital allocation efficiency than the existing proxies in current literature.

The survey from the World Bank comprising over 2400 Chinese companies from 84 industries is chosen for this research. China offers a natural setting for this study to investigate the dynamics of political connections and capital allocation, innovation and company

performance. First, it would be of paramount academic interest to examine an impressive economic phenomenon of any economy in history, given the fast and robust pace of China's development as seen in its GDP growth and export values (Figures 1 and 2). The phenomenon poses the question of whether this robust growth is achieved from higher acceptance of risk and whether this growth is sustainable. In addition, the uniqueness of the institutional environment of China, with coexistence of SOEs and non-SOEs would provide further information on how a firm's characteristics shape the short-, mid- and long-term risk attitude and tolerance as represented by leverage level, innovation ability and survival prospects.

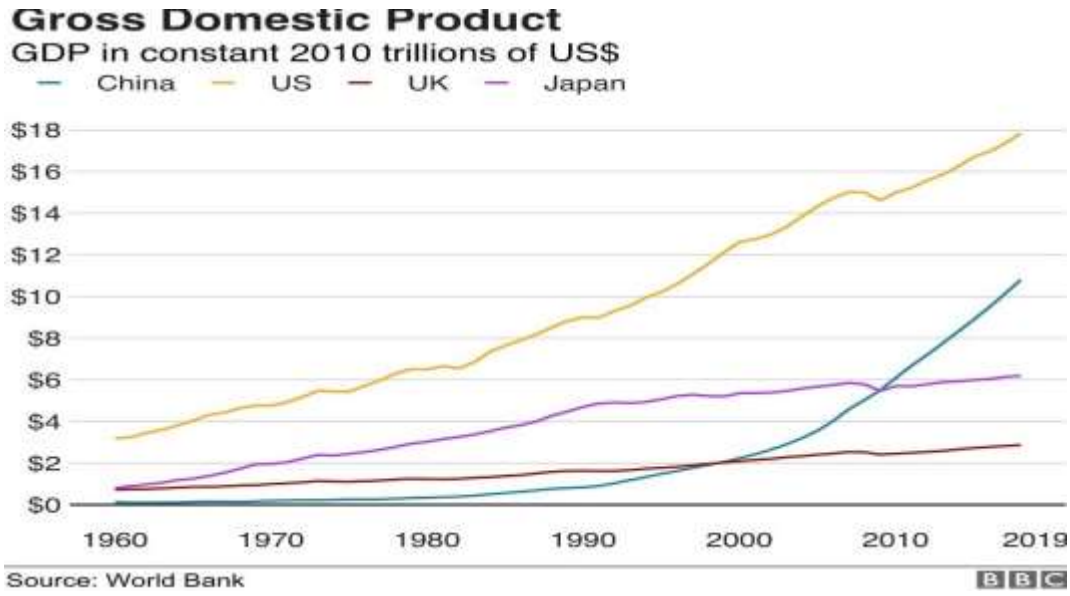


Figure 4.1: GDP of China

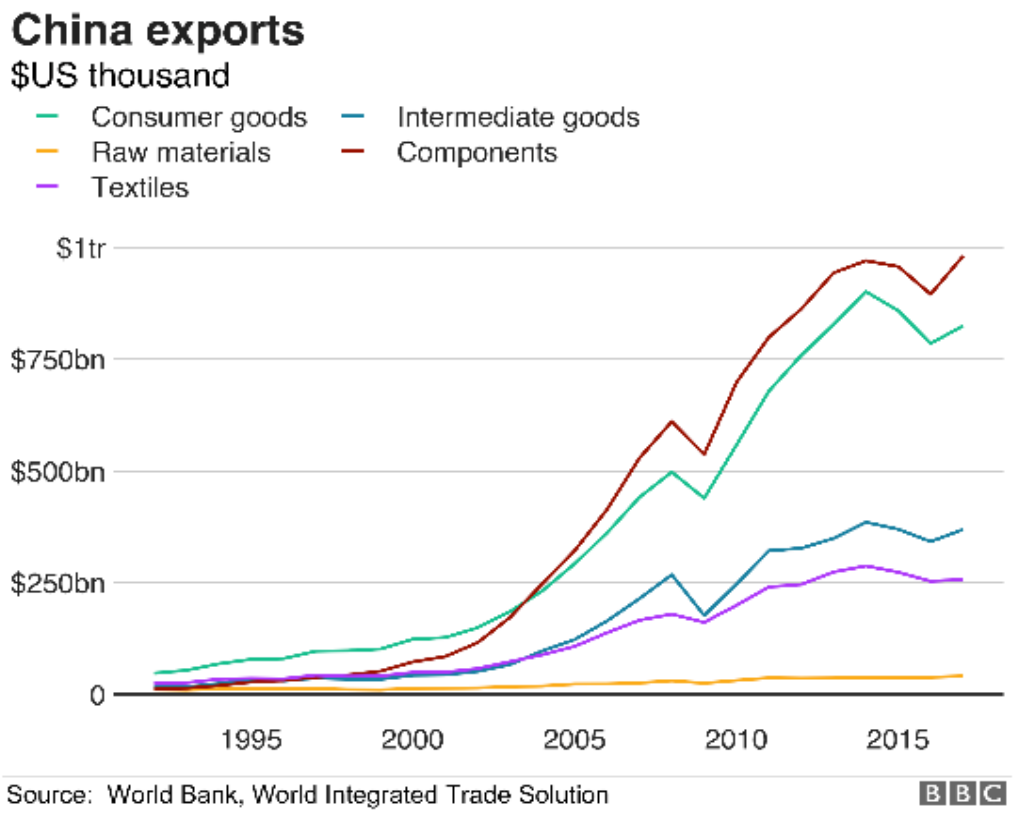


Figure 4.2: Exports of China

Second, China has gone through various market reforms since 1978, with the government continuously and deeply involved in capital allocation. Over the past 40 years, China has opened up trade routes and investment flows through a series of economic reforms, resulting in a better quality of life for hundreds of millions of Chinese people.

Third, China is a transitional economy characterized by a less stringent legal infrastructure featuring weaker copyright protections and more fierce market competition. However, in recent years, China has introduced many policies to facilitate corporate innovation abilities and allocated significant resources to help companies increase global

presence through innovation success. Hence, many businesses are incentivized to gain and maintain access to the government for innovation subsidies and privileges. This study provides important implications for policy makers to improve market-oriented innovation mechanisms through different channels of government interference with firms that lead to more successful outcomes for corporate innovation in China.

The remainder of the chapter is organized as follows. Section 4.2 provides a review of current literature and explains the hypothesis. Section 4.3 describes data and methodology. Section 4.4 reports the empirical results on the relationship between political ties and the quality of investment opportunities and discusses the implications of political connectedness on firm performance, including innovation. Section 4.5 concludes the findings.

4.2 Literature review and hypothesis development

Under the perfect capital market hypothesis, neither CEO characteristics nor company ties with government should affect corporate decision-making or risk-taking behavior. By analyzing the political connectedness of a firm with corporate performance measures, it is possible to see how the former facilitates or harms company performance and the value that political intervention brings into the firm through innovation and investment efficiency.

Theories developed in political economy have arrived at three main streams of bureaucratic relationship with businesses. The government plays an active role in facilitating the growth of businesses in the "helping hand" model, also known as the classical developmental state model in political science (Zheng, Singh, and Mitchel, 2015; Infante and Piazza, 2014; Cleassens, Feijen and Laeven, 2008; Correia, 2014; Firth, 2011; Fisman, 2001; Brockman, Rui and Zou, 2013; and Stigliz, 1989). In the "grabbing hand" hypothesis, bureaucrats maximize overall political rent at the cost of firms' growth and economic development (Frye and Shleifer, 1997; Shleifer and Vishny, 2002; Stulz, 2005; Carpio, Faccio and McConnell, 2013; Frye and Zhuravskaya, 2000; Evans, 1995; Pei, 2006; Shleifer and Vishny, 1993; Shleifer and Vishny, 1994). The "invisible hand" theory dictates that the government avoids intervening in the market (Sachs, 1994). More recent literature provides empirical evidence of the mixture of these models. The phenomenon of "dual incentives" of government to both facilitate business growth and extract short-term gains from firms has most recently attracted academics. Thus, with the increasing complication of the relationship between governments and firms through time, it is unlikely that a country would follow a purely helping- or grabbing-hand model.

It is commonly agreed that firms gain from a helping-hand government and suffer from a grabbing-hand government; however, the predominant

"dual" scenarios involving multiple actions that combine some rent-seeking behavior with developmental support are yet to be explored.

To evaluate how government affects businesses, this work is more inclined towards the "exchange of favors" hypothesis (Facio & Hsu, 2016) from behavioral finance, similar to the "mixed" scenario discussed above. This study argues that the government will be an "insurer of last resort" for the politically connected firm in the case of financial distress and company bankruptcy. Previous studies find evidence that politically connected firms are more resilient to economic crisis since they are more likely to be bailed out by the government than similar nonconnected peers (Facio, Masulis and McConnel, 2006). Another advantage to the firms is the access to information and resources (government subsidies, preferential loans, more choices of external funding, information and technology, etc.). To obtain such benefits through ties with government, firms bear the costs of government intervention and suffer from higher political influence in decision making (Bertrand, Kramarz, Schoar, and Thesmar, 2004; Fan, Wong, and Zhang, 2007; and Shleifer, 1998). Hence, political connectedness may lower the efficiency of connected firms. The hypothesis postulates that the formally connected firms are required to take on investment projects with less opportunity growth, which has socio-economic importance for the government and the country. Hence, there is a significant need for research that considers the dual incentives of politicians to balance government's developmental goals with

businesses' healthy growth. From this standpoint of behavioral finance, by being formally connected to government, a CEO will give up some good investment opportunities of a firm for the patronage that political ties would bring to his/her company.

By examining political orientation from a psychological perspective, CEOs might need government's further support for their next tenure or to secure future career opportunities. Hence, the prime pressure is that government-appointed CEOs want to maximize their personal utility (e.g. job security, longer post tenure, personal long-term relationship with politicians) by accommodating government's needs under the constraint that excessive misuse of capital will hurt the firm performance and prevent firms to grow and be profitable, and thus, limit their future personal wealth, generate dissatisfaction of company owners, potentially lead to internal unrest within the company, and harm their reputation as CEO.

4.2.1 Political connectedness and innovation

Prior research has shown that in emerging market contexts, political connectedness affects innovation by providing the firms with political legitimacy (Sheng et al., 2011), securing key regulatory schemes, offering financial support such as the awarding of government-funded innovation projects (Acquaah, 2012) and forming CEOs' political characteristics (Cho, Halford, Hsu and Ng, 2016). Previous literature

has also demonstrated complex relationships between political connectedness and innovation by considering different perspectives of political connectedness.

For example, Hou, Hu and Yuan (2017) find a negative relationship between politically connected CEOs and technological innovation activities. Qin and Zhang (2019) examine the reaction of firm's innovation to policy changes. Their results show that de-politicization results in a 10.8% increase in patent volume, suggesting that companies are more prone to market competition without political connections and try to offset this effect through the focus on technological advancement. On the other hand, Su, Xiao and Yu (2019) report the buffering effect of political connections on the corporate innovation activities of Chinese firms. In their work, they find that government subsidies mediate this relation. Su, Xiao and Yu (2019) support these findings by providing further evidence that formal political connections amplify patent grants. Kim, Ross and Shang (2016) also come to a similar conclusion when analyzing corporate innovation activities and federal grants.

While these studies provide valuable insights on the relationship between political connectedness and innovation, they focus only on formal political connectedness and consider only a single proxy for innovation activities. This study attempts to address the controversial findings in the literature by investigating both formal and informal

political connection measures to make a more informed judgement of political interference in corporate innovation.

If seen from the risk approach, investment in innovation makes a stock more lottery-like; risk takers are the ones that invest more in innovation projects and influence firms' innovative endeavors and facilitate growth opportunities int firms' values (Adhikari and Agrawal, 2016). According to their report, firms located in areas with a taste for gambling tend to be more innovative, that is, they spend more on R&D and obtain more and better-quality patents.

Innovation activities can be viewed as mid-term risk since R&D projects are hard to estimate and their outcomes take a longer time to realize. Innovation activity is thought to be a risk measure also because it turns reseources away from more assured short-term projects to less certain future plans. Hence, it shows the risk-taking approach of a firm whereby the possibility of R&D outcome distribution is associated with its use and the likelihood of those outcomes. The company makes riskier policy choices by investing more in R&D and higher leverage (Coles, Naveen and Naveen, 2006). Kamoto (2017) points out that a firm's structure of ownership matters to a CEO's innovation incentives since it impacts the extent of the shareholders' intolerance of failure. Attempts at innovation entail risk because innovation projects require large capital and entail potential failure (Li, 2011; Simpson, Siguaw and Enz, 2016).

Given the aforementioned studies that supply existing literature on innovation and political connections, this study examines how and which form of political ties is related to significant changes in innovation activities and performance. This study aims to draw a comprehensive picture of firms' innovation activities, taking into consideration innovation in products, business lines, production processes, quality controls, management techniques, patent grants onshore and offshore and access to innovation information within and outside the company.

This work argues that since previous literature has focused mainly on patent grants as a proxy for innovation activities, the results would not show the comprehensive innovation picture of a company. Instead, using the measures of this study, it is expected that formal political connections, i.e., state ownership and CEO appointment, do not affect innovation activities. Simply having SOE status or a CEO appointed by government would not make a difference to company innovation activities as a whole, but rather that informal political networks stimulate innovation activities. His argument is supported by prior studies that indicate other forms of political connections, like social networks with regulators are a significant source of company value derives from government (Facio, 2006; Peng and Luo, 2000). The influence of informal connections may be prominent in emerging markets with imperfect competition and distorted information.

Innovation activities are considered to be internally driven by the company and require more government intervention in operations for it to have an effect. Firms that have stronger informal political connections may obtain more assistance in getting necessary licenses and patents, and have access to new information that may lead to new management techniques and processes. This study argues that if all innovation activities are taken together, they are amplified by the prevalence and strength of informal political connectedness, not with formal political connections.

On the other hand, unlike internally driven innovation activities, innovation performance, manifested by the sale and exports of new products, is market led or consumer based. This is the best measure to determine a company's growth and prosperity from innovation activities. It leads to the idea that more innovation activities do not necessarily induce innovation performance which is the final goal of a firm. The outcome of company-driven innovation activities may not be welcomed by consumers or the market as reflected in the sale and exports of new products and services. Hence, it is imperative to examine the relationship between political connections and innovation performance. As a result, despite the buffering effect of informal political ties on innovation activities, political connections may not have the same results on innovation performance. The firms suffer from reduced autonomy in decision making in relation to choice of innovation projects

and may eventually choose less value-added innovation projects as a cost of political interference. Therefore, firms are required to take on innovation projects that have socio-economic importance to government or accommodate national developmental policies and these projects do not necessarily bring the best value for the firm's growth and prosperity. Hence, this study hypothesizes:

H1a: Informal political connectedness has stronger influence on innovation activities than formal political connectedness.

H1b: The effects of political connectedness on innovation activities are stronger than on innovation performance.

4.2.2 Political connectedness and capital allocation

This work extends existing literature by examining the effects of political connectedness on capital allocation. There are numerous papers that provide some insights around this issue. An, Chen, Luo and Zhang (2016) discover that political turnover has an association with the magnitude of corporate investment which is more prominent for SOEs, capital-intensive firms, and locally supported firms. Bekaert, Harvey, Lundblad and Siegel (2016), on the other hand, provide evidence estimated by 24% using the standard sovereign yield spread procedure to estimate international projects. Hence, misallocation of global investment could occur due to double counting of risks. A different measure of "political risk spread" using political risk ratings was

proposed by the aforementioned authors. Wurgler (2000) reports a positive relationship between the efficiency of capital investment and high state ownership. Facio and Mura (2016) provide evidence that differences in CEO personal characteristics (gender) leads to heterogeneity in a corporate risk-taking approach and results in a less efficient capital allocation process. Facio and Hsu (2016) provide evidence that the targeted companies increase employment following a buyout by politically connected private equity firms. Politically connected firms have lower investment intensity (Cull, Li, Sun and Xu, 2015) and are less efficient (Boubakri, Cossett and Saffar, 2008; Facio, 2010; Fan, Wong, Zhang and Tianyu, 2007; Luez and Oberholzer-Gee, 2006; Jiang and Kim, 2015) than unconnected firms. Cull, Xu, Yang, Zhou and Zhu (2017) find that government assistance is positively associated with firm efficiency expressed in labor productivity. Chen, Sun, Tang and Wu (2011) suggest that SOEs suffer from investment inefficiency. Cull, Li, Sun and Xu (2015) argue that misallocation of capital by Chinese firms comes from lower financial constraints of connected firms. Song, Ai and Li (2015) report that the financial connection aside, the lower the financial constraints, the lower is the innovation efficiency. Hou, Hu and Yuan (2019) focusing on political connections and firm's technological innovation find that political connections increase firms' overinvestments, and thereby inefficiently allocate innovation capital and lessen the corporate innovation impact

on its future performance. With the exception of the work of Chen, Sun, Tang and Wu (2011) and Wurgler (2000), none of the aforementioned papers investigate the relationship between political connections and capital allocation. Chen, Sun, Tang and Wu (2011) use investment opportunities (Tobin's Q) measured as the sum of market value of tradable shares, book value of non-tradable shares and liabilities, divided by book value of total assets. Instead, Wurgler (2000) investigates the quality of investment opportunities through the value-added growth perspective. Wurgler's (2000) study of the value-added growth focuses on a country level and uses earnings before interest and taxes (EBIT) as the proxy for the quality of investment opportunities. The disadvantage of this measure is that it can incorporate other external factors not related to the investment itself. Value-added growth using innovation performance represents a better measure of investment opportunity quality. Value-added growth obtained from EBIT, plus the cost of employees (Wurgler, 2000; Facio, 2016) might include not only investment opportunity quality, but also other factors embedded in the EBIT including cost management and prevailing market situations. Hence, investment opportunity growth should be extracted from innovation performance to overcome the shortcomings of Wurgler's (2000) value-added growth measure.

This study argues that the connected CEOs take on investment projects that are in line with government's key strategic objectives that have

profound implications for a country's socio- economic development. The investment approach that is based on suboptimal decisions can destroy the value of a firm. These are costs of political connections that need to be outweighed by benefits that these government-business relationships bring in order for the firm to be willing to enter into such a connection. Moreover, in the market environment with an incomplete competitive nature, firms with formal political connectedness face fewer financial constraints than their non-connected peers. But due to over-investment routed from over-confident behavior of connected firms (Hou, Hu and Yuan, 2019), the funds are wasted on less productive or less marketable new projects that, in turn, wipe out all the benefits that the connected firms have as compared with their non-connected peers in terms of financial constraints, thus, leading to inefficiency of capital allocation. This study hypothesizes that politically connected firms suffer from moral hazards of government appointed CEOs that need to fulfil their socio-economic responsibility towards government, thereby foregoing the best investment opportunities for the strategic projects that are the top priority for the country. Governments' directives through CEO appointment force CEOs to take the government policies into consideration during the decision-making process, thus altering the investment behavior of a firm and leading to inefficiency in resource allocation. Hence, the following hypothesis is developed:

H2: Firms without government-appointed CEOs are more efficient in capital allocation than firms with government-appointed CEOs.

4.2.3 Political connectedness and firm performance

There is an abundant literature on political connectedness and firm performance. Firm performance manifested by financial measures receives a buffering effect from politicial connectedness. The broad cross-country study of Facio (2010) on nearly 20,000 firms points out that companies with political connections have higher market values. Corporate political strategies also help firms miminize policy risk and induce a lower cost of debt (Bradley, Panzalis and Yuan, 2016). Liu, Luo and Tian (2016) stress the importance of managerial professional connections for informal financing resources. Political connectedness affects the appointment of a second-generation member in a family firm and the involvement of the second generation induces higher operating ROA, higher operating return on sales, and fewer tunneling activities (Xu, Yuan, Jiang and Chan, 2015).

The firms can also take advantage of their political links through obtaining more government subsidies and tax benefits (Wu, Wu, Zhou and Wu, 2012; Lin, Tan, Zhao and Karim, 2015), more financial support from government aid programs (Facio, Masulis and McConnel, 2006), less regulatory control and reporting (Stigler, 1971) and less severe prosecution consequences (Fulmer, Knill and Yu, 2012; Jia, Mao and

Yuan, 2019). Ning, Mao and Yuan (2019) suggest that ties with government would reduce corporate ligitation risk.

Politically-connected firms boost employment (Facio and Hsu, 2016; Bertrand, Kramarz, Schoar and Thesmar, 2007), enhance market values (Ferris, Houston and Javakhadze, 2016; Facio, 2010), hold less cash (Xu, Chen, Xu and Chan, 2016), face lower financing costs and larger sales (Su and Fun, 2013), enjoy superior financial and operating performance after acquisition (Ferris, Houston and Javakhadze, 2016), gain easier access to loans and credit (Houston, Jiang, Lin and Ma, 2014; Cleassens, Feijen and Laeven, 2008; Li, Meng, Wang and Zhou, 2008; Cull, Li, Sun and Xu, 2015; Khwaja and Mian, 2005), exposed to fewer financial constraints (Cull, Li, Sun and Xu, 2015), enhance the growth and survival of start-up firms (Girma and Du, 2010), and are more likely to be bailed out by government (Faccio, 2006) than their non-connected peers.

On the other hand, politically connected firms are found to have higher agency costs of free cash flows (Unsal, Hassan and Zirek, 2016), more cash holdings (Su and Fun, 2013), lower investment intensity (Cull, Li, Sun and Xu, 2015), less efficiency (Boubakri, Cossett and Saffar, 2008; Facio, 2010; Fan, Wong, Zhang, and Tianyu, 2007; Luez and Oberholzer-Gee, 2006; Jiang and Kim, 2015) and worse exit performance (Cumming, Grilli and Murtinu, 2017) than their counterparts.

One common thing about the previous studies is that the authors take a single form of political connections (mostly a formal form) and focus only on one measure as a proxy for political connectivity. Given inconclusive results on the benefits and costs of political connections on various aspects of firm performance, the recent study of Wong and Hooy (2018) further discovered that different forms of political connection affect corporate performance differently. More specifically, their results show that it is the stability of political connections that affects company performance. This study provides insights on the effects of different forms of political interference on company value.

One of the explanations for firm's performance impediment by political interference is the rent-seeking behavior of politicians (Johhson and Mitton, 2003; Fisman, 2001; Shleifer and Vishny, 1994) routing from the government's needs to pursue social policy goals (Aggarwal, Meschke and Wang, 2007; Ferguson and Voth, 2008; Goldman, Rochol and So, 2009; Gulen, Cooper and Ovtchinnikov, 2010; and Roberts, 1990). Christensen, Dhaliwal, Boivie and Graffin (2015) suggest that an individual's political connectedness[17] indicates underlying psychological differences in executives' conservatism[18] that may be predictive of a decision maker's impact on the firm's risk behavior, strategic choices and

[17] One observable measure is CEO appointment by government that can be used as a proxy for executive's attitudes and dispositions.

[18] Previous studies in this stream show that political conservatives tend to be loss averts, prefer financial and job stability, and have greater fear of ambiguity and uncertainty than their counterparts (Jost, Glacer, Kruglanski, and Sulloway, 2003).

organizational outcomes. Boubakri, Guedhami, Mishra and Saffar (2012) provide evidence that politically connected firms bear less risk than their counterparts and therefore enjoy a lower cost of capital. Francis, Hasan, Sun and Wu (2016) also suggest that tax sheltering decisions could be driven by their political ideology. Differences in political ideology also have an effect on Tobin's Q, agency costs of free cash flow and a company's abnormal returns (Unsal, Hassan and Zirek, 2016). The politician's new appointments also shape the corporate risk attitude by urging firms to adjust to their cash holding strategy during the first year of a new city government official's appointment (Xu, Chen, Xu and Chan, 2016). These arguments posit that political connectedness may help explain variation in executives' risk tolerance that impacts corporate performance, since decision makers constantly make financial choices under uncertainty.

Upper-echelon research has recently devoted much attention to determinants of firms' risk (Chatterjee and Hambrick, 2007; Devers, Wiseman and Holmes, 2007). Specifically, academics look at firms' risk by examining firm investment in risky, long-term projects such as R&D (Devers, Wiseman and Holmes, 2007; Sanders and Hambrick, 2007). In this chapter, two unique measures of the risk profile of a firm is employed: corporate innovation activities and innovation performance. Two other specific company performance measures of leverage and likelihood of survival are chosen as the propensity of undertaking risk

by a firm. Leverage can be considered as corporate choice and innovation and likelihood of survival as corporate outcome.

Leverage is a short-term risk that is continuously adjusted to accommodate current healthy operations of a company. The existing literature on formal political interference shows a higher leverage level used by politically connected firms (Facio, 2010; Johnson & Mitton, 2003, and Khwaja & Mian, 2005). This evidence begs for the question as to whether the informal relationship with government affects the financial risk-taking approach of firms. The results show new insights that the stronger the informal political ties, the less a company uses leverage. This finding suggests that formal and informal political connectivity would result in different short-term risk behavior of a firm.

Although several papers report that politically connected firms are more levered (Johnson and Mitton, 2003; Khwaja and Mian, 2005; Facio 2010), based on the comprehensive literature analysis above, this study argues that this might not be the case since the politically connected firms do not need to rely largely on debt financing. Instead, they can raise funds from various sources with the help of the regulators (government aid, financial subsidies or tax exempts). The proposition is that government provides means and support to politically connected firms to avoid debt financing. The state assists partisan firms through the direct assistance from government officials who are capable of providing solutions to the firms in the form of access to funds or facilities (i.e., one form of informal

political connections) that will enable the companies to pursue their goals without dependence on loans and credit. In fact, Facio (2010) also provides evidence that connected firms do not benefit from reduced cost for debt financing. Even though firms connected with politicians are less constrained in financial terms (Cull, Li, Sun and Xu, 2015), they are affected by the decision-making approach of CEOs who have lower risk tolerance[19] and different social cognition due to closeness to politicians (Francis, Hasan, Sun and Wu, 2016). Another argument for partisan firms not to have a higher leverage level than non-partisan peers is that companies with closer relationships to politicians can better predict laws and policies (i.e., another form of informal political connections); hence, the risk entailed in the firm's business is lower since they can properly adjust the company strategy in anticipation of regulatory changes.

Thus, this work argues that it is informal political connections that affects leverage, not formal connections with government. Since leverage is the short-term measure of the risk, the stability and persistence of informal interactions with government officials determine the corporate leverage level. It is expected that continuous informal political ties would lessen financial leverage due to good relationships with government officials and firms' better prediction of market changes and government regulations. Therefore, the following hypothesis is developed:

[19] that can be routed from shareholders' intolerance of failure (Kamoto, 2017).

H3a. Informal political connectedness has stronger negative effects on financial leverage than formal political connectedness.

In the same manner, it is expected that political connections have a buffering effect on company survival since connected firms face less severe enforcement outcomes (Fulmer, Knill and Yu, 2012), are shielded from ligitation risk (Jia, Mao and Yuan, 2019) and are more likely to be bailed out by government (Faccio, 2006) than their non-connected peers. One explanation is that politically connected CEOs possess an exclusive understanding of the regulations and regulators' practices that will help their firms circumvent exorbitant ligitation and legal proceedings (Ferris, Houston and Javakhadze, 2016; Brezis, 2002).

Likelihood of survival shows the resilience of business operations that can only be possible with continuous sound performance and good risk management. This study considers likelihood of survival as a proxy for long-term risk. Girma and Du (2010) provide evidence that political ties facilitate the growth and survival of start-up firms. Zheng, Singh and Mitchell (2015) document a positive relationship between interlocking political ties and firm survival. Based on the resource-based theory, the authors argue that both resource and institutional advantages may moderate threats and increase the likelihood of survival.

The firms with formal political connections also take more advantage in the form of government aid (Facio, Masulis and McConnel, 2006),

additional subsidization and tax benefits (Wu, Wu, Zhou and Wu, 2012; Lin, Tan, Zhao and Karim, 2015), larger long-term loan portfolio and greater cash holdings (Su and Fung, 2013), that in turn, will facilitate business growth and increase the firm's likelihood of survival. The logic of the buffering effect of political connections on the survival ability of a firm is also routed from the understanding that SOEs are considered more important to a national government; since they often occupy critical industries or operate in sensitive areas, government believes it needs to have an ownership in a firm. The bankruptcy of SOEs would endanger or significantly affect the safety and soundness of the entire industry or system that they function in. The same logic serves for CEO appointments. It is unlikely for a government to let SOEs go bankrupt and therefore many financial benefits are provided by government to the government-owned firms. It is also believed that government-appointed CEOs will have influence on government when it comes to the survival chances of those CEOs' companies. Another argument is that government, at the highest level, would be more concerned with the broader issues of a firm, i.e., the company's existence itself. Hence, formal political connections, represented by CEO appointment or state ownership, would focus more on the long-term risk of a firm, proxied by its survival chance. Therefore, the last hypothesis is developed:

H3b. Formal political connectedness has stronger effects on survival than informal political connectedness.

4.3 Sample and variable operationalization

4.3.1 Data and sample

The data used in this study come from the survey of investment climate, business environment and firm performance conducted by the World Bank and the Enterprise Survey Organization of China. This survey is part of the World Bank Enterprise Surveys. The Chinese data were collected from 18 cities across five regions in terms of different levels of regional economic development in China: (a) the Central Region: Changsha, Nanchang, Wuhan, and Zhengzhou; (b) the Northeast Region: Benxi, Changchun, Dalian, and Harbin; (c) the Northwest Region: Lanzhou and Xi'an; (d) the Southwest Region: Chongqing, Guiyang, Kunming, and Nanning; and (e) the Coastal Area: Hangzhou, Jiangmen, Shenzhen, and Wenzhou. One of the strengths of the survey is its coverage of different types of firms and broad range of information about such things as innovation and technology development, market environment, vertical relationships with clients and suppliers, relationships with the government, international trade, financial resources, human resources, access to finance and infrastructure services, corporate governance, ownership structure of the firm, and information on taxation. The questionnaire is split into two parts: the first covers qualitative information provided by firm's senior managers and the second asks for financial and quantitative results of the

company, much of which goes back three years, about firms' activities and operations, and is filled by firms' chief accountant based on firms' financial statements and accounting books.

4.3.2 Measures of political connectedness

Unlike the majority of previous studies that consider only CEO appointment or state ownership status as a formal form of political connectedness, this study extends a further understanding about political ties based on informal relationships. Wang, Yao and Kang (2019) investigate government's site visits as a measurement for informal political connetions and link it to innovation activities. Unlike the study of Wang, Yao and Kang (2019) that postulates informal political connections stem solely from governmental initiatives, this work considers that informal connectedness is dually based on a firm's own decision and linked to politicians to help firms out of problems or improve a company's performance through government support. Formal linkage through state ownership or CEO appointment is the direct intervention of government into firms that usually are considered as important and core businesses with significant influence on the country's economy and growth as a whole. Hence, it is more likely that the government has an intention to be connected to the firm in the formal political relationship.

The comprehensive measure of informal relationship with government (*PolitConnect*) is the sum of the values of four variables: *Government Assistance, Law Predictability, Competent Officials* and *Good Relations*. The average value of *PolitConnect* in the sample is 8.56.

Government Assistance is the total score assigned to each firm depending on the availability of government assistance in identifying foreign investors, locating foreign technology to license, identifying potential foreign clients, identifying potential foreign suppliers, obtaining bank financing, identifying potential domestic clients, securing loans by provincial/local government and access to information. Each type of state support is equal to 1 if the answer is "Yes" and 0 if "No", except for access to information where 1 is assigned to an access to each of the following kinds of information: supply of input/services, demand for your product, export market and import sources, technical standards, product/technology development, laws and regulations.[20]

Law Predictability is the variable that measures the predictability of laws or regulations that materially affect the operation and growth of a firm's business.

The variable of *Competent Officials* takes into consideration the share of competent officials among the government officials that a firm regularly interacts with.

[20] Hence, the maximum and minimum values of access to information are 6 and 0, respectively.

Good Relations measures the share of government officials (among the competent officials among the government officials that a firm regularly interacts with) that is oriented toward helping rather than hindering a firm.

For *Law Predictability, Competent Officials* and *Good Relations*, since raw data are in percentages, they are divided into five quantiles with 1 for the quantile with the lowest values and 5 for the quantile with the highest values.

Conventional measures are used for formal political connectedness. A company is defined as formally connected with government if it has a CEO appointed/approved by government or it is a state-owned enterprise (SOE). *CEO Appointment* takes the value of 1 if the CEO was appointed by government or approved by a government agency and 0 otherwise. *SOE* is the dummy that is equal to 1 if the firm is a state-owned company and 0 otherwise. These two measures are analyzed separately, as these two types of formal connection are believed to differ from each other in terms of their decision making approach, i.e., *SOE* refers to ownership of the company that reflects the legal status and *CEO Appointment* is about the direct impact of managerial style and personal characteristics that affect the behavior and attitude of the CEO. The unreported results on correlation also show relatively low correlation between *CEO Appointment* and *SOE* (37.07%). Hafsi, Kiggundu and Jorgensen (1987) identify a government-SOE

relationship cycle whereby an incumbent SOE starts out as an obedient servant of the state, internalizing the political goals of the state, but gradually develops the technical competence and financial self-sufficiency to pull away. This is not the case for a CEO appointment where the assigned CEO has an incentive to maintain a continuous and stable relationship with government during his/her entire tenure.

As shown in Table 4.1, 25.5% of the CEOs are government-appointed and 34.6% are SOEs. By contrast, Cull, Li, Sun and Xu (2015) document 13.3% of the firms have government-appointed CEOs and 22% are SOEs. The higher percentage of government-appointed CEOs and SOEs in the sample is, at least, due to inclusion of firms from different industries and sectors in the sample. There is a significant difference (Table 4.2) in the state ownership status, suggesting firms with government-appointed CEOs run more SOEs than firms without government-appointed CEOs (p<0.001).

4.3.3 Company performance measures, innovation index and other variables

The first company performance measure is leverage that assesses the riskiness of corporate financing choices. This measure is chosen as a proxy for short-term risk based on the argument that the impact of leverage on firm performance can be immediate and can be adjusted and monitored on a periodic, i.e., yearly, basis. *Leverage* is defined as a ratio

of financial debt (i.e., long-term debt and short-term loans) divided by the sum of financial debt and equity. Across the firms in the sample, the average *Leverage* ratio is 0.57% (Table 4.1). As shown in Table 4.2, this ratio is 56.3% for firms run by government-appointed CEOs and 57.3% for firms without government-appointed CEOs. *Leverage* is 49.9% for firms with strong informal connectedness and 63.6% for firms with weak informal connectedness. The *p*-value of the difference between the two groups is insignificant for all forms of political connectedness (0.884 and 0.157).

The second company performance and risk measure is *Likelihood of Survival* since riskier firms are less likely to survive (Facio, 2016). A threshold of a 15-year time window of business operations (very close to the average age value of all companies in the sample) is taken to estimate the *Likelihood of Survival* since it is a proxy for a long-term risk. This study finds that 30.75% of the firms in the sample survive at least 15 years (Table 4.1). The *Likelihood of Survival* is 60.0% for firms run by government-appointed CEOs and 20.7% for firms without government-appointed CEOs (Table 4.2). There is a significant difference for this variable ($p<0.001$). There is no significant difference in this variable for informal political connectedness ($p=0.598$).

Innovation can be regarded as a proxy for a medium-term risk. A notion that new projects entail higher risk than other firm activities is taken since any investment into innovation takes several years to realize. The

impact of innovation on company performance cannot be immediately seen and can have the realized outcome only in the medium term.

Innovation takes two forms: innovation activities and innovation performance. *Innovation Activities* takes the total score of 10 variables: new products/services entered into existing business, new business line introduced, new process improvements, new management techniques, new quality controls in production, new product number, patent grants in China, patent grants in the US, access to product and technology information and access to laws and regulations in the firm. Each sub-group of *Innovation Activities* is equal to 1 if the answer is "Yes" and 0 if "No", with the exception for new product number, patent grants in China and patent grants in the US. For new product number each year, 1 is assigned if its value falls between 1 and 50, 2 if its value falls between 51 and 100, 3 if at least 100 and 0 otherwise. For annual patent grants in China, 1 is assigned if its value falls between 1 and 5, 2 if its value falls between 5 and 10, 3 if at least 10 and 0 otherwise. For patent grants in the US per year, 1 is assigned if its value falls between 1 and 3, 2 if its value is at least 3 and below 5, 3 if at least 5 and 0 otherwise. Only for this case, the values of new product number, patent grants in China and patent grants in the US for the consecutives years from 2000 to 2002 are taken.

Innovation Performance is the ratio of new product sales and exports to total sales. The results of Table 4.1 show that, across all firms in the

sample, the average values of *Innovation Performance* and *Innovation Activities* are 42.8 and 23.8, respectively. This value of *Innovation Performance* is 40.1 for firms run by government-appointed CEOs and 43.5 for firms without government-appointed CEOs (Table 4.2). The same ratio is 43.98 for firms with strong political connectedness and 41.2 for firms with weak political connectedness. The *p*-value of the difference between the two values is insignificant for both forms of political connectedness (0.246 and 0.741). The average value of *Innovation Activities* is 23.5 for firms run by government-appointed CEOs and 23.9 for firms without government-appointed CEOs. The same ratio is 24.5 for firms with strong political connectedness and 23.2 for firms with weak political connectedness. There is a significant difference in this variable for both informal and formal forms of political connectedness ($p<0.001$). Because of data limitations, it is not possible to infer any causality from the results reports. However, the majority of the literature on political connection – company performance is more supportive of the idea that company performance reflects the benefits (i.e., the consequence) of political interference, rather than being a cause.[21]

Besides internal cash, investment might depend on the access to external financing. *Access to Loans* is a dummy that takes the value of 1 if a firm has an overdraft facility/line of credit and/or currently has a

[21] See, for example, Facio (2010).

bank loan, and 0 otherwise. This variable is used as the control variable in estimating capital allocation. Another measure is also used for access to external credit by computing the ratio of unpledged collateralizable assets (*UCA*) using Cull's (2015) definition. Of the firms in the pooled sample, 25.40% are considered as having access to debt financing (Table 4.1). Table 4.2. shows that there is a significant difference between the firms with strong and weak informal connections in terms of access to external financing (p<0.001).

Multiple control variables are used in the models. An additional measure of access to external credit is used by computing the ratio of unpledged collateralizable assets, *UCA* (Cull, 2015), to check the robustness of the results. *ROE* is defined as the ratio of EBIT to total equity. This profitability measure is included in the regressions to control for differences in the quality of corporate governance when analyzing the risk-taking approach of a firm. *Sales Growth* is calculated as the annual rate of growth of sales. *Firm Size* is the natural logarithm of total assets. *Firm Age* is the natural logarithm of the number of years since a firm's establishment. This variable is to control for differences in the lifecycle of a firm. *Cashflows/Fixed Assets* is calculated as a ratio of (net income + financing charges + tax payable) to the book value of total fixed assets (Cull et al., 2015). *Managerial Age* is the natural logarithm of average age of all management personnel. This variable is included in the risk analysis to control for the differences in risk-taking outlook due

to the age of the management team. *CEO Ownership* is the natural logarithm of a firm's stock percentage ownership by the CEO. *Geographic Dispersion* is the location coverage of the main business of a firm. This control variable is used in the analysis of company performance to control for government expropriation hazards (Jia and Mayer, 2015). The value of 1 is assigned if the major market of a firm's main product is in the firm's city, 2 if the major market of a firm's main product is in the firm's province, 3 if it is in China and 4 if it is global. This variable is included in some regressions to control for the differences in the nature and scope of the corporate business that might require a different kind of approach in operation and management.

An analysis of sample means for firms with different forms of political connectedness (Table 4.2) reveals some important differences in the characteristics of both firms and CEOs. Firms with government-appointed CEOs tend to be older, larger, state-owned, to invest less, have fewer innovation activities, survive much longer, have less CEO ownership and a higher average age of their management team than the firms with company-appointed CEOs. Firms with strong informal political ties tend to be larger, have more innovation activities and less access to debt financing than the firms with weak connections.

4.3.4 Empirical model for political connectedness, innovation and company performance

The impact of political connectedness on firm performance and innovation can be specified as follows:

$$Performance\ measure_{\ i} = \alpha + \beta Political\ Connectedness_{\ i} + \sum_{k=0}^{n} \gamma Control_{\ i,k} + \varepsilon_i, \quad (1)$$

where $Performance\ measure_{\ i}$ is either *Leverage, Likelihood of Survival, Innovation Activity or Innovation Performance* of firm i, $Political\ Connectedness_{\ i}$ is any form (informal and informal) of connectedness or its subgroup, and $\sum_{k=0}^{n} \gamma Control_{\ i,k}$ are the set of control variables[22] (*CEO Ownership, Cashflows/Fixed Assets, ROE, Sales Growth, Firm Size, Firm Age, Geographical Dispersion*). *Managerial Age, Investment/Fixed assets* and *Leverage* are additionally included in the regressions for *Likelihood of Survival*. These control variables are included to avoid spurious correlations.

4.3.5 Innovation value-added growth (IVAG), investment model setup for capital allocation and political connectedness

As previously discussed, an informal relationship with government has a significant positive impact on a corporate medium-term risk approach through increased innovation outputs. On the other hand, the connections (both informal and formal) with government may not facilitate firm's sales and export of new products. The extent to which these results are driven by connections with government and influence

[22] This study also tests the model using additional control variables and finds similar results.

the company decision-making process can be verified by looking at the efficiency of capital allocation of the firm.

Wurgler's (2000) idea of looking at the quality of investment opportunities through value-added growth is explored in this analysis. The proposition is that to achieve an efficient allocation, capital should be invested in growing industries and divested from declining industries. A firm should make more (fewer) investments in sectors with good (poor) investment opportunities. It is a natural way of looking at value-added growth to measure the growth of the company since gross domestic product (GDP) is the sum of the value-added of all firms in the economy. This methodology has the advantage of assessing allocative efficiency from direct observation of investment flows.[23]

However, this study argues that value-added growth obtained from earnings before interest and taxes (EBIT) plus the cost of employees (Wurgler, 2000; Facio, 2016) might be affected by not only the quality of investment opportunities, but also other factors (e.g., macroeconomic and market situation, cost-cutting strategies), which makes it impossible to see the standalone relationship between the quality of investment opportunities and capital allocation. By introducing innovation value-added growth (IVAG) that is taken from firms' sales

[23] Other advantages of Wurgler's (2000) value-added growth compared with the distribution of estimated shadow prices or shadow values of capital are discussed in Wurgler's (2000) paper.

and export of new products,[24] this study is able to more accurately estimate the efficiency of investment projects that have an output in the form of new products to be sold domestically and overseas:

$$IVAG_{i,t} = \frac{\text{Sales and export of new products}_{i,t}}{\text{Sales and export of new products}_{i,t-1}}. \quad (2)$$

The traditional model of investment that this study starts with is the following:

$$\frac{I_{i,t}}{K_{i,t-1}} = \alpha + \beta \frac{CF_{i,t}}{K_{i,t-1}} + \varepsilon_{i,t}, \quad (3)$$

where $\frac{I_{i,t}}{K_{i,t-1}}$ represents investment at time t /Fixed Assets at time t-1 of firm i, $\frac{CF_{i,t}}{K_{i,t-1}}$ represents internal funding and is computed as cashflow at time t over fixed assets at time t-1 of firm i.

This study extends further Cull's (2015) model by introducing an innovation value-added growth (IVAG) into the investment model with financial constraints to assess the efficiency of capital allocation:

$$\frac{I_{i,t}}{K_{i,t-1}} = \alpha + \beta \frac{CF_{i,t}}{K_{i,t-1}} + \delta F_{i,t} + \lambda IVAG_{i,t} + \varepsilon_{i,t}, \quad (4)$$

where $\frac{I_{i,t}}{K_{i,t-1}}$ represents Investment at time t /Fixed Assets at time t-1 of firm i, $\frac{CF_{i,t}}{K_{i,t-1}}$ is the Cashflow at time t /Fixed Assets at time t-1 representing internal funding of firm i, F_i is an access to external financing for firm i (Cull, 2015), $IVAG_i$ is firm i's innovation value-added growth.

[24] Another advantage of using this definition is that the values of sales and export in financial statements are much less prone to manipulative techniques frequently used by firms to improve company performance ratios compared with EBIT.

The model in a cross-sectional setting, augmented by an indicator denoting *CEO Appointment* and the interaction of this indicator with each firm's IVAG:

$$\frac{I_i}{K_i} = \alpha + \beta \frac{CF_i}{K_i} + \delta F_i + \gamma IVAG_i + \varphi CEO\ Appointment_i +$$

$$\theta IVAG_i \times CEO\ Appointment_i + \varepsilon_i, \quad (5)$$

where $\frac{I_i}{K_i}$ represents Investment/Fixed Assets (at time t-1) of firm i, $\frac{CF_i}{K_i}$ is the Cashflow/Fixed Assets (at time t-1), F_i is access to external financing for firm i (i.e., *Loans* and *UCA*), $IVAG_i$ is innovation value-added growth of firm i, $CEO\ Appointment_i$ is the dummy for CEO appointment that takes a value of 1 if a CEO in firm i is appointed or approved by government and 0 otherwise. γ represents the investment sensitivity to IVAG opportunities. Investment is computed as the total value of new investments made by a firm (i.e., investments into buildings, production machinery, equipment, cars, vans, trucks and other).

The beta (β) and delta (δ) coefficients in Equations (3), (4) and (5) are the measures for the degree of financial constraints. The traditional literature uses Tobin's Q to control for the investment opportunites, whereare the more recent literature uses Wurgler's value-added growth. IVAG is used in this study as a modified Wurgler's measure to replace the Tobin's Q to reflect the quality of investnment from the increases in

new products and services as opposed to the changes in the firm's market values from capital investment.

By intuition, the better (worse) the IVAG opportunities, the more a wealth-maximizing manager should invest (divest). θ is the coefficient of prime interest which measures the difference in the investment sensitivity to IVAG opportunities between the firms with and without government appointment of CEOs. If CEO appointment is inapt to investment efficiency as theory suggests, then $\theta = 0$.

4.4 Empirical findings

4.4.1 Political connectedness and innovation

Table 4.3 reports very robust and consistent results of a positive and statistically significant relationship between all the measures of informal political connectedness and *Innovation Activities*[25], supporting Wang, Yao and Kang's (2019), Su, Xiao and Yu's (2019) and Wong and Hooy's (2018) findings. *Innovation Activities* have a statistically significant association with *CEO Appointment* at the 10% level, but the relationship between the former and the informal political connectedness (*PolitConnect*) is statistically significant at the 1% level (coefficient and *z*-statistics are 0.17 and 9.45, respectively); thus supporting Hypothesis H1a. The most robust relationship is evident

[25] No endogeneity was detected in the unreported results of Durbin-Wu-Hausman test (augmented regression test).

between *Innovation Activities* and *Government Assistance* (coefficient and *z*-statistics are 0.42 and 11.44).

On the other hand, from Table 4.4, state ownership (*SOE*) – a formal form of political ties – shows a negative insignificant relationship with *Innovation Performance* represented by the ratio of new product's sales and exports to total sales (coefficient and *t*-statistics are -3.96 and -0.98, respectively). The relationship between *Innovation Performance* and *PolitConnect* is statistically significant at the 10% level (coefficient and *z*-statistics are -1.71 and -1.69, respectively). Of the informal connections with government, only *Government Assistance* has a negative and marginally significant relationship with *Innovation Performance* (coefficient and *t*-statistics are -3.72 and -2.00, respectively), supporting Hypothesis H1b. It is interesting to see that *Sales Growth* has a different effect on each type of innovation (negative effect on *Innovation Performance*, but a positive relationship with *Innovation Activities*).

4.4.2 Political connectedness and the efficiency of capital allocation

Table 4.5 presents OLS with regressions of firms' *Investment/Fixed Assets* on innovation value-added growth (*IVAG*), political connectedness (*CEO Appointment*), the interaction between these two variables and variables for financial constraints. To deal with

endogeneity issues from omitted variables, industry fixed effects are applied in the estimation[26].

Consistent with optimal capital budgeting theory, a positive and statistically significant relationship is evident between *Investment/Fixed Assets* and *IVAG* for the firms without government-appointed CEOs, the coefficient of investment sensitivity to innovation growth opportunities is 0.038 (*t*-statistics is 2.33) for the regression with *Access to Loans* as the only proxy for access to external funding (Column 3). The results imply that company-appointed CEOs invest more when the prospects of their firms are promising and divest capital when their firms are operating in industries with low opportunities. In addition, the coefficient of *CEO Appointment* in Column 3 is -0.046 (with *t*-statistics of -2.44), confirming the univariate results of Table 4.2 and implying that firms with company-appointed CEOs invest more aggressively than the connected firms. The results are robust even after including a second measure of access to external finance (*UCA*).

On the other hand, the interaction coefficient between *CEO Appointment* and *IVAG* documents the fact that corporate investments are less responsive to IVAG in firms run by government-appointed CEOs, suggesting that CEOs appointed by government do not appear to allocate capital as efficiently as their peers that are elected by the company. In the unreported results, the evidence shows no relationship

[26] The same methodology was used by Facio (2010) to deal with endogeneity issues.

between the efficiency of capital allocation and state ownership status (*SOE*), as opposed to the findings of Wurgler (2000), who reports efficiency of capital allocation is positively correlated with high state ownership and Chen, Sun, Tang and Wu (2011), who report a negative relationship. This chapter's findings indicate that government intervention through the appointment of connected managers distorts corporate investment behavior and harms firms' investment efficiency. In contrast to Cull, Li, Sun and Xu (2015), this study provides evidence that financial constraints are neither the cause of investment inefficiency for politically connected firms nor the primary concern for the firms with company-elected CEOs. The reported evidence shows that inefficiency of capital allocation comes from CEOs' idiosyncratic characteristics and support Hypothesis H2.

4.4.3 Political connectedness and company performance

4.4.3.1 Political connectedness and leverage

In contrast to existing literature that shows higher leverage used by politically connected firms (Johnson & Mitton, 2003, Khwaja & Mian, 2005, and Facio, 2010), this work's results report firms with weak informal connections take more financial risk. For each unit of increase in the comprehensive score of informal political relations in the sample, the leverage of firms declines by 0.8% on average (*t*-stat=-2.31), after controlling for various factors that might influence corporate capital

structure decisions[27]. Looking back at the summary statistics in Table 4.2, it is seen that companies with weak informal political connections take about 27.45% more financial debt than their non-connected peers (*p*-value of difference is 0.157). It could be the case that when government intervenes in risk-taking behavior of the firm, it provides relevant people who are capable of providing appropriate solutions to the firms without the reliance on debt financing. Psychology can also play a role here as an individual's political connectedness may reveal an individual's motivated social cognitions. Another explanation is that the connected firms' shareholder intolerance of failure is much higher than that of the non-connected peers. Hence, to satisfy the shareholders' demand for financial safety, CEOs are forced to lower the corporate leverage level. The last explanation could be that firms with better prophesy on regulatory changes to accommodate their business strategy do not rely as heavily on leverage compared with the firms that are not able to foresee the legal rule and policy amendments. This study cannot make inferences on how connections with more influential politicians create more value for firms, however, the evidence in Table 4.6 highlights the differences in reliance on debt financing by reporting the firms that interact more with government officials who are oriented toward helping firms (*Good Relations*) and the firms that can better anticipate laws and regulations (*Law Predictability*) are less financially

[27] The unreported Durbin-Wu-Hausman test results show no endogeneity issue.

levered. The relationship is marginally significant and negative since the coefficients for *Good Relations* and *Law Predictability* are -0.021 (*t*-stat=-1.80) and -0.023 (*t*-stat=-1.89), respectively. Overall, it is evident that the negative relationship between leverage and informal connections with government (*PolitConnect*) is statististically significant at the 5% level, whereas no statistically significant relationship is observed between any form of formal political connections and leverage. These findings confirm Hypothesis H3a.

4.4.3.2 Political connectedness and likelihood of survival

Consistent with Zheng, Singh and Mitchel (2015), the results in Table 4.7 provide evidence that companies with formal political ties experience much higher survival rates than firms without formal connections to government. The coefficient and *t*-statistics for *SOE – Likelihood of Survival* relationship are 1.534 and 4.057 (i.e., statistically significant at 1%), whereas that of *CEO Appointment – Likelihood of Survival* relationship are 0.269 and 1.306[28].

The results of Table 4.7 reveal the fact that informal connections do not have statistically significant relationship with survivability. Further investigation show that only *Law Predictability – Likelihood of Survival* relationship is significant at 10% level, with the coefficient and *z*-statistics of -0.095 and -2.327, respectively. Therefore, the formal

[28] In the unreported results of Durbin-Wu-Hausman test, no endogeneity was detected.

political ties represented through state ownership has stronger effects on survival of firms than informal political connectedness, thereby supporting Hypothesis H3b.

Consistent with Facio's (2016) finding on the US market, this study finds that Chinese firms that are larger and with an older management team survive longer. However, there is a strong positive relationship between *Leverage* and *Likelihood of Survival* in all forms of political connectedness, suggesting that debt financing is an important determinant of a firm's survival.

The coefficient and *t*-statistics for the *Likelihood of Survival – Cashflows/Fixed Assets* relationship in Column (1) of Table 4.7 are -0.337 and -2.057, respectively. These results are consistent with Xu, Chen, Xu and Chan's (2016) findings on negative cash holdings during the first year of a new city government official's appointment. According to the authors, this phenomenon of a negative cashflow–survival relationship arrives when a firm holds less cash to minimize the risk of political extraction. Under the grabbing hand hypothesis (Frye and Shleifer, 1997; Shleifer and Vishny, 2002), in which government officials can extract resources from a firm through fees, taxes, regulations or seizing all assets via nationalization, it is safer for a firm to hide its assets, especially liquid assets like cash, to minimize the loss of political extraction.

In summary, the findings confirm the hyphotheses in this study. Informal political connectedness has stronger influence on innovation activities than formal political connections. The effects of political linkage on innovation activities are stronger than on innovation performance. This work also finds support for the hypothesis that firms with government-appointed CEOs are less efficient in capital allocation than their counterparts without government-appointed CEOs. Companies with strong informal political ties take less financial leverage than firms with weak connections, but it is the formal political connection that determines the survivability of a company.

4.5 Conclusion

With the introduction of a novel parameter into the traditional investment model, this work supports optimal capital budgeting theory by providing evidence of a positive and statistically significant relationship between investment and IVAG for firms without government-appointed CEOs. However, firms with government-appointed CEOs are less efficient in terms of capital allocation than those without government involvement in CEO selection.

The univariate analysis, supported by the empirical results, shows that firms with formal political connectedness (CEO appointment by government) tend to be SOEs and older, invest less, survive much longer, and to have a higher average age of personnel in managerial positions

than the firms that can appoint CEOs without government intervention. They also have fewer innovation activities and CEO ownership. Firms with strong informal political ties tend to be larger, have more innovation activities and less financial debt than firms that maintain a weak informal relationship with government officials. The univariate results are supported by the multivariate findings on company performance: 1) the stronger the informal political ties, the lower is the company's leverage; 2) firms with greater help from government officials and firms with better prophesy on regulatory changes are less levered; 3) companies with state ownership status experience much higher survival rates than non-SOEs; and 4) the more-levered firms of larger size with a more experienced management team have a lower chance of becoming bankrupt.

The results of this study shed light on the linkage between political connectedness and innovation: 1) there is a positive and statistically significant relationship between all the measures of informal political connectedness and innovation activities, and 2) political connectedness has more linkage to innovation activities than innovation performance. Overall, the analysis on leverage, innovation and survival shows that the informal relationship with politicians enhances firm performance and affects the short- and mid-term risk-taking behavior of a company; however, it is the formal partisan ties that help increase the survival rates of a firm.

In summary, this study shows both buffering and hindering impacts of political connectedness on Chinese firms, thus supporting the exchange of favors hypothesis (Facio & Hsu, 2016). Government acts as an "insurer" when the formally connected firms encounter economic turbulence. In exchange, politically tied firms through CEO appointment accept less profitable investment projects that are important to government. The explanation lends grounds from behavioral finance that by being connected to politicians or government, a company decision maker will give up some good investment opportunities of the firm for the patronage that political ties would bring to the firm. Psychology and social cognition can also play a role here, as a CEO may need government's further support to increase his/her own personal utility. Hence, differences in managerial traits, in particular CEO appointment by government, appear to have implications for corporate choices and the quality of the capital investment process. The arguments of this study are supported by the interaction results of CEO appointment and IVAG. This study documents the evidence that corporate investments are less responsive to IVAG in firms run by government-appointed CEOs, suggesting political connectedness may lead to misallocation of capital.

Table 4.1 Univariate statistics for the pooled sample

This table reports mean, median, standard deviation (SD), maximum (max) and minimum (min) of each variable for the entire sample. *PolitConnect* is the sum of the values of 4 variables: *Government Assistance, Law Predictability, Competent Officials* and *Good Relations* as defined in Section 4.3.2 of this Chapter. *IVAG* is innovation value-added growth as defined in Section 4.3.5 of this Chapter. *CEO Appointment* takes value 1 if CEO was appointed by government or approved by a governing government agency and 0 otherwise. *SOE* is the dummy that is equal to 1 if the firm is state-owned company and 0 otherwise. *Leverage* is defined as a ratio of financial debt (i.e., long-term debt and short-term loans) divided by the sum of financial debt and equity. *Likelihood of Survival* is the dummy that is equal to 1 if the firm was established 15 or more years ago and 0 otherwise. *Innovation Activities* takes the total score of 10 variables: new products/services entered into existing business, new business line introduced, new process improvements, new management techniques, new quality controls in production, new product number, patent grants in China, patent grants in the US, access to product and technology information and access to laws and regulations in the firm as defined in Section 4.3.3 of this Chapter. *Innovation Performance* is the sale and exports of new products to total sales. *Access to Loans* is a dummy that takes value 1 if a firm has an overdraft facility/line of credit and/or currently has a bank loan, and 0 otherwise. *UCA* is the ratio of unpledged collateralizable assets as proposed by Cull (2015). *ROE* is defined as the % ratio of EBIT to total equity. *Sales Growth* is calculated as the annual rate of growth of sales. *Firm Size* is the natural logarithm of total assets. *Firm Age* is the natural logarithm of the number of years since establishment till 2002. *CEO Ownership* is defined as the natural logarithm of firm's stock percentage ownership by a CEO. *Cashflows/Fixed Assets* is calculated as a ratio of (net income + financing charges + tax payable) to the book values of total fixed assets. *Managerial Age* is the natural logarithm of average age of all management personnel.

	N	mean	median	SD	min	max
	(1)	(2)	(3)	(4)	(5)	(6)
PolitConnect	2,394	8.556	8	4.456	0	26
CEO Appointment	2,400	0.255	0	0.436	0	1
SOE	1,837	0.346	0	0.476	0	1
Investment/Fixed Assets	2,336	0.141	0.028	0.493	-0.491	15.91
IVAG	384	0.274	0.182	0.725	-2.813	4.129
Innovation Activities	2,393	23.81	24	2.104	21	28
Innovation Performance	903	42.80	30	41.65	0	200
Likelihood of Survival	2,400	0.308	0	0.462	0	1
Leverage	2,354	0.571	0.446	2.459	-9.044	80.67
Access to Loans	2,333	0.254	0	0.435	0	1
UCA	2,314	-0.903	0.267	36.36	-419.7	1,180
Cashflow/Fixed Assets	2,335	-8.292	0.105	796.4	-35,592	14,607
Firm Size	2,358	9.680	9.607	2.279	0.095	17.91

Table 4.1 Continued

	N	mean	median	SD	min	max
	(1)	(2)	(3)	(4)	(5)	(6)
Firm Age	2,400	2.430	2.303	0.799	1.099	3.970
CEO Ownership	646	2.893	3.401	1.775	-4.605	4.605
Managerial Age	2,260	3.602	3.638	0.164	2.996	4.522
ROE	2,306	0.252	0.023	8.275	-67	356.9
Sales Growth	2,373	1.040	0.071	26.473	-1	1,245

Table 4.2 Univariate statistics by political connectedness

This table reports statistics for a sample of firms with formal and informal political connectedness. Column 1 reports the mean of a variable for a sample of firms that have government-appointed CEOs. Column 2 shows the mean of a variable for a sample of firms without government-appointed CEOs (Company-appointed CEOs). Columns 3 reports *p*-value from a *t*-test of difference between the firms without and with government-appointed CEOs. For columns 4-6, the sample is divided into 2 portfolios with breakpoint equal to the mean of PolitConnect for the pooled sample (mean=8.556). Informal Political Connectedness of a firm is defined as *Strong* if its *PolitConnect* is above the mean of *PolitConnect* and *Weak* if otherwise. Column 4 provides the mean of a variable for a sample of firms with strong informal political connectedness. Column 5 provides the mean of a variable for a sample of firms with weak informal political connectedness. Columns 6 reports *p*-value from a *t*-test of difference between the firms with and with weak and strong informal political connectedness. *PolitConnect* is the sum of the values of 4 variables: *Government Assistance, Law Predictability, Competent Officials* and *Good Relations* as defined in Section 4.3.2 of this Chapter. *CEO Appointment* takes value 1 if CEO was appointed by government or approved by a governing government agency and 0 otherwise. *SOE* is the dummy that is equal to 1 if the firm is state-owned company and 0 otherwise. *Leverage* is defined as a ratio of financial debt (i.e., long-term debt and short-term loans) divided by the sum of financial debt and equity. *Likelihood of Survival* is the dummy that is equal to 1 if the firm was older than 15 years by the date of survey and 0 otherwise. *Innovation Activities* takes the total score of 10 variables: new products/services entered into existing business, new business line introduced, new process improvements, new management techniques, new quality controls in production, new product number, patent grants in China, patent grants in the US, access to product and technology information and access to laws and regulations in the firm as defined in Section 4.3.3 of this Chapter. *Innovation Performance* is the sale and exports of new products to total sale. *Access to Loans* is a dummy that takes value 1 if a firm has an overdraft facility/line of credit and/or currently has a bank loan, and 0 otherwise. *UCA* is the ratio of unpledged collateralizable assets as proposed by Cull (2015). *ROE* is defined as the ratio of EBIT to total equity. *Sales growth* is calculated as the annual rate of growth of sales. *Firm Size* is the natural logarithm of total assets. *Firm Age* is the natural logarithm of the number of years since establishment. *CEO ownership* is defined as the natural logarithm of firm's stock percentage ownership by a CEO. *Cashflows/Fixed Assets* is calculated as a ratio of (net income + financing charges + tax payable) to the book values of total fixed assets. *Managerial Age* is the natural logarithm of average age of all management personnel. *IVAG* is the innovation value-added growth as defined in Section 4.3.5 of this Chapter.

	Formal Political Connectedness			Informal Political Connectedness		
	Government appointed CEOs	Company appointed CEOs	*p*-value of difference	Strong	Weak	*p*-value of difference
	(1)	(2)	(3)	(4)	(5)	(6)
PolitConnect	8.488	8.580	0.666	12.378	5.169	0.000

Table 4.2 Continued

CEO Appointment				0.438	0.252	0.716
SOE	0.624	0.324	0.000	0.259	0.252	0.922
Investment/ Fixed Assets	0.087	0.160	0.000	0.555	0.135	0.583
IVAG	0.390	0.243	0.101	0.254	0.295	0.582
Innovation Activities	23.507	23.910	0.000	24.503	23.195	0.000
Innovation Performance	40.057	43.537	0.246	43.975	41.245	0.741
Likelihood of Survival	0.600	0.207	0.000	0.295	0.319	0.203
Leverage	0.563	0.573	0.884	0.499	0.636	0.157
Access to Loans	0.241	0.259	0.394	0.204	0.311	0.000
UCA	-1.881	1.936	0.074	-0.315	-1.442	0.453
Cashflow/Fixed Assets	-59.597	9.292	0.254	-31.820	12.823	0.195
Firm Size	9.928	9.595	0.002	10.155	9.262	0.000
Firm Age	2.951	2.251	0.000	3.263	3.274	0.555
Managerial Age	3.670	3.577	0.000	3.595	3.607	0.066
ROE	-0.041	0.352	0.137	0.441	0.000	0.318
Sales Growth	0.274	1.301	0.160	0.285	1.715	0.164

Table 4.3 Political connectedness and innovation activities

The table reports coefficients and *z*-statistics (in parentheses) adjusted for heteroscedasticity and industry clustering from cross-sectional ologit regressions of *Innovation Activities* that takes ordinary values as a proxy. Columns 1-2 analyze formal political connections with state ownership status (*SOE*) and CEO appointment by government (*CEO Appointment*) as proxies. Column 3 focuses on comprehensive measure of informal political ties (*PolitConnect*). Columns 4-7 investigate the specific areas of government interference that eventually make up *PolitConnect*. *Leverage* is defined as a ratio of financial debt (i.e., long-term debt and short-term loans) divided by the sum of financial debt and equity. *PolitConnect* is the sum of the values of 4 variables: *Government Assistance, Law Predictability, Competent Officials* and *Good Relations* as defined in Section 4.2.2 of this Chapter. *CEO Appointment* takes value 1 if CEO was appointed by government or approved by a governing government agency and 0 otherwise. *SOE* is the dummy that is equal to 1 if the firm is state-owned company and 0 otherwise. *ROE* is defined as the ratio of EBIT to total equity. *Sales Growth* is calculated as the annual rate of growth of sales. *Firm Size* is the natural logarithm of total assets. *Firm Age* is the natural logarithm of the number of years since establishment. *CEO Ownership* is defined as the natural logarithm of firm's stock percentage ownership by a CEO. *Cashflows/Fixed Assets* is calculated as a ratio of (net income + financing charges + tax payable) to the book values of total fixed assets. *Geographic Dispersion* is the location coverage of the main business of a firm. *Investment/Fixed Assets* is computed as the total value of new investments made by a firm (i.e., investments into buildings, production machinery, equipment, cars, vans, trucks and other) divided by the total fixed assets. Industry is the unique number assigned to an industry. The values are significant at 1% level (***), 5% level (**) and 10% level (*).

	Formal Political Connectedness		Informal Political Connectedness	Breakdown of Informal Political Connectedness			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SOE	-0.019						
	(-0.133)						
CEO Appointment		0.573*					
		(1.687)					
PolitConnect			0.169***				
			(9.453)				

Table 4.3 Continued

Government Assistance				0.423***			
				(11.440)			
Good Relations					0.142***		
					(2.761)		
Law Predictability						0.193***	
						(3.627)	
Competent Officials							0.009***
							(3.519)
CEO Ownership		0.073**	0.064	0.093**	0.071	0.074*	0.091**
		(1.981)	(1.437)	(2.082)	(1.594)	(1.650)	(2.015)
Cashflows/ Fixed Assets	-0.004	-0.013***	-0.003	-0.004	-0.005	-0.004	-0.005
	(-1.293)	(-2.733)	(-0.606)	(-0.823)	(-1.004)	(-0.768)	(-1.026)
ROE	0.023*	0.059***	0.026	0.029	0.029	0.024	0.032*
	(1.790)	(2.832)	(1.442)	(1.541)	(1.562)	(1.245)	(1.675)
Sales Growth	-0.021	0.008**	0.026***	0.025**	0.018*	0.017*	0.018
	(-0.964)	(2.433)	(2.618)	(2.445)	(1.765)	(1.684)	(0.738)
Firm Size	0.310***	0.319***	0.317***	0.273***	0.363***	0.371***	0.387***
	(11.842)	(5.627)	(6.836)	(5.839)	(7.926)	(8.162)	(8.172)
Firm Age	-0.263***	0.086	-0.001	0.027	-0.002	0.009	-0.074
	(-3.362)	(0.710)	(-0.010)	(0.237)	(-0.021)	(0.079)	(-0.648)

Table 4.3 Continued

Leverage	-0.008	-0.546**	-0.465**	-0.610***	-0.482***	-0.503***	-0.587***
	(-1.562)	(-2.443)	(-2.540)	(-3.148)	(-2.694)	(-2.775)	(-3.076)
Geographical Dispersion	0.209***	0.133	0.186**	0.148	0.188**	0.171*	0.175*
	(2.950)	(1.031)	(2.045)	(1.611)	(2.061)	(1.880)	(1.852)
Investment/Fixed Assets	0.224***	0.117	0.183	0.170	0.203*	0.214*	0.211*
	(3.461)	(0.677)	(1.619)	(1.513)	(1.787)	(1.886)	(1.831)
Observations	1,697	601	599	599	599	599	568
Pseudo R^2	0.095	0.094	0.091	0.146	0.125	0.090	0.077

Table 4.4 Political connectedness and innovation performance

The table reports coefficients and *t*-statistics (in parentheses) adjusted for heteroscedasticity and industry clustering from cross-sectional OLS regressions of *Innovation Performance* with the sales and exports of new products to total sales as a proxy. Columns 1-2 analyze formal political connections with state ownership status (*SOE*) and CEO appointment by government (*CEO Appointment*) as proxies. Column 3 focuses on comprehensive measure of informal political ties (*PolitConnect*). Columns 4-7 investigate the specific areas of government interference that eventually make up *PolitConnect*. *Leverage* is defined as a ratio of financial debt (i.e., long-term debt and short-term loans) divided by the sum of financial debt and equity. *PolitConnect* is the sum of the values of 4 variables: *Government Assistance, Law Predictability, Competent Officials* and *Good Relations* as defined in Section 4.3.2 of this Chapter. *CEO Appointment* takes value 1 if CEO was appointed by government or approved by a governing government agency and 0 otherwise. *SOE* is the dummy that is equal to 1 if the firm is state-owned company and 0 otherwise. *ROE* is defined as the ratio of EBIT to total equity. *Sales Growth* is calculated as the annual rate of growth of sales. *Firm Size* is the natural logarithm of total assets. *Firm Age* is the natural logarithm of the number of years since establishment. *CEO Ownership* is defined as the natural logarithm of firm's stock percentage ownership by a CEO. *Cashflows/Fixed Assets* is calculated as a ratio of (net income + financing charges + tax payable) to the book values of total fixed assets. *Geographic Dispersion* is the location coverage of the main business of a firm. *Investment/Fixed Assets* is computed as the total value of new investments made by a firm (i.e., investments into buildings, production machinery, equipment, cars, vans, trucks and other) divided by the total fixed assets. *Industry* is the unique number assigned to an industry. The values are significant at 1% level (***), 5% level (**) and 10% level (*).

	Formal Ties		Informal Ties	Breakdown of Informal Ties			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SOE	-3.959						
	(-0.977)						
CEO Appointment		7.806					
		(0.836)					
PolitConnect			-1.711*				
			(-1.688)				

Table 4.4 Continued

Government Assistance				-3.724*			
				(-1.997)			
Good Relations					-0.333		
					(-0.163)		
Law Predictability						-2.124	
						(-0.907)	
Competent Officials							-0.124
							(-0.855)
CEO Ownership		0.519	0.681	0.495	0.588	0.737	0.757
		(0.287)	(0.405)	(0.285)	(0.337)	(0.414)	(0.396)
Cashflows/ Fixed Assets	-0.520	0.335	0.316	0.270	0.329	0.328	0.393
	(-1.278)	(0.645)	(0.682)	(0.573)	(0.628)	(0.637)	(0.802)
ROE	1.450*	0.756	1.432	1.214	0.740	0.839	1.139
	(1.910)	(0.655)	(1.439)	(1.345)	(0.656)	(0.760)	(0.991)
Sales Growth	-0.729***	-0.289***	-0.430***	-0.412***	-0.299***	-0.316***	-0.634***
	(-3.344)	(-3.706)	(-3.448)	(-3.571)	(-3.856)	(-3.717)	(-4.089)
Firm Size	0.124	1.894	2.811	3.020	1.942	2.086	2.146
	(0.074)	(0.836)	(1.281)	(1.463)	(0.869)	(0.912)	(0.912)
Firm Age	0.202	-4.205	-4.015	-4.806	-3.163	-3.095	-3.423
	(0.095)	(-1.091)	(-0.993)	(-1.103)	(-0.745)	(-0.744)	(-0.792)

Table 4.4 Continued

Leverage	-1.866	-4.249	-4.722	-2.145	-3.402	-4.697	-1.103
	(-0.461)	(-0.296)	(-0.339)	(-0.143)	(-0.238)	(-0.333)	(-0.070)
Geographical Dispersion	9.634***	17.350***	16.337***	16.615***	17.375***	17.106***	16.167***
	(3.273)	(3.522)	(3.475)	(3.334)	(3.617)	(3.701)	(3.488)
Investment/ Fixed Assets	0.322	-11.927	-11.535	-12.155	-12.158	-12.769	-11.976
	(-0.539)	(-0.824)	(-0.884)	(-0.894)	(-0.854)	(-0.891)	(-0.856)
Observations	661	275	274	274	274	274	264
Adjusted R^2	0.064	0.197	0.221	0.233	0.195	0.199	0.187
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 4.5 The effect of political connectedness on capital allocation

The table reports coefficients and *t*-statistics (in parentheses) adjusted for heteroscedasticity and industry clustering from cross-sectional regressions of capital allocation on innovation value-added growth (IVAG) and its interactions with political connectedness. Columns 1 and 4 analyze the sample of the firms without government appointment of CEOs by regressing Eq. (4). Columns 2 and 5 also regress the same Eq. (4) but for the sample of the firms with government appointment of CEOs by regressing Eq. (4). Columns 3 and 6 use Eq. (5) to investigate the interaction effect using the pooled sample. *IVAG* is the natural logarithm of sales and exports of new products of this period divided by that of the previous year. *CEO Appointment* takes value 1 if CEO was appointed by government or approved by a governing government agency and 0 otherwise. *SOE* is the dummy that is equal to 1 if the firm is state-owned company and 0 otherwise. *Access to Loans* is a dummy that takes value 1 if a firm has an overdraft facility/line of credit and/or currently has a bank loan, and 0 otherwise. *UCA* is the ratio of unpledged collateralizable assets as proposed by Cull (2015). *ROE* is defined as the ratio of EBIT to total equity. *Cashflows/Fixed Assets* is calculated as a ratio of (net income + financing charges + tax payable) to the book values of total fixed assets. The values are significant at 1% level (***), 5% level (**) and 10% level (*).

	(1)	(2)	(3)	(4)	(5)	(6)
IVAG	0.037**	-0.008	0.038**	0.035**	-0.007	0.036**
	(2.309)	(-0.345)	(2.329)	(2.288)	(-0.448)	(2.290)
Cashflow/Fixed Assets	0.005	0.009	0.005	0.003	0.002	0.003
	(0.428)	(0.319)	(0.475)	(0.269)	(0.062)	(0.334)
Access to Loans	-0.000	0.000	0.000	-0.000**	0.000	0.000
	(-1.177)	(0.274)	(0.224)	(-2.222)	(0.276)	(0.024)
UCA				-0.001	-0.005***	-0.001
				(-1.629)	(-8.791)	(-1.633)
CEO Appointment			-0.046**			-0.046**
			(-2.442)			(-2.341)

Table 4.5 Continued

CEO Appointment x IVAG			-0.049*			-0.048*
			(-1.922)			(-1.986)
Number of observations	298	81	379	295	81	376
Adjusted R^2	0.015	0.141	0.029	0.006	0.163	0.047
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 4.6 Political connectedness and leverage

The table reports coefficients and *t*-statistics (in parentheses) adjusted for heteroscedasticity and industry clustering from OLS regressions of political connectedness on leverage using Eq. (1). Columns 1-2 analyze formal political connections with state ownership status (*SOE*) and CEO appointment by government (*CEO Appointment*) as proxies. Column 3 focuses on comprehensive measure of informal political ties (*PolitConnect*). Columns 4-7 investigate the specific areas of government interference that eventually make up *PolitConnect*. *Leverage* is defined as a ratio of financial debt (i.e., long-term debt and short-term loans) divided by the sum of financial debt and equity. *PolitConnect* is the sum of the values of 4 variables: *Government Assistance, Law Predictability, Competent Officials* and *Good Relations* as defined in Section 4.3.2 of this Chapter. *CEO Appointment* takes value 1 if CEO was appointed by government or approved by a governing government agency and 0 otherwise. *SOE* is the dummy that is equal to 1 if the firm is state-owned company and 0 otherwise. *ROE* is defined as the ratio of EBIT to total equity. *Sales Growth* is calculated as the annual rate of growth of sales. *Firm Size* is the natural logarithm of total assets. *Firm Age* is the natural logarithm of the number of years since establishment. *CEO Ownership* is defined as the natural logarithm of firm's stock percentage ownership by a CEO. *Cashflows/Fixed Assets* is calculated as a ratio of (net income + financing charges + tax payable) to the book values of total fixed assets. *Geographic Dispersion* is the location coverage of the main business of a firm. The values are significant at 1% level (***), 5% level (**) and 10% level (*).

	Formal Ties		Informal Ties	Breakdown of Informal Ties			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SOE	0.166						
	(0.578)						
CEO Appointment		0.178					
		(1.517)					
PolitConnect			-0.008**				
			(-2.314)				
Government Assistance				-0.006			
				(-0.793)			

Table 4.6 Continued

Good Relations					-0.021*		
					(-1.803)		
Law Predictability						-0.023*	
						(-1.894)	
Competent Officials							-0.000
							(-0.558)
CEO Ownership	0.017	0.012	0.009	0.009	0.010	0.010	0.008
	(1.086)	(0.972)	(0.899)	(0.836)	(0.993)	(0.904)	(0.724)
Cashflows/ Fixed Assets	-0.002	-0.003*	-0.003*	-0.003*	-0.003*	-0.003*	-0.003*
	(-1.316)	(-1.757)	(-1.852)	(-1.800)	(-1.826)	(-1.825)	(-1.803)
ROE	0.008	0.010	0.012*	0.011	0.011*	0.011*	0.010
	(1.331)	(1.601)	(1.682)	(1.656)	(1.668)	(1.683)	(1.630)
Sales Growth	0.001	0.002	0.001	0.001	0.001	0.001	-0.003
	(0.168)	(1.168)	(0.712)	(0.923)	(0.887)	(0.970)	(-0.373)
Firm Size	0.026	0.016	0.023	0.022	0.022	0.021	0.019
	(1.382)	(0.975)	(1.622)	(1.570)	(1.493)	(1.435)	(1.223)
Firm Age	0.086*	0.069	0.078*	0.078*	0.078	0.079*	0.079
	(1.708)	(1.620)	(1.677)	(1.683)	(1.659)	(1.674)	(1.573)
Geographical Dispersion	-0.049	-0.025	-0.027	-0.028	-0.029	-0.028	-0.021
	(-1.400)	(-0.989)	(-1.106)	(-1.117)	(-1.166)	(-1.132)	(-0.788)

Table 4.6 Continued

Observations	434	602	600	600	600	600	569
Adjusted R^2	0.081	0.079	0.071	0.066	0.070	0.071	0.060
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 4.7 Political connectedness and likelihood of survival

The table reports coefficients and *t*-statistics (in parentheses) adjusted for heteroscedasticity and industry clustering from cross-sectional probit regressions *of Likelihood of Survival* that takes value 1 if the company in the sample is more than 15 years old by the date of the survey and 0 otherwise. Columns 1-2 analyze formal political connections with state ownership status (*SOE*) and CEO appointment by government (*CEO Appointment*) as proxies. Column 3 focuses on comprehensive measure of informal political ties (*PolitConnect*). Columns 4-7 investigate the specific areas of government interference that eventually make up *PolitConnect*. *PolitConnect* is the sum of the values of 4 variables: *Government Assistance, Law Predictability, Competent Officials* and *Good Relations* as defined in Section 4.3.2 of this Chapter. *CEO Appointment* takes value 1 if CEO was appointed by government or approved by a governing government agency and 0 otherwise. *SOE* is the dummy that is equal to 1 if the firm is state-owned company and 0 otherwise. *ROE* is defined as the ratio of EBIT to total equity. *Sales Growth* is calculated as the annual rate of growth of sales. *Firm Size* is the natural logarithm of total assets. *Leverage* is defined as a ratio of financial debt (i.e., long-term debt and short-term loans) divided by the sum of financial debt and equity. *CEO Ownership* is defined as the natural logarithm of firm's stock percentage ownership by a CEO. *Cashflows/Fixed Assets* is calculated as a ratio of (net income + financing charges + tax payable) to the book values of total fixed assets. *Geographic Dispersion* is the location coverage of the main business of a firm. *Managerial Age* is the natural logarithm of average age of all management personnel. *Investment/Fixed Assets* is computed as the total value of new investments made by a firm (i.e., investments into buildings, production machinery, equipment, cars, vans, trucks and other) divided by the total fixed assets. Industry is the unique number assigned to an industry. The values are significant at 1% level (***), 5% level (**) and 10% level (*).

	Formal Ties		Informal Ties	Breakdown of Informal Ties			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SOE	1.534***						
	(4.057)						
CEO Appointment		0.269					
		(1.306)					
PolitConnect			-0.024				
			(-1.072)				

Table 4.7 Continued

Government Assistance				-0.018			
				(-0.569)			
Good Relations					-0.032		
					(-0.376)		
Law Predictability						-0.095**	
						(-2.327)	
Competent Officials							-0.002
							(-0.498)
CEO Ownership	-0.064	-0.046	-0.047	-0.050	-0.048	-0.046	-0.028
	(-0.933)	(-0.903)	(-0.911)	(-0.960)	(-0.910)	(-0.877)	(-0.494)
Cashflows/ Fixed Assets	-0.337**	-0.253	-0.263	-0.259	-0.250	-0.278	-0.226
	(-2.057)	(-1.480)	(-1.508)	(-1.522)	(-1.483)	(-1.554)	(-1.338)
ROE	-0.090	-0.079	-0.074	-0.075	-0.077	-0.074	-0.083
	(-0.940)	(-1.036)	(-1.133)	(-1.127)	(-1.065)	(-1.090)	(-1.019)
Sales Growth	-0.407**	-0.241	-0.237	-0.251	-0.248	-0.228	-0.230
	(-2.555)	(-1.513)	(-1.518)	(-1.573)	(-1.543)	(-1.447)	(-1.578)
Firm Size	0.182*	0.248***	0.280***	0.269***	0.268***	0.275***	0.267***
	(1.891)	(3.009)	(3.346)	(3.373)	(3.059)	(3.336)	(3.294)
Leverage	0.478***	0.483**	0.514***	0.516***	0.523***	0.504**	0.544***
	(2.665)	(2.298)	(2.601)	(2.620)	(2.615)	(2.442)	(2.594)

Table 4.7 Continued

Geographical Dispersion	0.122	0.043	0.048	0.043	0.037	0.035	0.000
	(0.606)	(0.257)	(0.272)	(0.253)	(0.215)	(0.193)	(0.000)
Managerial Age	1.713**	2.634***	2.689***	2.712***	2.706***	2.631***	2.687***
	(2.242)	(4.456)	(4.329)	(4.407)	(4.344)	(4.146)	(4.383)
Investment/ Fixed Assets	-0.195**	-0.222	-0.207	-0.198	-0.204	-0.192	-0.209
	(-2.079)	(-1.249)	(-1.203)	(-1.256)	(-1.245)	(-1.337)	(-1.113)
Observations	268	396	394	394	394	394	370
Pseudo R^2	0.337	0.329	0.330	0.328	0.329	0.332	0.319

CHAPTER 5

CONCLUSION

This thesis provides three essays that empirically investigate the asset pricing models and value of firms in emerging markets of Asia that feature strong government involvement in financial market development.

Chapter 1 guides the reader to the background, structure and contribution of this PhD thesis.

Chapter 2 examines three FF multi-factor models for the Vietnamese stock market during the 2008–2015 period. The findings document the superiority of the FF five-factor model over the three-factor and four-factor models in explaining the average returns of all Vietnamese equities sorted on a combination of size and value, profitability or investment; whereas the three-factor model is a preferred model in explaining the average stock returns of private companies in Vietnam. This chapter also provides evidence that state-owned enterprises have significantly higher average returns than private firms, although the former invest less aggressively and have lower profitability and book-to-market ratios than private firms. Profitable private entities tend to provide lower returns to investors and invest more aggressively than

SOEs. This study also shows that investors holding the portfolio with average book-to-market, or focusing only on small-cap SOEs during the sample period, would bear the highest returns. The loser portfolio is the one that contains large-sized stocks with an average investment ratio.

The findings suggest that the value factor (HML) is associated with portfolio returns and the profitability and investment factors cannot absorb its effect. HML is not redundant in the Vietnamese stock market after considering two other proxies for the profitability factor. The value factor and operating profitability have the largest marginal contribution to the maximum squared Sharpe ratio for the five-factor model's factors. The operating profitability (RMW) used in the FF five-factor model performs better than cash profitability and ROE profitability. All the tests provide consistent results on the superiority of the FF five-factor model over other traditional asset pricing models, regardless of the profitability factor choice.

Chapter 3 investigates factor models using both cross-sectional factors from the Fama-Macbeth (1973) approach and time-series factors of the Fama and French (2015) methodology. The study provides evidence that the cross-section factor models have less explanatory power than the time-series factor models, supporting the findings on FF five-factor superiority in Chapter 2. The pricing error metrics provide the preference for the model with a time-varying nature of factor loadings as the best model regardless of the choice of the Fama-Macbeth (1973) approach or Fama-French (2015) methodology. Time-varying loadings

largely impact the pricing error of the models. The superiority of the times-series factor models with time-varying factor loadings is due to both its time-series factors and their time-varying characteristics. The findings provide evidence that a portfolio's monthly standardized characteristics anticipate next month's factor returns of the Vietnamese stock. The results support Chapter 2's findings that operating profitability (RMW) still performs better than cash profitability and ROE profitability regardless of methodology of asset price testing and factor loading setting.

Chapter 4 extends the analysis on state ownership and value of a firm in Chapter 2 by looking at political connectedness, innovation and other performance metrics. With the introduction of a novel parameter into the traditional investment model, this study supports optimal capital budgeting theory by providing evidence of a positive and statistically significant relationship between investment and innovation value-added growth (IVAG) for firms with company-appointed CEOs. However, firms with government-appointed CEOs are less efficient in terms of capital allocation than those without government involvement in CEO selection.

The study shows that firms with formal political connectedness (CEO appointment by government) tend to be SOE and older, invest less, survive much longer, and to have a higher average age of personnel in managerial positions than the firms that can appoint CEOs without government intervention. These firms also have fewer innovation

activities and less CEO ownership. Firms with strong informal political ties tend to be larger, have more innovation activities and less financial debt than firms that maintain a weak informal relationship with government officials.

The findings provide evidence that political connectedness has more linkage to innovation activities than innovation performance, with an informal political network significantly enhancing innovation activities. Overall, the analysis on leverage, innovation and survival shows that an informal relationship with politicians enhances firm performance and affects the short-, mid- and long-term risk-taking behavior of a company; however, it is the formal partisan ties that help increase the survival rates of a firm. Thus, this study documents both the buffering and hindering impacts of political connectedness on Chinese firms, which supports the exchange of favors hypothesis. This chapter provides evidence that corporate investments are less responsive to IVAG in firms run by government-appointed CEOs, suggesting political connectedness may lead to misallocation of capital, which has significant consequences on the economy as a whole.

BIBLIOGRAPHY

Acquaah, M., 2012. Social networking relationships, firm-specific managerial experience and firm performance in a transition economy: A comparative analysis of family owned and nonfamily firms. *Strategic Management Journal 33(10)*, 1215–1228.

Adhikari, B. K., and Agrawal, A., 2016. Religion, gambling attitudes and corporate innovation. *Journal of Corporate Finance 37*, 229–248.

Aggarwal, R. K., Meschke, F., and Wang, T. Y., 2007. Corporate political contributions: Investment or Agency. University of Minnesota, *Working Paper*.

An, H., Chen, Y., Luo, D., and Zhang, T., 2016. Political uncertainty and corporate investment: evidence from China. *Journal of Corporate Finance* 36, 174–189.

Ang, A., Hodrick, R. J., Xing, Y. and Zhang, X., 2006. The cross-section of volatility and expected returns. *Journal of Finance 61*, 259–299.

Angelides, T., 2010. Idiosyncratic risk in emerging markets. *Financial Review 45*, 1053–1078.

Asness, C., and Frazzini, A., 2013. The devil is in HML's details. *Journal of Portfolio Managment 39*, 49–68.

Avramov, D., and Chordia, T., 2006. Asset pricing models and financial market anomalies. *Review of Financial Studies 19*, 1001–1040.

Back, K., Kapadia, N., and Ostdiek, B., 2013. Slopes as factors: Characteristic pure plays. *Working Paper, Rice University*.

Back, K., Kapadia, N., and Ostdiek, B., 2015. Testing factor models on characteristic and covariance pure plays. *Working Paper, Rice University*.

Ball, R., Gerakos, J., Linnainmaa, J.T. and Nikolaev, V., 2015. Deflating profitability. *Journal of Financial Economics 117(2)*, 225–248.

Barillas, F., and Shanken, J., 2017. Which alpha? *Review of Financial Studies 30*, 1316–1338.

Batten, J. and Vo, V., 2014. Liquidity and return relationships in an emerging market. *Emerging Markets Finance and Trade 50(1)*, 5–21.

Bekaert, G., Harvey, C. R., Lundblad, C. T., and Siegel S., 2016. Political risk and international valuation. *Journal of Corporate Finance 37*, 1–23.

Bertrand, M., Kramarz, F., Schoar, A., and Thesmar, D., 2004. Politically connected CEOs and corporate outcomes: evidence from France. *NBER Working Paper (3291)*.

Bessembinder, H., Cooper, M. J., and Zhang, F., 2019. Characteristic-based benchmark returns and corporate events. *Review of Financial Studies 32*, 75–125.

Boubakri, N., Cossett, J. C., and Saffar, W., 2008. Political connection of newly privatized firms. *Journal of Corporate Finance 14(5)*, 654–673.

Boubakri, N., Guedhami, O., Mishra, D., and Saffar, W., 2012. Political connections and the cost of equity. *Journal of Corporate Finance 18*, 541–559.

Bradley, D., Panzalis, C., and Yuan, X., 2016. Policy risk, corporate political strategies, and the cost of debt. *Journal of Corporate Finance 40*, 254–275.

Brockman, P., Rui, O. M., and Zou, H., 2013. Institutions and the performance of politically connected MandAs. *Journal of International Business Studies 44*, 833–852.

Cakici, N., 2015. The five-factor Fama-French model: International evidence. *Working Paper*. Retrieved from SSRN: ssrn.com/abstract=2601662.

Carhart, M. (1997). On persistence of mutual fund performance. *Journal of Finance 52*, 57–82.

Carpio, L, Faccio, M., and McConnell, J. J., 2013. Sheltering corporate assets from political extraction. *Journal of Law and Economic Organisation 29*, 332–354.

Chatterjee, A., and Hambrick, D. C., 2007. It's all about me: narcissistic CEOs and their effects on company strategy and performance. *Administrative Science 52(3)*, 351–386.

Cheema, M. A. and Nartea, G. V., 2014. Momentum returns and information uncertainty: Evidence from China. *Pacific–Basin Finance Journal 30*, 173–188.

Chen, Y., 1993. Price limits and stock market volatility in Taiwan. *Pacific–Basin Finance Journal 1(2)*, 139–153.

Chen, S., Sun, Z., Tang, S., and Wu, D., 2011. Government intervention and investment efficiency: Evidence from China. *Journal of Corporate Finance* 17, 259–271.

Chiah, M., Chai, D. and Zhong, A., 2016. A better model? An empirical investigation of the Fama-French five-factor model in Australia. *International Review of Finance 16(4)*, 595–638.

Cho, C., Halford, J. T., Hsu, S. and Ng, L., 2016. Do managers matter for corporate innovation? *Journal of Corporate Finance* 36, 206–229.

Christensen, D. M., Dhaliwal, D. S., Boivie S., and Graffin, S. D., 2015. Top management conservatism and corporate risk strategies: evidence from managers' personal political orientation and corporate tax avoidance. *Strategic Management Journal 36*, 1918–1938.

Chung, L., and Tan, L. H., 2017. The unique chinese innovation pathways: Lessons from chinese small and mediuem sized manufacturing firms. *International Journal of Production Economics 190*, 80–87.

Cleassens, S., Feijen, E., and Laeven, L., 2008. Political connections and preferential access to finance: the role of campaign contribution. *Journal of Financial Economics 88(3)*, 554–580.

Coles, J. L., Naveen, D. D., and Naveen, L., 2006. Managerial incentives and risk-taking. *Journal of Financial Economics 79*, 431–468.

Cooper, M. J., Gulen, H., and Schill, M. J., 2008. Asset growth and the cross-section of stock returns. *Journal of Finance 63 (4)*, 1609–1651.

Cornett, M., Gui, L., Khaksari, S. and Tehranian, H., 2010. The impact of state ownership on performance differences in privately-owned versus state-owned banks: An international comparison. *Journal of Financial Intermediation 19(1)*, 74–94.

Correia, M. M., 2014. Political connections and SEC enforcement. *Journal of Accounting and Economics 57*, 241–262.

Cull, R., Li, W., Sun, B., and Xu, L. C., 2015. Government connections and financial constraints: Evidence from a large representative sample of Chinese firms. *Journal of Corporate Finance 32*, 271–294.

Cull, R., Xu, L. C., Yang, X., Zhou L.-A., and Zhu, T., 2015. Market facilitation by local government and firm efficiency: Evidence from China. *Journal of Corporate Finance 42*, 460–480.

Cumming, D. J., Grilli, L., and Murtinu, S., 2017. Governmental and independent venture capital investments in Europe: A firm-level performance analysis. *Journal of Corporate Finance 42*, 439–459.

Davis, J. L., Fama, E. F., and French, K. R., 2000. Characteristics, covariances, and average returns: 1929 to 1997. *Journal of Finance 55,* 389–406.

Devers, C. E., Wiseman, R. M., and Holmes, R. M. Jr., 2007. The effects of endowment and loss aversion in managerial stock option valuation. *Academy of Management Journal 50(1)*, 191-208.

Downs, 1957. An economic theory of political action in a democracy. *Journal of Political Economy 65(2)*, 135–150.

Elton, E., 1999. Expected return, realized return and asset pricing tests. *Journal of Finance 54(4),* 1199–1120.

Epstein, L. G. and Schneider, M., 2008. Ambiguity, information quality, and asset pricing. *Journal of Finance 63(1)*, 197–228.

Evans, P., 1995. Embedded autonomy: States and industrial transformation. *Princeton University Press,* New Jersey.

Facio, M., Masulis, R. W., and McConnel, J. J., 2006. Political connections and corporate bailouts. *Journal of Finance 61(6)*, 2597–2635.

Facio, M., 2006. Politically connected firms. *American Economic Review 96*, 369–386.

Facio, M., 2010. Differences between politically connected firms and nonconnected firms. *Journal of Financial Management 39*, 905–927.

Facio, M., Marchica, M.-T., and Mura, R., 2016. CEO gender, corporate risk-taking, and the efficiency of capital allocation. *Journal of Corporate Finance 39*, 193–209.

Facio, M., and Hsu, S. H. C., 2017. Politically connected private equity and employment. *Journal of Finance 72(2)*, 539–574.

Fan, J. P. H., Wong, T. J., Zhang, T. J., and Tianyu, 2007. Politically-connected CEOs, corporate governance and post-IPO performance of China's newly partially privatized firms. *Journal of Financial Economics 84(2)*, 330–357.

Fama, E. F., 1976. Foundations of finance. *Basic Books*, New York.

Fama, E. F., 1989. Perspectives on October 1987, or what did we learn from the crash? *In: Kamphuis, Jr. R.W., Kormendi, R.C., Watson, J.W.H. (Eds.), Black Monday and the Future of the Financial Markets,* 71–82.

Fama, E. F. and French, K. R., 1992. The cross-section of expected returns. *Journal of Finance 47*, 427–465.

Fama, E. F. and French, K. R., 1993. Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics 33*, 3–56.

Fama, E. F. and French, K. R., 1996. Multifactor explanations of asset-pricing anomalies. *Journal of Finance 51*, 55–84.

Fama, E. F. and French, K. R., 1997. Industry costs of equity. *Journal of Financial Economics 43*, 153–193.

Fama, E. F. and French, K. R., 2006. Profitability, investment, and average returns. *Journal of Financial Economics 82*, 491–518.

Fama, E. F. and French, K. R., 2015. A five-factor asset pricing model. *Journal of Financial Economics 116*, 1–22.

Fama, E. F. and French, K. R., 2016. Dissecting anomalies with a five-factor model. *Review of Financial Studies 29(1)*, 69–103.

Fama, E. F. and French, K. R., 2017. International tests of a five-factor asset pricing model. *Journal of Financial Economics 123*, 441–463.

Fama, E. F. and French, K. R., 2018. Choosing factors. *Journal of Financial Economics 128*, 234–252.

Fama, E. F. and French, K. R., 2019. Comparing cross-section and time-series factor models. *Review of Financial Studies, forthcoming.*

Fama, E. F. and Jensen, M. C., 1983. Separation of ownership and control. *Journal of Law and Economics 26(2)*, 301–325.

Fama, E. F. and MacBeth, J. D., 1973. Risk, returns, and equilibrium: Empirical tests. *Journal of Political Economy 81(3)*, 607–636.

Fang, K., Wu, J. and Nguyen, C., 2017. The risk-return tradeoff in a liberalized emerging stock market: Evidence from Vietnam. *Emerging Market Finance and Trade 53(4)*, 746–763.

Fazzari, S. M., Hubbard, G. R., and Peterson, B. C., 1988. Financing constraints and corporate investment. *Brookings Papers on Economic Activity 1*, 141–195.

Ferguson, T., and Voth, H.-J., 2008. Betting on Hitler – The value of Political Connections in Nazy Germany. *The Quarterly Journal of Economics 123*, 101–137.

Ferris, S. P., Houston R., and Javakhadze, D., 2016. Friends in the right places: the effect of political connections on corporate merger activity. *Journal of Corporate Finance 41*, 81–102.

Ferson, W. E., and Harvey, C. R., 1991. The variation of economic risk premiums. *Journal of Political Economy 99*, 385–415.

Ferson, W. E., and Schadt, R. W., 1996. Measuring fund strategy and performance in changing economic conditions. *Journal of Finance 51*, 425–461.

Fisman, R., 2001. Estimating the value of political connections. *American Economic Review 91*, 1095–1102.

Francis, B. B, Hasan, I., Sun, X., and Wu, Q., 2016. CEO political preference and corporate tax sheltering. *Journal of Corporate Finance 38*, 37–53.

Frye, T., and Shleifer, A., 1997. The invisible hand and the grabbing hand. *American Economic Review Papers and Proceedings 87*, 354–358.

Frye, T., and Zhuravskaya, E., 2000. Rackets, regulation, and the rule of law. *Journal of Law, Economics, and Organisation 16(2)*, 478–502.

Fulmer. S., Knill, A. M., and Yu, X., 2013. Negation of sancions: The personal effect of political controbutions. *AFA 2013 San Diego Meetings Paper*. Available at SSRN: https://ssrn.com/abstract=2024069 or http://dx.doi.org/10.2139/ssrn.2024069

Gibbons, M.R., Ross, S.A. and Shanken, J., 1989. A test of the efficiency of a given portfolio. *Econometrica 57(5)*, 1121–1152.

Girma, J. and Du, S., 2010. Red capitalists: Political connections and the growth and survival of start-up companies in China. Univesity of Nottingham. *Research Paper Series 2007/40*.

Goldman, E., Rochol J., and So J., 2009. Do politically connected boards affect firm value? *Review of Financial Studies 22*, 2331–2360.

Green, J., Hand, J. R., and Zhang, X. F., 2017. The characteristics that provide independent information about average US monthly stock returns. *Review of Financial Studies 30(12)*, 4389–4436.

Gulen, H., Cooper, M., and Ovtchinnikov, A., 2010. Corporate political contributions and stock returns. *Journal of Finance 65*, 687–724.

Hafsi, T., Kiggundu, M., and Jorgensen, J., 1987. Strategic apex configurations in state-owned enterprises. Academy of Management Review 12 (4), 714–730.

Harvey, C., Liu, Y., Zhu, H., 2015. … and the cross-section of expected returns. *Review of Financial Studies 28*, 650–705.

Heaney, R., Koh, S. and Lan, Y., 2016. Australian firm characteristics and the cross-section variation in equity returns. *Pacific-Basin Finance Journal 37*, 104–115.

Hongbin, L., Meng, L., Wang, Q., and Zhou, L.-A., 2008. Political connections, financing and firm performance: Evidence from Chinese private firms. *Journal of Development Economics 87*, 283–299.

Hou, Q., Hu, M., and Yuan, Y., 2017. Corporate innovation and political connections in Chinese listed firms. *Pacific Basin Finance Journal 46*, 158–176.

Hou, K., Mo, H., Xue C. and Zhang, L., 2019. Which Factors? *Review of Finance 23*, 1–38.

Hou, K., Xue C. and Zhang, L., 2015. Digesting anomalies: An investment approach. *Review of Financial Studies 28(3),* 650–705.

Houston, J. F., Jiang, L., Lin, C., and Ma, Y., 2014. Political connections and the cost of bank loans. *Journal of Accounting Research 52(1)*, 193–243.

Hsu, P.-H., Lee, H.-H., Liu, A. Z., and Zhang, Z., 2015. Corporate innovation, default risk, and bond pricing. *Journal of Corporate Finance 35*, 329–344.

Huang, W., Liu, Q., Rhee S. G. and Zhang, L., 2010. Return reversals, Idiosyncratic risk and expected returns. *Review of Financial Studies 23*, 147–168.

Infante, L., and Piazza, M., 2014. Political connections and preferential lending at local level: Some evidence from the Italian credit market. *Journal of Corporate Finance* 17, 1410–1429.

Jagannathan, R. and Wang, Z., 1996. The conditional CAPM and the cross-section of expected returns. *Journal of Finance 51*, 3–53.

Jegadeesh, N. and Titman, S., 1993. Returns to buying winners and selling losers: Implications for stock market efficiency. *Journal of Finance 48*, 65–91.

Jia., N., Mao, X., and Yuan, R., 2019. Political connections and directors' and officers' liability insurance – Evidence from China. *Journal of Corporate Finance 58*, 353–373.

Jia, N. A., and Mayer, K. J., 2017. Political hazards and firm's geographic concentration. *Strategic Management Journal 38*, 203–231.

Jiang, F., and Kim, K. A., 2015. Corporate governance in China: a modern perspective. *Journal of Corporate Finance 32*, 190–216.

Johnson, S., and Mitton, S., 2003. Cronyism and capital controls: evidence from Malaysia. *Journal of Financial Economics 67*, 351–382.

Jost, J., Glacer, J., Kruglanski, A., and Sulloway, F., 2003. Political conservatism as motivated social cognition. *Psychological Bulletin 60*, 307–337.

Kamoto, S., 2016. Managerial innovation incentives, management buyouts, and shareholders' intolerance of failure. *Journal of Corporate Finance 42*, 55–74.

Khaw, K. L.-H., Liao, J., Tripe, D., and Wongchoti, U. 2016. Gender diversity, state control, and corporate risk-taking: Evidence from China. *Pacific Basin Finance Journal 39*, 141–158.

Khwaja, A. I., and Mian, A., 2005. Do lenders favor politically connected firms? Rent-provision in an emerging financial market. *Quarterly Journal of Economics 120*, 1391–1411.

Kim, C., Ross, M. M., Shang, C., 2016. Political connections and corporate innovation productivity. *Working Paper*.

Kotabe, M., Jiang, C. X., and Murray, J. Y., 2011. Managerial ties, knowledge acquisition, realized absorptive capacity and new

product market performance of emerging multinational companies: A case of China. *Journal of World Business 46(2)*, 166–176.

Kothari, T., Kotabe, M., and Murphy, P., 2013. Rules of the Game for Emerging Market Multinational Companies from China and India. *Journal of International Management 19(3)*, 276–299.

Kothari, S. P., Ramanna, K., and Skinner, D. J. , 2010. Implications for GAAP from an analysis of positive research in accounting. *Journal Accounting and Economics 50*, 246–286.

Kozak, S., Nagel, S., and Santosh, S., 2017. Shrinking the cross section. *Working Paper*. National Bureau of Economic Research.

Lettau, M., and Pelger, M., 2018. Estimating latent asset-pricing factors. *Working Paper*. National Bureau of Economic Research.

Lewellen, J., 2015. The cross-setion of expected stock returns. *Critical Finance Review 4(1)*, 1–44.

Lewellen, J. and Nagel, S., 2006. The conditional CAPM does not explain asset-pricing anomalies. *Journal of Financial Economics 82(2)*, 289–314.

Li, D., 2011. Financial constraints, RandD investments and stock returns. *Review of Financial Studies 24*, 2974–3007.

Li, H. B., Meng, L. S., Wang, Q., and Zhou, L. A., 2008. Political connections, financing and firm performance: Evidence from Chinese private firms. *Journal of Development Economics 87(2)*, 283–299.

Li, J., Xia, J., Zajac, E., 2018. On the duality of political and economic stakeholder influence on firm innovation performance: Theory and evidence from Chinese firms. *Strategic Management Journal 39*, 193–216.

Liedong, T. A., and Rajwani, T., 2018. The impact of managerial political ties on corporate governance and debt financing: Evidence from Ghana. *Long Range Planning 51(5)*, 666–679.

Light, N., Maslov, D., and Rytchkov, O., 2017. Aggregation of information about the cross section of stock returns: A latent variable approach. *Review of Financial Studies 30(4)*, 1339–1381.

Lin, K. J., Tan, J., Zhao, L., and Karim, K., 2015. In the name of charity: Political connections and strategic corporate social responsibility in a transition economy. *Journal of Corporate Finance 32*, 327–346.

Lin, X. and Zhang Y., 2009. Bank ownership reform and bank performance in China. *Journal of Banking and Finance 33(1),* 20–29.

Lintner, J., 1965. The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets. *Review of Economics and Statistics 47*, 13–37.

McConnell, J. and Servaes, H., 1990. Additional evidence on equity ownership and corporate value. *Journal of Financial Economics 27(2),* 595–612.

Liu, Q., Luo, J., and Tian, G. G., 2016. Managerial professional connections versus political connections: evidence from firms'

access to informal financing resources. *Journal of Corporate Finance 41*, 179–200.

Luez, C., and Oberholzer-Gee, F., 2006. Political relationships, global financing, and corporate transparency: Evidence from Indonesia. *Journal of Financial Economics 81(2)*, 411–439.

Maitland, E., and Sammartino, A., 2015. Decision making and uncertainty: The role of heiristics and experience in assessing a politically hazardous environment. *Strategic Management Journal 36*, 1554–1578.

Merton, R. C., 1987. A simple model of capital market equilibrium with incomplete information. *Journal of Finance 42(3)*, 483–510.

Nartea, G. V, Ward, B. D. and Yao, L. J., 2011. Idiosyncratic volatility and cross-sectional stock returns in Southeast Asian stock markets. *Accounting* and *Finance 51*, 1031–1054.

Nartea, G. V and Wu, J., 2013. Is there a volatility effect in the Hong Kong stock market? *Pacific–Basin Finance Journal 25*, 119–135.

Nartea, G. V, Wu, J. and Liu, H. T., 2014. Extreme returns in emerging markets: Evidence of a MAX effect in South Korea. *Applied Financial Economics 24(6)*, 425–435.

Nartea, G. V, Wu, J. and Liu, Z, 2013. Does idiosyncratic volatility matter in emerging markets? Evidence from China. *Journal of International Financial Markets, Institutions* and *Money 27*, 137–160.

Novy-Marx, R., 2013. The other side of value: The gross profitability premium. *Journal of Financial Economics 108*, 1–28.

Pastor, L. and Stambaugh, R. F., 2003. Liquidity risk and expected stock returns. *Journal of Political Economy 111(3)*, 642–685.

Pei, M., 2006. China's trapped transition: The limits of developmental autocracy. Harvard Uni. Press, Cambridge, MA.

Peng, M. W., and Luo, Y. 2000. Managerial ties and firm performance in a transition economy: The nature of a micro-macro link. *Academy of Management Journal 43*, 486–501.

Qin, X., and Zhang, X., 2019. De-politicization and innovation: Evidence from China. *Journal of Accounting and Public Policy 38*, 106668.

Ridge, J.W., Ingram, A., and Hill, A.D., 2017. Beyond Lobbying Expenditures: How Lobbying Breadth and Political Connectedness Affect Firm Outcomes. *Academy of Management Journal 60(3).*

Roberts, B.E., 1990. A dead senator tells no lies: seniority and the distribution of federal benefits. *American Journal of Political Science 34*, 31–58.

Sachs, J., 1994. Poland's jump to a market economy. *MIT Press*. Cambridge.

Sanders, W. G., and Hambrick, D. C., 2007. Swinging for the fences: The effects of CEO stock options on company risk taking and performance. *Academy of Management Journal 50*, 1055–1078.

Shanken, J., 1990. Intertemporal asset pricing: An empirical investigation. *Journal of Econometrics 45*, 99–120.

Sharpe, W. F., 1964. Capital asset prices: A theory of market equilibrium under conditions of risk. *Journal of Finance 19(3)*, 425–442.

Sheng, S., Zhou, K. Z., and Li, J. J., 2011. The effects of business and political ties on firm performance: Evidence from China. *Journal of Marketing 75*, 1–15.

Shleifer, A., 1998. State versus private ownership. *Journal of Economic Perspective 12(4)*, 133–150.

Shleifer, A., and Vishny R. W., 1993. Corruption. *Quarterly Journal of Economics 108*, 599–617.

Shleifer, A., and Vishny R. W., 1994. Politicians and firms. *Quarterly Journal of Economics 109*, 995–1025.

Shleifer, A., and Vishny R. W., 2002. The grabbing hand: Government pathologies and their cures. *Harvard University Press*.

Simpson, P. M., Singuaw, J. A., and Enz, C. A., 2006. Innovation orientaion outcomes: The good and the bad. *Journal of Business Research 59*, 1133–1141.

Song, M., Ai, H, and Li, X., 2015. Political connections, financing constraints, and the optimization of innovation efficiency among China's private enterprises. *Technological Forecasting and Social Change 92*, 290–299.

Stambaugh, R. F., and Yuan, Y., 2017. Mispricing Factors. *Review of Financial Studies 30(4)*, 1270–1315.

Stigler, G. S., 1971. The theory of economic regulation. *The Bell Journal of Economic and Management Science 2(1)*, 3–21.

Stigliz, J. E., 1989. On the economic role of the state. *The Economic Role of the State, Heertje A (ed.)*. Blackwell, Oxford, UK.

Stulz, R. M., 2005. The limits of financial globalization. *Journal of Finance 60*, 195–1638.

Su, Z.-Q., and Fung, H.-G., 2013. Political connections and firm performance in Chinese companies. *Pacific Economic Review 18*, 283–317.

Su, Z.-Q., Xiao, Z., and Yu, L., 2019. Do political connections enhance or impede corporate innovation? *International Review of Economics and Finance 63*, 94–110.

Tihanyi, L., Aguilera, R. V., Heugens, P., van Essen, M., Sauerwald, S., Duran, P., and Turturea, R., 2019. State ownership and political connections. *Journal of Management 45(6)*, 2293–2321.

Titman, S., Wei, K. and Xie, F., 2004. Capital investment and stock returns. *Journal of Financial and Quantitative Analysis 39(4)*, 677–700.

Tu, G., Lin, B., and Liu, F., 2013. Political connections and privatization: Evidence from China. *Journal of Accounting and Public Policy 21*, 114–135.

Unsal, O., Hassan, M. K., and Zirek, D., 2016. Corporate lobbying, CEO political ideology and firm performance. *Journal of Corporate Finance* 38, 126–149.

Wang, Y., Yao, C., and Kang, D., 2019. Political connections and firm performance: Evidence from government officials' site visits. *Pacific Basin Finance Journal*, *forthcoming*.

Wong, W.-Y. and Hooy, C.-W., 2018. Do types of political connection affect firm performance differently? *Pacific Basin Finance Journal 51*, 297–317.

Wooldridge, J. M., 2010. Econometric analysis of cross-section and panel data. *MIT Press*. Cambridge.

Wu, W. F., Wu, C. F., Zhou, C. Y., and Wu, J., 2012. Political connections, tax benefits and firm performance: Evidence from China. *Journal of Accounting and Public Policy 31(3)*, 277–300.

Wurgler, J., 2000. Financial market and the allocation of capital. *Journal of Financial Economics 58*, 187–214.

Xu, N., Chen, Q., Xu, Y. and Chan, K. C., 2016. Political uncertainty and cash holdings: Evidence from China. *Journal of Corporate Finance 40*, 276–295.

Xu, N., Yuan, Q., Jiang, X., Chan, K. C., 2015. Founder's political connections, second generation involvement, and family firm performance: Evidence from China. *Journal of Corporate Finance* 33, 243–259.

Yiu, D. W., and Lau, C.-M., 2008. Corporate entrepreneurship as resource capital configuration in emerging market firms. *Entrepreneurship Theory and Practice 32*, 37–57.

Zheng, W., Singh, K., and Mitchel, W., 2015. Buffering and enabling: The impact of interlocking political ties on firm survival and sales growth. *Strategic Management Journal 36*, 1615–1636.