

Financial Management: Clear Concepts, Contemporary Theory, and Practical Applications



Ketty Samual

**FINANCIAL MANAGEMENT:
CLEAR CONCEPTS,
CONTEMPORARY
THEORY, AND PRACTICAL
APPLICATIONS**

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Editor:

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TABLE OF CONTENTS

List of Contributors.....	ix
<i>Preface</i>	<i>xiii</i>
Chapter 1 The Application of Financial Analysis in Business Management.....	1
■ Abstract.....	1
■ The Background of The Study	2
■ The Present Research Situation of Domestic and Foreign and Review	2
■ Significance Analysis of Financial Indicators In Enterprise Management	4
■ The Current Problems of Financial Indicators Analyze	6
■ Countermeasures and Suggestions.....	7
■ References.....	10
Chapter 2 Big Data, Big Change: In The Financial Management.....	11
■ Abstract.....	11
■ Introduction to Big Data.....	12
■ Big Data, Big Change: Accounting Data Processing.....	13
■ Big Data, Big Change: Comprehensive Budget Management.....	17
■ Big Data, Big Change: Management Accounting.....	19
■ Big Data, Big Challenge.....	20
■ Acknowledgements	21
■ References.....	22
Chapter 3 Reinforcement Learning In Financial Markets.....	23
■ Abstract.....	23
■ Introduction	24
■ Base Reinforcement Learning.....	26
■ On And Off Policy Reinforcement Learning	27
■ Modifications To Reinforcement Learning	30
■ Continuous Time Unit Models	33
■ Recurrent Neural Network And Q Learning Combined	34
■ Deep Neural Network And Recurrent Reinforcement Learning	37
■ Advanced Learning Strategies In Reinforcement Learning.....	39
■ Overall Analysis.....	45
■ Conclusions And Future Directions	46

■	Author Contributions	47
■	Acknowledgments	47
■	References	48
Chapter 4	Integrated Financial Management Information System And Supply Chain Effectiveness	51
■	Abstract	51
■	Introduction	52
■	Literature Review	55
■	Research Methodology	65
■	Results And Interpretation	67
■	Discussion And Conclusion	80
■	References	86
Chapter 5	Valuation Of Environmental Management Standard Iso 14001: Evidence From An Emerging Market	91
■	Abstract	91
■	Introduction	92
■	Prior Literature	95
■	Data Sources And Methodology	100
■	Analysis And Results	103
■	Conclusions And Discussion	106
■	References	111
Chapter 6	Factors, Outcome, And The Solutions Of Supply Chain Finance: Review And The Future Directions	119
■	Abstract	119
■	Introduction	120
■	Methodology	123
■	Formulation of Research Questions	124
■	Locating The Research Articles	124
■	Classification of The Articles	125
■	Synthesis of Structure Literature Review	126
■	Results and Findings	126
■	Contribution to The Existing Literature	142
■	Managerial Implications	142
■	Conclusions, Future Directions, and Limitations	143
■	References	148

Chapter 7	The Role Of Entrepreneurial Strategy, Network Ties, Human And Financial Capital In New Venture Performance	159
	■ Abstract	159
	■ Introduction	160
	■ Theoretical Background	163
	■ Hypotheses Development	163
	■ Methodology.....	168
	■ Analysis And Results.....	171
	■ Discussion And Conclusions	176
	■ References.....	181
Chapter 8	Developments In Risk Management In Islamic Finance: A Review.....	189
	■ Abstract.....	189
	■ Introduction	190
	■ Islamic Financial Institutions (IFIS)	192
	■ Credit Risk Of Islamic Banks (IBS)	211
	■ Conclusions.....	215
	■ References.....	218
Chapter 9	Monetary Policy, Cash Flow And Corporate Investment: Empirical Evidence From Vietnam.....	225
	■ Abstract.....	225
	■ Introduction	226
	■ Theoretical Framework	228
	■ Literature And Empirical Studies	229
	■ Data And Methodology.....	232
	■ Findings And Results	236
	■ Conclusions And Implications	242
	■ Acknowledgments	245
	■ References.....	246
Chapter 10	Finance and Jobs: How Financial Markets and Prudential Regulation Shape Unemployment Dynamics	251
	■ Abstract.....	251
	■ Introduction	252
	■ Finance And Regulation: An Overview of The Literature	257
	■ Unemployment Flows and Financial Market Interactions.....	265
	■ Data, Methodology, and Hypotheses	272
	■ Financial Market Determinants of Unemployment Flows.....	276

- Reform Scenarios and Unemployment
 - Dynamics 292
- Conclusions..... 298
- Acknowledgments 299
- References..... 300
- Citations 307**
- Index 311**

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PREFACE

Now a day it has been enlarged with innovative and multi-dimensional functions in the field of business with the effect of industrialization, Financial Management has become a vital part of the business concern and they are concentrating more in the field of Financial Management. The rapidly changing nature of today's external environment continuously creates a need for business strategy, process improvements and organizational transformation to ensure survival in today's highly competitive market. Today, businesses are under constant pressure to develop, implement and rapidly revise their financial management strategies. To do this, businesses need to develop and implement financial strategies to manage risk and improve financial performance and capabilities. The success behind any organization depends on the efficient management of finance. Financial practices go together with scanning the economic environment of a certain market. While financial management is a critical element of the management of a business as a whole, within this function the management of its assets is perhaps the most important. The main task of all managers at all levels and all social institutions is Environmental design, implementation and maintenance that members are able to work and achieve their collaboration on specific targets for achieving these goals are essential managers a system of management accounting system. Every day there is a new form of economic relations and of individuals and companies and institutions is associated with each other and influences each other changes in their financial and day-to-day activities become more complex. These factors will lead to a role as providers of accounting and financial information determined using accounting standards for most users.

This book provides detailed information about the finance and finance related area to investigate various factors that impact the selection of financial management practices. It also attempts to explore the impact of financial management practices and earnings management on firm performance. Managing the movement of funds in relation to the budget is essential for a public academic institutions performance. But experience reveals that the financial management processes of public academic

institutions are generally weak and dominated by conditions of resource scarcity vis-à-vis the ever increasing agenda of development activities on which such funds could be spent. It is believed that greater the confidence in selecting the best course of action can only be achieved by carefully analyzing finance functions and the unique contexts within which they operate. Business partnering to business intelligence, outsourcing, benchmarking, and talent management, just some of the solutions put forward to develop effective finance functions. In this book we propose a framework which helps managers carry out this analysis. Thus the study of financial management helps and guides the finance managers to make right decision in generating fund, making right investment, earning good return and sharing the profit to the shareholders. The key aim of this book is to review recent studies to concentrate on the main critical issues of financial management. The book enriches the quality of information in financial management and enables the reader to clearly understand the major concepts and techniques in the subject.

CHAPTER 1

THE APPLICATION OF FINANCIAL ANALYSIS IN BUSINESS MANAGEMENT

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ABSTRACT

With the application of financial analysis in business management with the development of economy, enterprises are facing increasingly complex environment. Enterprise modern management is the trend. Financial management is an important part of strengthening the capacity of corporate financial analysis. It has an irreplaceable role to improve their core competitiveness, but this aspect currently in China is still not taken seriously enough. In business management, through the analysis of accurate and comprehensive financial indicators can be more systematic and comprehensive understanding of the enterprise, it can provide a favorable support to make correct and reasonable judgments and decisions, so as to formulate a more comprehensive fit enterprise systems and strategies, a more reasonable and effective, targeted measure for enterprises' sustainable development is important. Its implementation enables businesses to sustainable development.

Keywords: Financial Analysis, Business Management, Impact, Recommendation

THE BACKGROUND OF THE STUDY

Accounting financial analysis is the process and results of carrying out corporate financial activities that are based on the research and evaluation of the company's financial statements and other information, which can reveal the advantages and disadvantages of the business enterprises in the past, analyze financial condition and predict future trends, so that it can be better to help companies plan for the future, optimize investment decisions. Financial analysis is an important part of financial management. It is an important part of financial management in an integral part, and is an important means of financial management. Financial analysis for its many analytical methods can play in economic management in the enterprise evaluation of enterprise financial situation, examine the pros and cons of business, and predict business trends important role. Access to business financial information within a certain period of time runs through the financial analysis, and accordingly develops strategic direction or to adjust the development of the business, which is the core of financial management. Financial analysis can help business enterprises to understand the past, evaluate the present situation of enterprises, forecast the future, and provide accurate information for company to make the right decisions and financial basis is an important tool for enterprises to carry out the daily management. The accuracy of financial analysis in business decision-making and the establishment of a scientific financial system promote the standardization of financial management, improve business efficiency and the quality of financial personnel. Other aspects play an important role.

THE PRESENT RESEARCH SITUATION OF DOMESTIC AND FOREIGN AND REVIEW

Foreign Research Status

Leopold Bernstein [1] thought that the financial analysis is an analytical

judgment process, and it is designed to assess companies in the past or financial condition and operating results at this stage, it would be the best predictor of its future financial condition and operating results.

Alexander Wole (1928) [2] in “credit barometer study” and “financial statement ratio analysis” put forward the concept of credit capacity index, he chose the seven financial ratios namely current ratio, equity ratio, the ratio of fixed assets, inventory turnover, accounts receivable turnover, fixed asset turnover and own capital turnover rate, respectively, given the proportion of each index, and then determine the standard rate, the standard rate and the actual rate compared to the relative ratio obtained, and this relative ratio multiplied by the proportion of each index to determine the cumulative score, and the score of the indicators of the overall index, and thus to evaluate the level of corporate credit.

Schouten, the company (1991) put forward the economic value added (EVA) indicator, $EVA = \text{total operating profit after tax} - \text{the cost of capital}$, and the enterprise financial statements of the after-tax net profit, operating profit after tax is make necessary adjustment according to the financial statements of the enterprise actual situation, the distortion of financial position data back into real financial performance, however, when the enterprise is not equal to the capital market value and its book value, the calculation results are still error.

Baker driver and others (1997) [3] on the basis of modification to EVA proposed revised economic value added (there), there are = final adjusted operating profit – initial assets market value weighted average cost of capital. Compared with traditional financial analysis methods, EVA and there are considering the actual cost of capital of enterprises, avoid a lot of the management behavior, which combines capital budget, performance evaluation and incentive pay up.

Domestic Research Status

China introduced the “economic benefit evaluation system (trial)”, the index system mainly composed of 10 indicators, highlighting the social contribution rate, the rate of accumulation of social, return on capital and capital maintenance and increment ratio and other indicators importance.

Zou jiKang and Qu Zhifeng (2011) [4] in “Chinese Listed Companies Performance Evaluation Index System of” that, under accrual accounting profits as there are many drawbacks performance evaluation index system assessment focus should be on the basis of financial indicators Join cash flow indicators.

Balanced Scorecard as an effective performance management tools, domestic scholars actively explore. Xiao Lijun, the BSC customer dimension expanded into a dimension of social responsibility, and ultimately build a comprehensive performance evaluation system.

Lijun shaw (2012) [5] to expand the balanced scorecard in the customer dimension becomes a dimension of social responsibility, eventually to build a set of comprehensive the performance evaluation index system. Yan Songbing, Ma Jianggong (2012) [6] think that enterprises should correctly understand the cost effectiveness of implementing the balanced scorecard than relationship, can't give up because there is no effect in the short term to build and use the balanced scorecard # and should focus on long-term benefits.

In contrast, domestic and foreign scholars in their own merits. Theoretical Study abroad started earlier, the analysis system is more mature, but not suited to China's national conditions; theory of our country is a reference to the basis of foreign studies, although the late start, but in recent years some experts, the government began a more comprehensive analysis and actively explore.

SIGNIFICANCE ANALYSIS OF FINANCIAL INDICATORS IN ENTERPRISE MANAGEMENT

Financial analysis index system for the enterprise's creditors, shareholders, managers and staff of its internal financial forecasting and decision to provide protection and support role. Better for rapid development of enterprises play an important role.

It Can Provide the Correct Information to Investors and Creditors to Implement Rational Decision

Through financial analysis, investors can understand the business's profitability and solvency, expected return and risk investment that exist, and then make the right decisions. In recent years, with the diversification of business investors, creditors are not only confined to the National Bank. Financial analysis indicators are an important method of investors and creditors in market economy conditions to obtain the desired information. By business managers to make financial statements on daily financial analysis, to understand their own strengths, its shortcomings found, which can change in time enterprise business strategy.

It Can Help Managers to Determine Business Direction

Enterprise production and management activities has its own laws, to be with the development of production, changes in the volume of business size to make the right business decisions, according to the laws in order to better financial management of enterprises. Through the financial analysis of the business in the past have a clear understanding and summarizing, so that we strengthen the economic activities and the development of understanding of the laws, timely and objective of the financial management activities experience, we found the financial management problems in , objective and reflect the true financial situation of enterprises, and gradually recognized by the law to master and apply the law of financial management activities, give full play to the role of financial management in risk control and management prediction for business decision-makers a comprehensive understanding of financial information, analysing historical performance and forecast future trends and ultimately make a rational economic decision-making to provide strong support.

It Can Help Companies to Achieve Their Financial Goals

For business managers, companies adept at financial management, and maximize enterprise value is important. Through financial analysis,

identify their own gaps, and tap the inherent potential, full use of material and human resources, ongoing integration, in order to maximize the corporate value of the target operation, and promote healthy and rapid development. Financial analysis for an enterprise, it is not only the financial activities have been completed in a summary, but it also laid the premise for the financial projections, loop management process in the corporate finance, plays the role of nexus.

THE CURRENT PROBLEMS OF FINANCIAL INDICATORS ANALYZE

At present, China's financial analysis system is not perfect, with the continuous development of enterprises, financial analysis is also facing more and more problems and solved.

The Financial Statements of Their Own Limitations Exist

Financial analysis of data derived from the analysis of accounting information, in real life, accounting information distortion, it will affect corporate financial analysis incorrect data, thus affecting the business's policy direction, affecting the development of enterprises. Accounting information distortion mainly the following aspects: the theory of imperfect accounting; accounting management system is not perfect; the interests of drivers; internal control system is imperfect.

The Use of Independent Financial Analysis Led to Incomplete Financial Analysis

Financial analysis often reflect a period or stage of development of enterprises operating conditions, the use of independent financial analysis does not come from the analysis of the development situation of the enterprise as a whole, a single index value does not mean that corporate profitability. Usually we need indicators for trend analysis and comparative analysis of the industry. Enterprises are now widespread,

“a financial analysis report take the world” status, that no matter who read this report that do not understand the financial information needed to read the object, only provides a model of financial analysis, the report makes readers often get the financial information they really want to know. Affect the quality of financial analysis reports. Or even misleading business owners making an incorrect economic decision affecting the development of enterprises again.

The Limitation of Financial Analysis Methods

There are basic methods of financial analysis ratio analysis, comparative analysis, and trend analysis. Which inevitably need to compare financial indicators, financial indicators usually are quantified, static, and lacking of qualitative analysis, dynamic analysis, and these problems are worth discussing. Emphasis on financial analysis of financial indicators, ignoring the importance of non-financial indicators, and the lack of overall analysis of the enterprise concept, just one isolated indicator analysis. Corporate financial analysis, post hoc analysis of heavy, light but beforehand. In addition, the analysis of the importance of corporate financial awareness is not enough, there is the financial analysis of the quality of personnel is generally not high, the use of computer technology for financial analysis of the degree of popularity.

COUNTERMEASURES AND SUGGESTIONS

Strengthening Financial Management Awareness of Managers at All Levels of the Enterprise, Improving the Ability of Corporate Financial Analysis

Improve financial analysis capabilities should be from three aspects: to improve the professional quality of corporate financial officers to safeguard the scientific rationality of financial work to ensure accurate financial analysis of sources, reliable; improve enterprise management personnel at all levels and all staff accounting knowledge, financial analysis to ensure fast, smooth and accurate implementation within the enterprise; the formation of financial analysis and efficient team.

Financial analysis requires not only a high level of expertise, but also need to have an efficient team to implement specific operations.

Improving Constantly and Perfecting the Financial Index System, and Enhancing the Quality of Analysis Process

Associated increase in financial analysis, financial indicators such as intangible assets, human resources and other financial indicators. Business managers for corporate financial indicators flaws and shortcomings that exist, to strengthen the system of financial indicators improve and perfect. Managers should focus on its own business characteristics, the index system for their own development, not only a financial analysis, but also non-financial analysis. Enterprise product quality, market share, innovation and so on prospects for the development of enterprises have a significant impact. At the same time, increase the content of the notes to financial statements, standardized financial reporting system, an auxiliary of the financial statements is an important way to improve the corporate financial indicators system. Enterprise managers should fully reveal the corporate financial reports and timely disclosure of financial information on enterprise influential.

Strengthening Further the Comprehensive Quality of Personal's Financial and Professional Level

With the reform and development of China's economy, human resources as the company's assets have to be evaluated on the skills of human resource accounting. Enterprise Accounting Financial Analyst at the same time has professional financial knowledge, but also needs to understand and master the relevant expertise to other industries, thereby continuously improve the overall moral quality level of financial personnel, improve the effect of corporate financial analysis to ensure that financial analysts objective fair devoted to financial analysis work, and constantly improve the financial analysis indicators.

The further reform of market economy and improvement of the financial management system of enterprises are becoming increasingly standardized. In the market economy, enterprise business operation

is facing numerous challenges, so that enterprises face the business environment and have undergone great changes, and for the enterprises and business managers, financial management is a very important aspect. Only improving the quality of the corporate financial analysis, it can be better to make the gradual deepening of China's market economy and improve China's modern enterprise systems. Financial analysis as an important part of financial management activities play an increasingly important role in modern companies and only has a rational, scientific, sound financial analysis system in order to more accurately and objectively on the financial situation of enterprises for analysis, enterprise forecasting and decision to make the right judgments. Therefore, the business stakeholders to timely analysis of financial statements do the budget for future operations and management to provide effective basis.

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CHAPTER 2

BIG DATA, BIG CHANGE: IN THE FINANCIAL MANAGEMENT

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ABSTRACT

In recent years, “Big Data” has attracted increasing attention. It has already proved its importance and value in several areas, such as aerospace research, biomedicine, and so on. In “Big Data” era, financial work which is dominated by transaction, business record, business accounting and predictions may spring to life. This paper makes an analysis about what change that “Big Data” brings to Accounting Data Processing, Comprehensive Budget Management, and Management Accounting through affecting the idea, function, mode, and method of financial management. Then the paper states the challenges that “Big Data” brings to enterprise aiming to illustrate that only through fostering strengths and circumventing weaknesses can an enterprise remain invincible in “Big Data” era.

Keywords: Big Data, Financial Management, Change, Challenge

INTRODUCTION TO BIG DATA

In recent years, “Big Data” has been increasingly mentioned. It is used to describe and define reams of data generated in information explosion era. As a column in the New York Times in February, 2012 reported, “Big Data” era has arrived. In the field of business, economy and otherwise, it is data and analysis not experience and intuition that are the bases of decision-making. In “Big Data” era, financial work which is dominated by transaction, business record, business accounting and predictions may spring to life. The idea, function, mode and method of financial management will make a subversive change.

Though there has been an increasing emphasis on big data in recent years, the definition of “Big Data” hasn’t reached a consensus. Gartner which is an authority IT research and consulting firm defines that as follows: “Big Data is high-volume, high-velocity, and/or high variety information assets that require new forms of processing to enable enhanced decision making, insight discovery and process optimization [1] .” IBM says: “Big Data is being generated by everything around us at all times. Every digital process and social media exchange produces it. Systems, sensors and mobile devices transmit it. Big Data is arriving from multiple sources at an alarming velocity, volume and variety [2] .” The National Science Foundation (NSF) defines Big Data as “scientific instruments, sensors, Internet, E-mail, audio and video software, network click stream data sources generate a variety of large-scale, diversified, complicated and long-term distributed data set” [3] .

Anyhow, the characteristics of Big Data are usually reduced to 4 Vs (Figure 1):

- **Volume.** The data unit has developed from GB, TB to PB, EB, ZB, even YB. And $1\text{YB} = 1024\text{ZB}$, $1\text{ZB} = 1024\text{EB}$, $1\text{EB} = 1024\text{PB}$, $1\text{PB} = 1024\text{TB}$, $1\text{TB} = 1024\text{GB}$.
- **Velocity.** Big data’s speed of updating and changing is surprising. The enterprise has to process the mass data generated from or coming into business continuously at short notice. Only in this way can the Big Data’s business value be maximized.
- **Variety.** It has a variety of data types besides structured data, such as text, voice, graph, video, click stream and so on.

- Value. Data are useful. It enables enterprise to find and come up with some new problems. IBM reduces the 4th V to Veracity for the reason that only real and accurate data can make the control on data meaningful.

Big Data is also a wrapper for different types of granular data. The five key sources of Big Data are public data, private data, data exhaust, community data, and self-quantification data. “Public data” are data typically held by governments, governmental organizations, and local communities that can potentially be harnessed for wideranging business and management applications. “Private data” are data held by private firms, non-profit organizations, and individuals that reflect private information that cannot readily be imputed from public sources. “Data exhaust” refers to ambient data that are passively collected, non-core data with limited or zero value to the original data-collection partner. “Community data” are a distillation of unstructured data—especially text—into dynamic networks that capture social trends. “Self-quantification data” are types of data that are revealed by the individual through quantifying personal actions and behaviors [4] .

Big Data has already proved its importance and value in several areas. Organizations such as the National Oceanic and Atmospheric Administration (NOAA), the National Aeronautics and Space Administration (NASA), several pharmaceutical companies, and numerous energy companies have amassed huge amounts of data and now leverage big data technologies on a daily basis to extract value from them [5] . In fact, Big Data should attract financial personnel’s and managers’ attention in all industries so as to improve the core competitiveness of enterprises.

BIG DATA, BIG CHANGE: ACCOUNTING DATA PROCESSING

As the core of an enterprise, accounting data reflects and supports the normal running of business and capital. Through processing accounting data and mining financial information fully, the enterprise could improve its financial management, lower cost of capital, and make fat profit.

The Development History of Accounting Data Processing

Accounting Data is the record of all kinds of economic affairs occurring in business operation. It's the origin of financial information. Processing accounting data is gathering, storing, machining, transferring, and analyzing accounting data.

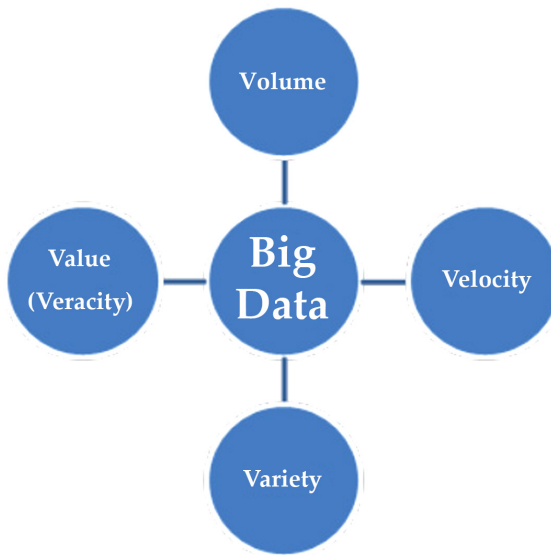


Figure 1. The characteristics of big data (4 Vs)

Up to now, the development history of accounting data processing can be divided into five stages (Table 1):

- **Manual Process:** In this stage, accountants regard their eyes, ears as input unit, record economic affairs with pens and paper, store them, cure them, then transfer them. Manual process has two main advantages: One is flexibility. It's easy to adjust when the processing mode and program of accounting affairs change. The other is reliability. Accounting affairs will not suspend completely just because of electricity or temperature. Nevertheless, the disadvantages of manual process are obvious, such as low speed, poor efficiency, and high error rate.

-
- **Mechanical Process:** In the end of the nineteenth century and at the beginning of the twentieth, industrial economy developed, enterprise scale expanded, and accountants' workload increased. In this case, the mechanical process emerged. Accountants use puncher, verifier, and electronic equipment to gather, store, cure, and transfer accounting data. Compared with manual process stage, mechanical process increases the speed and accuracy of processing. Nevertheless, the equipment is too huge and heavy. It's difficult to operate. And its cost is very high.
 - **Electronic Computer Process:** Electronic computer is composed of input, storage, arithmetic, logic operation, control and output. Centralized storage and automatic processing raise the efficiency of accounting data processing, and increase the timeliness and accuracy of accounting information. In this stage, however, information is shared and exchanged mainly via optical disk and floppy disk. Business accounting and operation procedure just simulate that in manual process stage. There is no relationship among accounting procedures.
 - **Networked Process:** With the network technique developing, financial department can use computers and network to process accounting data, such as intranet, extranet, and internet. Modern Information Technology, especially the ERP system, carries out the integration of business process and accounting procedures, business accounting and accounting management, financial information and non-financial information. It improves the sharing of the enterprise information vastly. In this stage, the data type is just structured data.
 - **Big Data Process:** With the Internet of Things developing and Cloud Computing maturing, Big Data era is coming. In this stage, accounting data connotation is richer and the structure is more complex. The analytical method is more intelligent and the analysis and application become the keys. It's worth noting that once the accounting data is stolen, its damage is greater.

Accounting Data Processing in Big Data Era

With the Information Technology-especially the Internet of Things and the Cloud Computing technology-developing, business accounting has to gather and process high volume and different structure data. Compared with general big data, accounting big data possess the characteristic of “parasitism” besides the 4 Vs. That is to say, accounting data is parasitic on the business data. It doesn’t exist breaking away from business data.

Accounting data in Big Data era possess the characteristics of volume, velocity, variety, value, and parasitism. Therefore, accounting data processing is more complex. It needs more than one solution fusing a lot of traditional and modern technologies. Until now, IBM, INTEL, HP, SAP, Oracle, and EMC possess their respective big data solutions [6] . It’s worth noting that data is not only asset but also rubbish. Only through integrating (assembling multiple data), selecting (extracting relative data), cleaning (deleting conflicting data), transforming (turning into forms easy to mine), mining (extracting data mode in intelligent means), and estimating (evaluating its value) can make accounting data into asset and useful information [7] .

Table 1. The advantages and disadvantages of five stages of accounting data processing.

Five Stages	Advantages	Disadvantages
Manual Process	Flexibility, Reliability	Low speed, Poor efficiency, High error rate
Mechanical Process	Faster speed, Higher accuracy	Heaviness, High cost, Difficult operation
Electronic Computer Process	Higher efficiency, Timeliness, Higher accuracy	Independence, Simulation of manual process
Networked Process	Integration	Structured data only
Big Data Process	Intelligence	Greater damage once being stolen

BIG DATA, BIG CHANGE: COMPREHENSIVE BUDGET MANAGEMENT

Nowadays, enterprise budget management is facing two challenges: One is enterprise is improving its management level. The other is the requirements put forward by supervision department.

First of all, modern enterprise hasn't been satisfied with management after the event making use of ERP software. More and more enterprises expect control in advance. Secondly, with increasing competition, it's more important to make adequate business operation objectives and achieve them. Thirdly, recurrent merger and acquisition makes the management level in Group Company ragged. Therefore, the Group Company requires improving management level urgently. In addition, large-scale Group Company's industry distribution is complex and geographical distribution is scattered. So it requires allocating resources reasonably.

When it comes to budgeting, Lukka pointed out, budget control is found to be difficult due to the fact that adequate and correct budgets are difficult to make and that organizations therefore operate under budget slack [8] . At present, most enterprises are still in primary stage. It's difficult for managers to judge the authenticity and rationality of data, because plenty of data are surmised by experience. Budgeters rarely make budget referring to previous data and future market prospect. And rare enterprise carries out reasonable budget adjustment and rolling forecast. Budget control lacks integrated control system. It depends on managers to examine after the event, without systematic information-based means. In the process of budget analysis, most enterprises are still conducting simple chart analysis. They lack effective access control and don't analyze data aiming at different management objectives.

In Big Data era, structuring a budget information management platform can solve three core problems in comprehensive budget management: How to make scientific management objectives? How to decompose objectives scientifically? How to achieve managers' objectives through performing and analyzing budget?

Take IBM TM1 as an example, it can import all of historical business data into TM1 system. Based on these data, it can conduct multidimensional

analysis, compare them with previous data, and then make next period budget. In the meanwhile, TM1 can build models and analyze, decompose, and deliver objectives scientifically based on managers' objectives. More specifically, after acquiring actual data, budgeters accomplish the budget enforcement report through comparing budget data and actual data. Managers can adjust next period strategy and make next period management objectives based on the budget enforcement report. At the same time, we consider that budgeting is not the task of financial department but the entire personnel. All of the departments should participate in the process of making, controlling, and analyzing budget. Sales budget generates cost budget, human resource planning, purchase plan, period charge plan, financing plan, and then accomplish the budget information in profit statement. Thus, budgeters can provide a set of budget report. Under the concerted effort of business departments and financial department, enterprise's limited resources can be distributed to different area, different branches, and different departments. Nevertheless, the budget enforcement control requires being put in the business information system. Because business information system is running at every moment, while budget system runs only in budgeting period, budget adjustment period, and budget analysis period. Thus, under the integration of budget system and business information system, strategic planning, strategic target decomposition, budget making, budget enforcement control, budget analysis report, budget evaluation, and the effect on next period can form a closed loop (Figure 2) [9].



Figure 2. Comprehensive budget management.

BIG DATA, BIG CHANGE: MANAGEMENT ACCOUNTING

Big Data era's coming makes management accounting change a lot.

Changing from Analyzing Based on Result to Mining Based on Process

Taking the selling operation analysis in FMCG (Fast-Moving Consumer Goods) industry for example, traditional analysis means is conducting multidimensional analysis based on statistical data generated from terminals, including products, channels, quantity, and sum. The question is when it requires tracing to the source, what we can do is to make a qualitative judgment roughly. That means risk of decision making.

If we extend the data antenna to the terminals facing to consumers, what will happen? For example, when customers come to buy our products, the salespersons can communicate with them passionately. They can ask them the evaluation to products, and how often they come. Even though some customers choose the products of competitors, we still can ask them the reason. For convenience's sake, the salespersons can do it in the way of live recording, and then deliver it to the company background. Thus, it can reduce the salespersons' workload and make sure the authenticity of information. In this process, we obtain structured data like sales volume, unstructured data like consumer's evaluation, and some information about competitors' sales promotion and promotion price. All of information will become enterprise's wealth of great value in Big Data era and turn into income in due time.

Changing from Single-Type Data to Multi-Type Data

In recent years, unstructured data rise rapidly. Through analyzing unstructured data besides structured data, we can conduct financial analysis more comprehensively.

For instance, when an enterprise requires making evaluation on client credit, it isn't confined to financial statement, business background, or status of development. The evaluators can collect information such as

positive comment, negative comment on the client from relative website, which enriches our information and reduces information asymmetry in trade.

Considering risk management and control, it is unreliable to estimate the state of operation of one client enterprise just depending on its financial statement. It requires collecting multi-channel information. In 2007 Li Keqiang who is China's prime minister didn't pay much heed to the figures Liaoning provincial officials feed him, where he was the party chief. He preferred to track Liaoning's economy by looking at other indicators: the cargo volume on the province's railways, electricity consumption and loans disbursed by banks. In Mr Li's honor, The Economist has created a "Keqiang index" for China's economy, combining his three preferred indicators [10].

Changing from Periodical Report to Real-Time Report

With the big data technology developing, the change from periodical financial report to real-time financial report will come true. For example, when the information gathered from terminals changes, personalized marketing strategy and regionalized marketing analysis report can be issued regularly. Even though it's difficult to do it every day, it will come true that doing it every week in the near future.

BIG DATA, BIG CHALLENGE

Big Data can bring cost saving, risk control, improvement of management efficiency, and increment of value into enterprise. In the meanwhile, Big Data brings some challenges:

Unevenness of Data Quality

Trevor Hastie, a professor of Statistics and Biostatistics in Stanford University, pointed out that when you want to seek a significant needle in a pile of data straw, the problem is a large amount of straw looks like the needle [11]. Though the first step of processing accounting data is to gather data, if the workers gather all of data in spite of quality,

it is possible to make wrong predictions and decisions. In view of this condition, after gathering data, it is necessary to select relative data and clean conflicting data.

Threat to Privacy

In 2013, a research report issued by the European Parliament pointed out the big data's threat to privacy in cloud computing era exists, and is more severe than imagination. A professor in University of Toronto said the combination of SNS (Social Networking Services) like Facebook and Twitter and mobile communication technology makes it easy to search individual information in Big Data era. In 2011, a survey conducted by Canada Privacy Commission indicated that 60 percent of the interviewees thought their privacy became more insecure compared with 10 years ago, 55 percent thought the SNS would leak their privacy [12] .

Lack of Talents

Big data application requires enterprise to design new data analysis models. That's because traditional models are fit to process structured data not big data including multi-type data. Thus, it needs some data science to apply to enterprise data management. The enterprise is short of talents who can design new data analysis models. The talents who not only can design new data analysis models but also know the financial management are fewer. Lack of talents is a severe and long-term issue.

Big Data is a sword with two blades. Through affecting the idea, function, mode, and method of financial management, it can bring cost saving, risk control, improvement of management efficiency, and increment of value into enterprise. In the meanwhile, it brings a lot of challenges. Only through fostering strengths and circumvent weaknesses, can an enterprise remain invincible in Big Data era.

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CHAPTER 3

REINFORCEMENT LEARNING IN FINANCIAL MARKETS

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ABSTRACT

Recently there has been an exponential increase in the use of artificial intelligence for trading in financial markets such as stock and forex. Reinforcement learning has become of particular interest to financial traders ever since the program AlphaGo defeated the strongest human contemporary Go board game player Lee Sedol in 2016. We systematically reviewed all recent stock/forex prediction or trading articles that used reinforcement learning as their primary machine learning method. All reviewed articles had some unrealistic assumptions such as no transaction costs, no liquidity issues and no bid or ask spread issues. Transaction costs had significant impacts on the profitability of the reinforcement learning algorithms compared with the baseline algorithms tested. Despite showing statistically significant profitability when reinforcement learning was used in comparison with baseline models in many studies, some showed no meaningful level of profitability, in particular with large changes in the price pattern between the system training and testing data. Furthermore, few performance comparisons between reinforcement

learning and other sophisticated machine/deep learning models were provided. The impact of transaction costs, including the bid/ask spread on profitability has also been assessed. In conclusion, reinforcement learning in stock/forex trading is still in its early development and further research is needed to make it a reliable method in this domain.

Keywords: reinforcement learning; stock market; foreign exchange market; trading; forecasts

INTRODUCTION

Machine learning-based prediction methods has been extensively used in medical, financial and other domains [1,2,3,4]. Buy and sell trading decisions on the financial market could be decided by either human or artificial intelligence. There has been a steady increase in the use of machines to make trading decisions on both the foreign exchange market and the stock market. Usually the training of artificial intelligence to perform financial trading involves extracting raw data as inputs and finding or recognising patterns within a training process in order to make a decision regarding the task at hand as the output. This process is called machine learning and in this context it can be used to understand rules for buying and selling and executing them. However, the scope of the systematic review is reinforcement learning. Reinforcement learning techniques are those where the system or agent are repeatedly fed new information from the available raw data in an iterative process that allows them to maximise the value of a certain pre-determined reward. It is a growing and popular method to make predictions in the financial market after the program AlphaGo defeated the strongest human contemporary Go board game player Lee Sedol in 2016. The forex market is included as it is the largest financial market by trade volume in the world.

The majority of articles considered were published in recent years due to the exponential growth in the area but older articles were considered when relevant. Each section of this review aims to cover a distinct topic within the broad field of reinforcement learning. The review articles are all grouped based on the topic titles within this review article. Finally, the review wraps everything up with a conclusion.

Google Scholar was used to search for the reinforcement learning articles for this systematic review. By typing into Google Scholar the key phrases “reinforcement learning forex” and “reinforcement learning stock trading” and then all the results were filtered according to the selection process given below in Figure 1. The search results returned from Google Scholar was automatically sorted by relevance, therefore only the first few pages are selected for manual inspection for eligibility. Afterwards, the results of the searched phrases were manually inspected without opening the article links to determine the most relevant articles for this systematic review. The selected articles from this step were then opened and their content read through to determine the final list of articles to be reviewed. Of 27 articles reviewed, 20 articles implemented or simulated trades to maximise profit and 7 articles were only interested in forecasting future financial asset prices. Of 20 trading articles 11 articles provided comparison with other models and 10 did not.

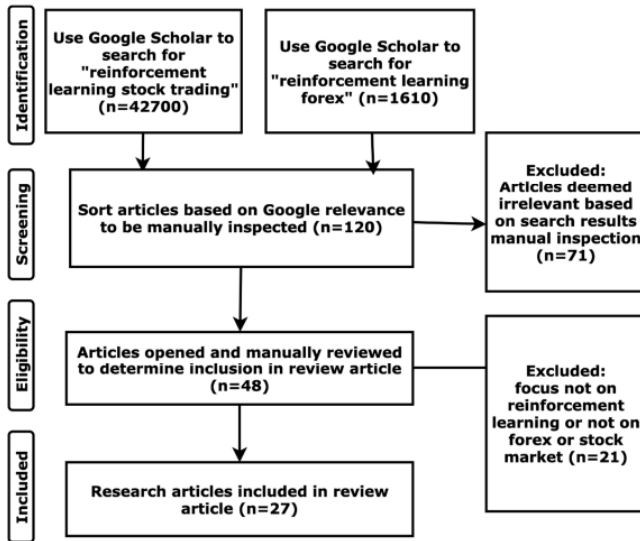


Figure 1. Flowchart showing the filtering of reinforcement articles chosen for review.

The overwhelming majority of the articles were focused on the forecasting in either the foreign exchange market or the stock market. However, there were several articles such as [5,6,7] that were comprehensive

enough to analyse forecasting and trading on both types of markets. However, three articles by García-Galicia et al. in 2019, Pendharkar et al. in 2018 and Jangmin O et al. in 2006 were focused on the allocation of financial assets to a portfolio to maximise returns which made them the most unique articles within the 28 articles reviewed. It showed that most articles within this systematic review had a very narrow research scope that did not extend well into broad financial asset trading or management. The performance measure for all the trading algorithm articles were either the Sharpe ratio or the rate of return. The forecast only algorithms performances were measured using goodness of fit measures such as root mean squared error (RMSE). Once again, García-Galicia et al. in 2019 was unique in that instead of presenting a standard measure of rewards or results an optimal portfolio asset weight matrix was presented instead.

BASE REINFORCEMENT LEARNING

Reinforcement learning was first introduced and implemented in the financial market in 1997 [8]. Standard reinforcement learning, a type of machine learning that iteratively learned about the optimal timing of trades through new information, were used in many different contexts such as those given in Kanwar in 2019 to manage stocks and bonds in a portfolio [9] and Cummings in 2015 to manage the foreign exchange market [10].

Each article presented the methodologies in a different way. Cumming in 2015 applied the same idea using least-squares temporal difference on several different foreign exchange currency pairs such as EUR/GBP, USD/CAD, USD/CHF, USD/JPY etc. [10]. Kanwar in 2019 used reinforcement learning to optimise a financial portfolio in order to maximise the return over a long period. The algorithm was model free but the parameters were learned and iteratively improved using Policy Gradient and Actor Critic Methods on real past stock market data [9]. Note in this case whenever the algorithm took an action, the net change in wealth was received as feedback in order to either reinforce or discourage the previous decision made [9].

As a result of the different methodologies the results returned from each article was different as well. The results of Cumming in 2015 had

very limited success yielding only 0.839% annualised return over all currency pairs with some of the rates showing negative returns [10]. The results of the deep reinforcement learning algorithm in Kenwar in 2019 showed it was able to outperform the baseline methods described above by capturing the broad market movement pattern in some cases but in other cases the performance was very poor at 0.486 Sharpe ratio overall [9]. The results showed that deep reinforcement learning was not as successful in capturing the dynamic changes in the stock market as originally thought [9].

Each article had several advantages and disadvantages. The main advantages of Kanwar in 2019 were that the rewards generated were compared with more than the usual number of baseline models including Following the Winner, Follow the Loser and Uniformly Balanced and the change in actual amount of wealth at each iteration was used to provide precise feedback as to the future action that should be taken [9]. The main disadvantage was that although the algorithm made theoretical sense from the data, its overall performance was rather poor with only 0.486 Sharpe ratio [9]. The main advantages of Cumming in 2015 were that the algorithm results were tested on many different types of exchange rates and applied the least square temporal difference to incorporate the dependency between the exchange rates at different points in time whilst the disadvantage was that the algorithm made the extremely simplifying assumption of not considering transaction costs at all and still achieving a low level of profitability [10].

ON AND OFF POLICY REINFORCEMENT LEARNING

Reinforcement learning can be divided into two separate categories: On policy learning and off policy learning with algorithms trained using these categories in [11,12,13,14]. They were both online policies in that they were learning new information to make decisions when they were running at the end of each step, as opposed to offline policies that only learned once the algorithm finished running at the end of the final step such as support vector machine [11]. On policy learning included SARSA (state-action-reward-state-action) that learned policies and

evaluated consequences of the action currently taken [11]. Off-policy learning included Q-learning policies and would evaluate the rewards independent of the current action as they were always evaluating all the possible current actions to see which action could maximise the reward gained at the next step [11]. Both the Q-learning and SARSA methods were developed and designed to take advantage of the fact that the market was not able to adopt the new information indicated in the adaptive market hypothesis as quickly as it arrived [12].

Within the context of the project the actions of the algorithm were normally limited to the following three possible actions: buy, sell and no-action. However, each article presented the methodologies in a different way. In Pendharkar et al. in 2018 the algorithm was trained to manage a portfolio of assets consisting of a share security that mimicked the returns of the Standard and Poor's 500 Index and a bond security that mimicked the returns of Barclays Capital Aggregate Bond Index (AGG) in the United States or the 10-year US Treasury-note [11]. Trading decisions, i.e., adjustments to the weighting of the two assets within the portfolio were made at the end of specified periods (quarter, semi-annual, annual) within the investment horizon of several decades [11]. It also showed that during the training process of the Q-learning algorithm there was a pre-determined probability that the algorithm chose an action that may not maximise the reward at the next step in order to learn what were the rewards or consequences of the action in question [11]. Marco Corazza et al. showed in 2015 it was possible to use these techniques to create algorithms that executed profitable trades with positive returns based on the adaptive market hypothesis that asserted the market prices vary over time based on the changing risk aversion of the investors and market efficiency [12]. It was conducted using several selected shares on the Italian stock market over an investment period of 30 stock market years with the algorithm making buy and sell decisions on the six selected shares over the period [12]. Deep Q-learning have also been applied to the foreign exchange market against the baseline buy and hold strategy and an expert trader [13] as well as to a stock market index [15]. Sornmayura in 2019 applied this methodology and compared its performance against the expert trade and baseline buy and hold strategy using the currency pairs EUR/USD and USD/JPY within 15 years of foreign exchange market data [13]. D'Eramo et al. in 2016 attempted to use Q-learning to predict the future movement of foreign exchange currency pairs and thus

the most profitable action to take at any point in time [14]. The list of actions were given in a state space and included buying, selling or closing a position with each transaction having a fixed cost [14]. Four different types of Q-learning and learning policy were trained on a training dataset and then tested on a testing dataset [14]. They were the ϵ -greedy policy Q-learning, ϵ -greedy policy double Q-learning and weighted Q-learning as well as weighted policy for weighted Q-learning [14].

The results of the article by Sornmayura in 2019 showed the deep Q-learning algorithm had little problem significantly outperforming the baseline buy and hold strategy but it could only significantly outperform the expert trade for the EUR/USD (43.88% annualised return) and not the USD/JPY pair (26.73% annualised return) [13]. The study results warranted further study in the area [13]. D'Eramo et al. in 2016 showed the weighted policy of weighted Q-learning performed the best on the test dataset (with an annualised return of around 6%) due to the fact it was more explorative than the other policies which generally resulted in better estimation of Q-values, in particular when there was only one desirable action that was significantly more profitable than other actions [14]. Within the article by Marco Corazza et al. in 2015 the results showed that Q-learning executed more trades compared with the SARSA meaning that the SARSA method was likely to have lower overall transaction costs incurred although it may have the undesirable side effect of staying out of the market for too long [12]. The more exploratory nature of the Q-learning algorithm most likely explained why it obtained a better overall result than the SARSA method (75% of the simulations obtained positive returns under Q-learning compared with 72% of the simulations under SARSA) [12]. The results of the Pendharkar et al. in 2018 showed the cumulative profit over the 17 year test period was about 10 times the initial investment [11]. The portfolio value increased by about 10 times over the testing period of 17 years [11].

The main advantages of Pendharkar et al. in 2018 were that both the Q-learning and SARSA algorithms were applied and their results compared with one another and that the algorithm also at certain times considered an action that did not always maximise the reward to learn the reward from sometimes sub-optimal actions and the main disadvantage was that transaction costs were assumed to be non-existent which inflated the profitability of the algorithm [11]. The main advantages of Marco Corazza et al. in 2015 were that both the Q-learning and SARSA

algorithms were applied and their results compared with one another and the shares whose data was used to train the algorithms were ran over a very long period of 30 years [12]. The main drawback was that only six individual shares on the Italian market were included in the training of the algorithms which meant the results were unlikely to be replicable in other financial markets [12]. The main benefits of the Sornmayura article in 2019 were that the algorithm was compared with the performance of an expert trader, something that was rarely done within trading algorithm articles and that the algorithm was trained and tested over a very long period of 15 years [13]. The advantages of the article by D'Eramo et al. in 2016 were its attempt to train, test and compare four different types of Q-learning algorithms whilst including the transaction costs in the entire process [14]. The main drawback of both articles was the lack of application of SARSA algorithms unlike the previous articles mentioned. Additionally, within the Sornmayura article in 2019 only two different foreign exchange currency rates were considered and trained in the algorithm [13,14].

MODIFICATIONS TO REINFORCEMENT LEARNING

Modifications to the base reinforcement learning method described above could be implemented as well in order to achieve better results. Elder in 2008 attempted a modification of the standard reinforcement learning approach by adapting the underlying market regimes via a hierarchical learning method that continually updated the trading strategy through new observations [16]. This learning method was compared with the standard reinforcement learning agent and tested on simulated market data from the Russell 2000 Index on the New York Stock Exchange [16]. Moody et al. in 1998 attempted the use of recurrent reinforcement learning to account for dependency between current and prior inputs [8]. The idea was that due to the temporal correlation of the past share prices a reinforcement system was better at creating profitable trades than standard recurrent learning algorithms [8]. The trained algorithm was tested on the monthly Standard and Poor 500 stock index over a 25-year period from 1970 to 1994 [8]. The trading strategy was compared with the baseline buy and hold model with an assumed transaction cost of 0.5% per transaction and any profits and dividends were reinvested

into the market [8]. Note this idea could be further refined into threshold recurrent reinforcement learning as shown by Maringer et al. in 2010 [17]. Li et al. in 2007 adopted two hybrid reinforcement learning systems that were called actor-only and actor-critic which were used on neural networks for stock market prediction [18]. The hybrid reinforcement learning systems were tested on two stock indices Standard & Poor's 500 and NASDAQ Composite, as well as an individual stock IBM listed on the New York Stock Exchange [18]. The data ranged over a period of 21 years from January 1984 to June 2004 (NASDAQ started in October 1984) [18]. The 50-day training period was fixed and used to train the system for the next day prediction on a rolling basis [18]. Stone et al. in 2004 documented several different autonomous stock-trading agents with one of them being reinforcement learning [19]. The Penn Exchange Simulator (PXS), a virtual environment for stock trading that merged together virtual orders from any algorithms with real-time orders from the real stock market [19].

The results within Elder in 2008 showed that other than the trivial setup where no market observations were learned through the financial indicators used to make the trading decisions, there were no significant statistical difference in the rewards gained from using either agent [16]. The study suggested that the inconsistent nature of the reward signals or the assumptions made in the rewards function of the hierarchical reinforcement caused this result [16]. However, it was also found that the hierarchical reinforcement agent behaved like human traders by increasing the number of trades and their profitability with more market information and made less trades with increases in transaction costs [16]. In fact, the cumulative return with the transaction costs included was minus 10% [16]. The results within Moody et al. in 1998 showed that the maximisation of the differential Sharpe ratio yielded more consistent share returns than maximising profits or minimising mean squared error [8]. The resulting profits using the reinforcement system were significantly higher than the baseline buy and hold model (0.83 Sharpe ratio to 0.34 Sharpe ratio) [8]. The actor-only system performed poorly in comparison with the baseline models but the actor-critic system did outperform the baseline models including the Elman Network, showing significant short-term market predictive ability [18]. It was speculated before that the random walk may not be sufficient in incorporating the abnormal, irrational part of human psychology that helped to drive the price movements within

the share market [18]. The improvement in performance by the actor-critic system (with mean absolute percentage error (MAPE) of 0.87%) in comparison with baseline neural network could be seen as evidence that the reinforcement learning system had some success in incorporating this factor into the share market prediction [18]. Stone et al. in 2004 showed the performance of the algorithm was measured by the average of the daily returns with its daily position reset before the share market closed every trading day [19]. For the reinforcement learning algorithm, the action space consisted only of a single variable that represented the volume of shares to purchase (if number is positive) or sell (if number is negative) with the price to buy and sell determined by the market at that point in time [19]. This trading strategy was then compared with other strategies tested including trend following and market making as well as the baseline static order-book imbalance strategy [19].

The advantage of all the articles in this section was that the modifications made served as a springboard to explore relatively unorthodox reinforcement learning methodologies that could improve the algorithms' performance whilst the main disadvantage was that there were little proven history of these modifications reliability and no related articles for comparison purposes. Another advantage within the article by Elder in 2008 was that it considered the potential algorithm profitability from both the long and short positions with the main disadvantage being that there were no statistically significant returns generated from the trading algorithms [16]. Another advantage within the article by Moody in 1998 was that it considered several different trading criterion including profit/wealth, economic utility, the standard Sharpe and a modified differential Sharpe ratio that was shown to be the most effective performance measurement whilst applying several different levels of transaction costs and assessing the performance impact [8]. The main disadvantage being that the returns generated were only compared with the baseline buy and hold model which was almost never used in real life [8]. The advantage within the article by Li et al. in 2007 was that it considered different performance measures including the average daily RMSE, mean absolute deviation and mean absolute percentage error as performance criterion. It also built an Elman Network from neural networks as a baseline for prediction, a type of model comparison that was rarely conducted. The main disadvantage being that the actor-only system did not create any significant improvement in comparison with the baseline model whilst the

actor-critic system only generated slight improvements [18]. Additional advantages from the article by Stone et al. in 2004 were that the PXS considered the number of shares to be traded as well as the price they were traded at and considered relatively complex baseline strategies including the Static Order-Book Imbalance strategy [19]. The disadvantage was its very poor performance (-0.82 Sharpe ratio) in comparison with both the baseline strategy and all the other strategies listed and tested in this study [19].

CONTINUOUS TIME UNIT MODELS

Most of the portfolio optimisation methods described above were measured using discrete time units. However, it was also possible to measure the portfolio returns using continuous time units [20]. García-Galicia et al. in 2019 used a reinforcement learning system based on an actor critic combination and created the system through the calculation of transition rates in continuous-time discrete-state Markov chain structure based portfolio problems [20]. The chain structure was characterised by probability transition rate and rewards matrices for each state derived from the observed financial assets price data and was used to determine the optimal weight for different assets in a portfolio [20]. The optimisation problem boiled down to a convex quadratic minimisation problem with linear constraints represented by Lagrange multipliers which could also represent the constraints caused by the continuous timeframe [20]. The matrix representation of the different states and their respective utilities allowed the agent to choose the course of action that maximised its utility [20]. Lee in 2001 showed that the continuous time unit within the share price movement and portfolio management could also be measured and modelled using the Markov process and the multi-layer neural network trained through reinforcement learning [21]. In this case, the states which contained the financial indicator and past price value information needed for the neural network to learn the likely future price movement almost never encountered the same values as before [21]. Note each state had different elements that incorporated all the information listed above and due to the relative subjective nature of what information should be included there could be different algorithms being trained as a result [21].

The results of the algorithms were rather different as well. The researchers García-Galicia et al. in 2019 were able to estimate the required matrices

successfully to create the system but unfortunately did not provide any comparable performance measures with other trading algorithms [20]. The algorithm from Lee et al. in 2001 was trained using 2 years of past share price for 100 different shares from the South Korean stock market whilst the test data was one year of past share price for 100 different shares from the same market [21]. Different periods of future price prediction was conducted and the accuracy of the predictions were measured by the root mean squared error with an average of 3.02 over a five-day forecast period [21].

The advantage of the article by García-Galicia et al. in 2019 was that it considered a sophisticated matrix system for determining the weights of the financial assets in the investment portfolio and an utility function was used as the reward criterion rather than the more conventional criterion such as rate of return or Sharpe ratio with the main disadvantage being the simplifying assumptions that there were zero transaction costs and all investors had homogenous expectations and were risk-averse [20]. The advantages of the article by Lee in 2001 was the use of the sophisticated Markov process and the multi-layer neural network trained to improve the reinforcement learning algorithm whilst incorporating a broad group of relevant information such as the past financial indicators into the model input [21]. Another advantage was the attempt to compare the prediction results from different forecast intervals [21]. The disadvantage was that the lack of a trading system which highlighted the potentially significant gap between profitable trading and forecasting price movement accuracy as well as the poor performance when the prediction period was either too short (1 day) or too long (20 days) [21].

RECURRENT NEURAL NETWORK AND Q LEARNING COMBINED

This section presents all the articles reviewed that combined recurrent neural network and Q-learning in some form. Moody et al. in 2001 presented two different trading systems based on recurrent reinforcement learning and Q-learning using neural networks with the tanh activation function [6]. These methods were applied on two separate real-life financial trading tasks [6] and were an extension on a similar study conducted in 1999 by the same researchers [7]. The first was as an intra-

day currency trader on the USD/GBP foreign exchange rate data using the complete first 8 months of historical data within 1996 [6]. For this task, the trading algorithm was trained using recurrent reinforcement learning to maximise a risk-adjusted return called differential downside deviation ratio [6]. Note both the bid and ask prices were used meaning there were transaction costs. The data was then rolled forward on two-week basis for testing and generating trading signals on out-of-sample data [6]. Another experiment within the same article involved the use of 25 years of Standard & Poor's 500 stock index from 1970 to 1994 [6]. In 1999 the researchers found that when testing on the Standard & Poor's 500/Treasury Bill allocation problem the standard Q-learning method was inferior to the recurrent reinforcement learning system [7]. Therefore in 2001 the researchers used the advantage updating refinement Q-learning in lieu of the standard Q-learning method [6]. Pendharkar et al. in 2018 had shown the presence of complex neural networks did allow the required pattern generalisation power, including to non-linear relationships, that was very much needed in the financial market to make profitable trades [11]. Ha Young Kim et al. in 2018 combined the Q-learning algorithm with the deep neural network, meaning neural network with many different hidden layers of neurons between the input (raw data in the financial market) and output action [22]. The number of shares to be traded (for a given level of existing capital) was determined using the decisions made by the deep neural network, something that was often neglected or set to a default value when constructing stock or other financial asset trading algorithms [22]. It also adopted various action strategies that used Q-values to analyse profitable actions within a confused market, defined as a financial market with no clear direction or movement [22]. Another adoption of Q-learning algorithm with neural networks was completed by Carapuço et al. in 2018 [23]. Three hidden layers were used in the neural networks trained under the Q-learning algorithm with the Rectified Linear Unit as the activation function [23].

Moody et al. in 2001 showed that over the six month test period for the USD/GBP exchange rate, the recurrent reinforcement learning trading system achieved a 15% return and a Sharpe ratio of 2.3 after annualization [6]. Both the long and short position could be maintained with any unused funds invested in three-month Treasury Bills and a 0.5% transaction cost was included in the calculation of profits with the assumption that any profits earned were reinvested into the stock market

during trading [6]. The recurrent reinforcement learning was compared with the Q-learning algorithm [6]. The returns of the recurrent reinforced learning method over dozens of different trials were still significantly better than that of the Q-learning method (Sharpe ratio of 0.83 versus 0.63) and both of them outperformed the baseline buy and hold method by a considerable margin [6]. Within Pendharkar et al. in 2018 during the period of market confusion the trained results from the market data was not very helpful and thus a pre-determined action was triggered once market condition exceeded a pre-determined threshold measured by market price movement [22]. This usually resulted in delays to buy or sell until a more profitable time as the most profitable strategy [22]. This method outperformed the standard method of buying and selling a fixed number of shares on various stock market indices such as the Standard & Poor's 500, Korea Composite Stock Price Index (in South Korea), Hang Seng Index (in Hong Kong) and EUROSTOXX50 [22]. The overall profit on the Standard & Poor's 500 index was increased by 4.5 times compared with the baseline reinforcement model [22]. The adoption of the Q-learning algorithm by Carapuço et al. in 2018 eventually was able to make profitable trades based on out-of-sample data despite the difficulties presented by the lack of data predictability within the simulated foreign exchange market [23]. The algorithm was tested on the EUR/USD foreign exchange market over a period of 8 years of data from 2010 to 2017 using 10 tests of different initial conditions with an overall yearly average profit of over 15% [23]. It also appeared that the learning rate in the training dataset was stable and the model could be used for profitable trading [23].

Each article had various benefits and drawbacks. The advantages of the article by Moody et al. in 2001 were that it applied a relatively complex trading methodology on both the stock and foreign exchange market. It also incorporated different bid and ask prices into the trades as well as examined the various levels' impact on profitability [6]. The disadvantages were that only one foreign exchange currency pair and one stock market was used for the training of the algorithm and the stock market performed mediocly as measured by the Sharpe ratio [6]. In addition, the currency pair USD/GBP was only trained over eight months in 1996 meaning the trained algorithm was unlikely to generalise well to trading in other currency pairs especially as the rate the time period was almost flat at around 0.65 [6]. The article by Ha Young Kim et al. in 2018

had a number of advantages including the consideration of the number of shares to be traded at any time as well as the price traded at and attempted to specifically consider possible actions to take during a confused market, something encountered often in real-life trading [22]. The main disadvantage was the results were only compared with the Standard & Poor's 500 index which did not offer a great deal of insight [22]. The advantages within the article by Carapuço et al. in 2018 were its training of the three hidden layers neural network for share trading and the testing of different initial conditions to obtain a high level of overall profitability [23]. The disadvantage was that only one foreign exchange currency pair, EUR/USD was tested over a relatively short time span of 8 years and the model performance could be measured by more sophisticated measures than the profitability on a fixed validation dataset [23].

DEEP NEURAL NETWORK AND RECURRENT REINFORCEMENT LEARNING

Tan et al. in 2011 proposed an artificial intelligence model that employed a system called the adaptive network fuzzy inference system for technical analysis supplemented by the use of reinforcement learning [24]. In this case, reinforcement learning was used to provide useful information for the algorithm to learn including the past moving average prices and momentum period also known as the rate of change of the stock price over a period of time [24]. Random exploration of data for improvements within the algorithm was mitigated by the provision of more feedback signals. The algorithm was tested on five individual listed shares on the New York Stock Exchange which were then compared with the market indices of the Standard and Poor 500 and Dow Jones index [24]. A transaction cost of 0.5% was included for every trade within the calculation of the stock returns [24]. Lu in 2017 applied the recurrent reinforcement learning combined with deep neural network and Long Short Term Memory network (LSTM) to the foreign exchange market [25]. Note long short term memory network is a special type of recurrent neural network more capable of learning long term dependencies than standard recurrent neural networks. Huang et al. in 2018 utilised a Markov decision process model that was solved using deep recurrent Q-network and sample a longer sequence for recurrent neural network learning [26]. It could be used to train the algorithm every few steps instead of

at the end of the process [26]. It included extra feedback to the agent to eliminate the need for random exploration during reinforcement learning [26]. However, this technique was only applicable to financial trading under a few market assumptions including the cost of any transaction was a fixed percentage of the value of foreign exchange currency traded [26]. It also required increases in sequence sampling for recurrent neural network training which reduced the time interval required for training the algorithm [26]. The log of daily returns was defined as the reward function [26].

The algorithm trained by reinforcement learning within Kumar et al. in 2013 was able to easily outperform the baseline strategies listed here on the pre-determined proportion of test data which consisted of the last 10 days of data within 60 trading day rolling data samples [27]. However, during volatile periods where the foreign exchange rate in question was highly variable the algorithm performed far worse than in periods of relatively price stability with a -10% cumulative profit showing that there was no stable performance across all time periods on the stock market [27]. The result of the proposed trading system within Tan et al. in 2011 was able to exceed the market index returns by about 50 percentage points over a period of 13 years from 1994 to 2006 [24]. The algorithm in Huang et al. in 2018 was tested on 12 different commonly traded currency pairs including GBP/USD, EUR/USD and EUR/GBP and performance was measured by common indicators such as the annualised rate of return and Sharpe ratios [26]. Positive results were achieved under the majority of the currency pairs simulations [26]. The overall result was 26.3% return using the 0.1% transaction cost assumption over all currencies tested [26].

The advantages with the article by Kumar et al. in 2013 were its careful application of the entire set of neural network methodology, the incorporation of transaction costs and periods of stability versus instability during the trading time [27]. The disadvantages were the consideration of only one foreign exchange currency over a relatively short period (with a general, overall downward trend over the 5-year period) with a negative overall return [27]. The advantages offered by related research Tan et al. in 2011 was that it were a unique system that incorporated a wide range of information including momentum period into the algorithm and considered transaction costs as well [24]. The downside was that the algorithm was very specialised and only tested

on five individual listed shares on the New York Stock Exchange [24]. The advantages within the article by Huang et al. in 2018 included its utilisation of deep recurrent neural network with Q-learning which was then tested on 12 different commonly traded currency pairs [26]. Another advantage was the interesting but worthwhile investigative result that a larger transaction spread generated better returns suggesting this was likely due to the constraint imposed by the system that forced the algorithm to look for more creative ways to profitably trade on the market [26]. A major disadvantage was the short time period for all currency pairs over the same period of time between 2012 and 2017 which diluted the advantages of using multiple currencies [26].

ADVANCED LEARNING STRATEGIES IN REINFORCEMENT LEARNING

Reinforcement learning could be generalised into behavioural learning method that used a similar strategy for the predictions. This was tried and tested by Ertugrul et al. in 2017 where a generalized behavior learning method (GBLM) was used to detect hidden patterns with different stock and forex indicators. The GBLM was trained using extreme learning machine similar to standard artificial neural networks [5]. Reinforcement learning could also be used as a subsequent step to genetic algorithm for forecasting of foreign exchange rates [28]. Hryshko et al. in 2004 initially used a genetic algorithm for in-sample trading strategy search to select the optimal trading strategy of entry and exit rules [28]. The data, namely the financial indicators making up the rules were then passed on to the reinforcement learning, Q-learning algorithm engine [28]. The algorithm could then be used online to continually search for the optimal strategy through repetitive experience [28]. Jangmin O et al. in 2006 presented an asset allocation strategy called meta policy that aimed to dynamically adjust the asset allocation in a portfolio to maximise the portfolio returns [29]. Reinforcement learning could also be combined with standard share market return technical graphs and indicators such as the Japanese candlesticks like those used by Gabriellsson et al. in 2015 [30]. Recurrent reinforcement learning could also be refined through parameter updates for inter-day trading and consequent higher autocorrelation between the adjacent price data within the time series of data with Zhang et al. in 2014 presented two different types of parameter updates: average

elitist and multiple elitist [31]. This was a deeper analysis of the results obtained using a similar elitist methodology in 2013 by Zhang et al. with the features to be selected using genetic algorithm [32]. Zhang et al. in 2013 applied elitist recurrent reinforcement learning after using genetic algorithms to select the input features data to be included in the algorithm [32].

Several of the articles' methodologies require a more detailed explanation than given in this section. Within Jangmin O et al. in 2006 the meta policy and any strategies were constructed within the reinforcement learning framework which utilised recommendations of local traders as well as the stock fund ratio over the asset [29]. The expert traders advice were utilised to learn the share price patterns in a supervised way [29]. The Q-learning reinforcement learning framework incorporated a relatively compact environment and the learning agent design [29]. The baseline model used were fixed asset allocation strategies compared with the dynamic asset allocation strategy tested on the Korea Composite Stock Price Index [29]. Gabriellsson et al. in 2015 attempted to combine recurrent reinforcement learning with lagged time series information from Japanese candlesticks in short, one minute intervals to create a trading algorithm using data from the Standard and Poor 500 index futures market [30]. The daily trading returns over the 31-trading-day period and Sharpe ratio were used as the performance benchmarks [30]. In Zhang et al. in 2014 the first idea, also called the average elitist method, was aimed to improve the returns on out-of-sample testing data [31]. The second idea, also called the multiple elitist, attempted to incorporate the serial correlation between the stocks within their price movements [31].

The results of each article varied considerably as well. Within the article by Ertugrul et al. in 2017 the model was trained and tested for future prediction on different stock indices and foreign exchange indices using previous values [5]. The results were compared with the artificial neural network method and showed that GBLM with a 3-month stock index MAPE (with a value of 4.82) was more successful in tracking the data trend despite the presence of natural fluctuations [5]. In Hryshko et al. in 2004 the hybrid system was tested using available past foreign exchange data with a reasonable level of gain of 6% annualised return during the test data period [28]. Within the article by Jangmin O et al. in 2006 the data from 1998 to 2001 Korea Composite Stock Price Index inclusive were used for training the algorithm whilst the subsequent two years

of data was used for testing with the baseline models [29]. The results showed that over the prescribed test period, the meta policy trading strategy produced a return of around 258% that was more than twice the profits generated by the baseline fixed asset allocation strategies [29]. The algorithm from Gabrielsson et al. in 2015 was compared with three different benchmark models including a buy-and-hold model, a zero intelligence model and a basic recurrent reinforcement learning model under two separate settings: one with no trading costs and one with trading costs included [30]. The candlestick-based reinforcement learning algorithm significantly outperformed the benchmark models when transaction costs were non-existent but was not able to repeat the feat when transaction costs were included with an average overall return of 0 [30]. Within Zhang et al. in 2014 the data used to test the trading system were stocks on the Standard and Poor 500 index over the four-year period of 2009 to 2012 [31]. When the performance was measured in Sharpe ratio, the average elitist updated parameter schemes (Sharpe ratio 0.041) seemed to outperform at a statistically significant level both the multiple elitist scheme (Sharpe ratio 0.028) and the two base models strategies random trading and buy-and-hold [31]. Within Zhang et al. in 2013 the four years of data from 2009 to 2012 were split into the training, evaluation and trading set [32]. It resulted in an average Sharpe ratio of around 1 using the average results of all 500 NASDAQ company share prices tested [32].

Each article had various benefits and deficiencies. Advantages of the article by Ertugrul et al. in 2017 were the GBLM's application on different stock and foreign exchange indices as well as the inclusion of performance comparison with artificial neural network. The disadvantage was the lack of consideration of the transaction costs [28]. The main strengths of the article by Hryshko et al. in 2004 were its inclusion of financial indicators and moving averages that made up the rules and the resulting reasonable level of profitability despite the inclusion of transaction costs [28]. The main deficiency was that the algorithm was only trained and tested on a single currency pair EUR/USD over a period of seven months from June to December 2002 at 5 min frequency base within a relatively flat trend [28]. This meant the trained algorithm was unlikely to generalise well to trading in other currency pairs. The article by Jangmin O et al. in 2006 had the additional advantages of using a relatively complex fixed asset allocation strategy as the baseline strategy with the additional

disadvantage being that it used a very old Stock Price Index from 1998 to 2001 that was most likely outdated [29]. The article by Gabriellsson et al. in 2015 had the additional benefits of using three different benchmark models for comparison as well as analysing the profitability with and without transaction costs [30]. An additional strength was the zero overall rate of return once transaction costs were included [30]. The article by Zhang et al. in 2014 had the additional advantage of incorporating transaction costs into both methodologies attempted. There were the additional shortcomings of training the algorithm over a very limited time period of 4 years over a single share market index, with relatively poor returns as measured by Sharpe ratio for both methodologies [31]. The main advantage of the article by Zhang et al. in 2013 was the results from using different input features to the recurrent reinforcement learning were tried and tested with the main drawback being the assumption that the results of all 500 companies on the NASDAQ contributed equally to the final result and no transaction costs were included in the Sharpe ratio calculations [32]. The contributions of all the articles in this section were that the modifications made served as a springboard to explore relatively unorthodox reinforcement learning methodologies that could improve the algorithms' performance whilst the main disadvantage was the little proven history of these modifications reliability and no related articles for comparison purposes. Table 1 below gives a summary of each article reviewed.

Table 1. Summary of article reviewed.

Article	Main Goal	Market	Input Variables	Main Techniques	Transaction Cost Included	Results	Trading System
[11]	Trading	Stock	Past historical returns	Reinforcement learning on-policy and off-policy	No	10 times increase in portfolio over 17 years	Yes
[12]	Trading	Stock	Past historical data	Reinforcement Learning Q learning SARSA	Yes	75% simulations net positive return Q-learning 72% simulations net positive return SARSA	Yes

[22]	Trading	Stock	Past historical data	deep Q-learning (reinforcement learning) Deep neural network	No	4.5 times higher profit compared with baseline RL model	Yes
[23]	Trading	Forex	Past historical data	Reinforcement learning Neural networks under Q-learning algorithm	No	Yearly average test profit 15.6 \pm 2.5	Yes
[26]	Trading	Forex	Past historical data	Reinforcement learning recurrent neural network training	Yes	26.3 annualised return	No
[20]	Trading	Portfolio management	Past historical data	Reinforcement learning (continuous) Markov chains	Yes	No return/error. Optimal portfolio matrix.	Yes
[10]	Trading	Forex	Past historical data as candlesticks	Reinforcement learning LSTD, LSPI	No	0.839% annualised return over all currency pairs	Yes
[13]	Forecasting	Forex	Past historical data	Reinforcement learning Deep Q-learning	No	26.73% annualised return on USD/JPY	Yes
[14]	Trading	Forex	Past historical data	Multiple Q-learning	Yes	6% return on W Q-Learning with W-policy	No
[5]	Forecasting	Forex/ Stock	Past historical data, economic indicators	Generalised Behaviour Learning Method	No	4.82 3 month stock index MAPE	No
[28]	Trading	Forex	Past historical data	Genetic Algorithms Reinforcement learning	Yes	6% annualised return	Yes
[30]	Trading	Stock	Technical indicators Past historical data	Recurrent reinforcement learning	Yes	Average return of 0	Yes
[31]	Trading	Stock	Past historical data Correlation coefficient	Recurrent reinforcement learning	Yes	Elitist: 0.028 Sharpe ratio Average Elitist: 0.041 Sharpe ratio	Yes
[17]	Trading	Stock	Past historical data	Threshold recurrent reinforcement learning	Yes	Average Sharpe ratio 0.1	Yes

[15]	Trading	Stock	Past historical data	deep Q-learning (reinforcement learning) Deep neural network	Yes	4.5 times higher profit compared with baseline RL model	Yes
[25]	Trading	Forex	Past historical data	Recurrent reinforcement learning LSTM	Yes	Average Sharpe ratio 0.1 at 600 epochs	Yes
[32]	Trading	Stock	Past historical data Correlation coefficient	Recurrent reinforcement learning, Genetic Algorithms	No	Elitist: 1 Sharpe ratio on average	Yes
[9]	Trading	Stock	Past historical data Volume	Deep Reinforcement Learning	Yes	0.486 Sharpe ratio	Yes
[16]	Trading	Stock	Real historical data for simulation	Hierarchical reinforcement learning	Yes	-10 on average for Russell 2000 index	Yes
[21]	Forecasting	Stock	Past historical data Volume, Technical indicators	Markov process reinforcement learning	No	3.02 RMS 5 day forecast	No
[6]	Trading	Stock / Forex	Past historical data	Recurrent reinforcement learning	Yes	0.06 Sharpe ratio	Yes
[24]	Trading	Stock	Past historical data Financial indices	Adaptive Network Fuzzy Inference System reinforcement learning	Yes	Total profit 240.32%	Yes
[29]	Trading	Stock / Portfolio management	Past historical data	Meta policy in reinforcement learning	Yes	258% profit	No
[8]	Trading	Stock	Labelled historical data	Recurrent reinforcement learning	Yes	0.83 Sharpe ratio	Yes
[19]	Trading	Stock	Past historical data	Penn Exchange Simulator Reinforcement learning	No	-0.82 average sharpe ratio	No
[18]	Forecasting	Stock	Past historical data	actor-only and actor-critic reinforcement learning	No	Actor-Critic MAPE 0.87%	No

[7]	Trading	Stock / Forex	Past historical data	Recurrent reinforcement learning	Yes	0.83 annualised monthly Sharpe ratio	Yes
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OVERALL ANALYSIS

Almost all trading systems reviewed made the assumptions there were no liquidity issues and no bid or ask spread incurred within the trades, which were not realistic assumptions in real-life trading especially for individual traders. In particular, few articles even mentioned this issue at all with Moody et al. in 2001 and Hryshko in 2004 being the exceptions let alone incorporated this constraint into the algorithm training and testing. This issue could be potentially resolved through the use of additional model constraints that imitated the conditions faced by an individual investor in the market.

Transaction costs, including bid/ask spreads, had significant impacts on the profitability of the reinforcement learning algorithms compared with the baseline algorithms tested. This was because these reinforcement learning algorithms usually made a relatively large number of trades within a short period of time meaning the transaction costs assumptions could play a significant role in the overall profitability of the system. This could be seen by the fact that under many of the studies such as that in and [30], an increase in transaction costs changed the profitability of the reinforcement learning system from profitable to not profitable in one stroke.

However, as the articles had little coverage of other advanced models used for financial market trading and prediction, there were little results for comparison despite being a potentially very relevant and important question. It meant this was an interesting and worthwhile future direction for these studies.

The majority of research articles were primarily focused on the price of any buy or sell orders on the market. There was far less interest in the monetary size of each trade relative to the capital available. In fact, many articles such as [6,8] made the simplifying assumption that every buy and sell order were of the same monetary size. However, in real life trading the size of these trades could have just as big an impact on the overall

profitability of the trades and only a few articles such as [19,22] were interested in investigating this factor on profitability.

CONCLUSIONS AND FUTURE DIRECTIONS

Reinforcement learning is a broad and growing field of interest within the trading of financial assets on the stock and foreign exchange market. All reinforcement papers reviewed here had settings and assumptions such as those regarding transaction costs (including bid/ask spreads), forecast periods, criterion for success that were strikingly different meaning direct comparison between their results and systems was not feasible.

From the review of the articles here it can be seen that when the reinforcement learning methodology was applied in a suitable context it could substantially improve on the performance over baseline models when the performance was based on either forecasting accuracy or trading profitability. However, there were some studies that showed reinforcement learning performed rather poorly when there were large changes in the price pattern between data used to train the system and that were used to test the system. Furthermore, performance comparison between reinforcement learning models and other models such as Autoregressive Integrated Moving Average (ARIMA), deep neural network, recurrent neural network and state space were very rare. Therefore, any definitive comparisons between them could not be drawn. For anyone interested in the field it meant reinforcement learning should be used with caution in making predictions and trades on the financial markets compared with the current artificial intelligence methods available. Any future research on reinforcement learning should focus on the possibility of comparing reinforcement learning techniques with other sophisticated models used for forecasting or trading on the financial market.

Over the past few years, reinforcement learning within the foreign exchange and financial market have been gradually dominated by the use of reinforcement learning in conjunction with other predictive models such as neural networks. The rewards of the algorithms tested in these studies are mostly the traditional Sharpe ratio or rate of returns based on historical testing data. Future possible areas of research or direction could include the following:

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- Testing of reinforcement learning algorithms on live trading platforms rather than just performance on historical data which would include work on setting up an operational environment for the algorithms.
 - More comparison of different reinforcement learning algorithms constructed and compared under similar conditions and data sources.
 - More comparison of reinforcement learning algorithms constructed and compared under similar conditions and data sources with other complex learning methodologies such as neural networks.
 - Assessment of algorithm users that encounters liquidity issues when trading compared with the default assumption of no liquidity issues.

AUTHOR CONTRIBUTIONS

Conceptualization, T.M. and M.K.; methodology, T.M. and M.K.; investigation, T.M.; writing—original draft preparation, T.M.; writing—review and editing, T.M. and M.K.; supervision, M.K.

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CHAPTER 4

INTEGRATED FINANCIAL MANAGEMENT INFORMATION SYSTEM AND SUPPLY CHAIN EFFECTIVENESS

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ABSTRACT

This study sought to determine the influence of Integrated Financial Management Information System (IFMIS) on Supply Chain Effectiveness focusing on Kirinyaga County Government Suppliers, staff who were IFMIS users and Kenya National Treasury IFMIS staff. This study was carried out in March 2017 and used a descriptive research design. The study used quantitative and then qualitative data to draw conclusions. Stratified sampling was used to arrive at a sample of 100 respondents. The causal-effect relationship was determined through use of regression test. The study found that IFMIS had a significant effect on Supply Chain Effectiveness. The effectiveness of the IFMIS could be improved by

upgrading control system to protect documents from being attacked by viruses or getting lost, including stronger fraud detection, reporting and a wide application and use of e-purchasing in all county departments.

Keywords: Integrated Financial Management Information System, Supply Chain Effectiveness, E-Purchasing, Electronic Document and Recording Management System, Internal Controls

INTRODUCTION

Supply chain effectiveness is an important requirement for organisational success. With an increasingly turbulent and unpredictable business environment, there is a greater need for effectiveness in organizations to ensure survival and longer-term sustainability [1]. Organizations are continuously looking for ways and methods to ensure competitive advantage and value for money. This has led to the adoption of the Supply Chain (SC) concept which is gaining momentum in organizations from the tactical, reactive purchasing to strategic, proactive and relational Supply Chain Management (SCM). It is clear that it is not organizations competing but supply chains competing. There is a need for integration of management of activities between functions in organizations; suppliers of organizations and customers of organizations [2].

Public organizations have not been left in adopting modern concepts of management, it is noted that there is more public awareness and scrutiny of public institutions, there is need for greater value for money, therefore, requiring efficiency and effectiveness for their operations. The SCM approach has been adopted into government operations [2].

In a bid to improve effectiveness and streamline business processes in the government supply chain, most governments have implemented Integrated Financial Management Information Systems. IFMIS is an ICT tool used in the supply chain. It actually automates financial operations and improves efficiency. It is a radical method of reforming government processes and making them customer focused and effective. An IFMIS is an information system that tracks financial events and summarizes financial information [3]. It enables appropriate management reports, strategic, fiduciary responsibilities and the development of financial

statements that can be audited. Basically, an IFMIS is an accounting system augmented to carry out a function depending on the requirements and the environment [4].

The size of the IFMIS will likewise shift contingent upon whether its operation is restricted to choose focal level foundations, for example, the finance ministry and treasury, or is actualized all the more comprehensively, to incorporate line services, their spending offices, and even local governments and regions [5]. The benefits arising from the implementation of IFMIS in the long term are far more than the capital cost [6]. Information from IFMIS can be used for various purposes like audit, budgeting among other uses [7].

The County Government of Kirinyaga is one of the 47 located in the central region of Kenya. Following the enactment of the 2010 Constitution, County Governments were conceived. The County Government of Kirinyaga succeeded the defunct County Council of Kirinyaga and all the municipalities within the county. Following the inception of County Governments and election of governors, they started building their capacity to offer the services as stipulated in the constitution to their residents. County governments partly draw their funds from the central government and the local revenue collection. To ensure transparency, accountability, fairness and efficiency in the counties, in 2014, the national government rolled out the IFMIS system into counties [8].

The IFMIS system has been implemented in County Governments since 2014. However, the e-procurement module that usually has a positive influence on sourcing and supply chain integration [2] hasn't been fully implemented since then. Due to the high levels of corruption in the procurement cycle cited in Kenya [9], the implementation of the e-procurement module should promote effectiveness, fairness, transparency, accountability in the supply chain. The IFMIS system should further improve the Supply Chain integration through automation of processes; ensure compliance with legal & ethical practices, enhance information management and the audit trail and enhance internal controls [2]. IFMIS having consumed a huge amount of resources including staff and funds, the ongoing capacity building in human resource with the IFMIS academy and the unending support from the IFMIS staff, reports are still indicating high corruption levels, manipulation of systems, fraud and inefficiencies in counties [10].

Problem Statement

The emerging ICT solutions in organizations can improve performance in the supply chain [11]. As a result, the introduction of IFMIS has become a mainstream approach to improving Public Finance Management. Despite the huge amount of resources pumped into the system, IFMIS projects do not really provide the expected results in developing countries, as institutional, political, technical and operational challenges affect its successful implementation [5]. A number of researchers have looked into IFMIS. Hendriks (2012) conducted a research to identify the challenges and risks in the implementation of the IFMIS in South Africa, results indicated that there are many challenges involved in the implementation and then developed a set of best practice guidelines [3]. Lundu & Shale (2015) assessed the effect of IFMIS on staff competence and skills, organization policies, technological infrastructure and Top management support on SCM performance in Nairobi City County Government (NCCG) and indeed results confirmed that IFMIS has an effect on SC Performance. Few studies have looked at how IFMIS has influenced SCE. Especially looking at the Supply Chain in terms of internal controls, integration and accuracy, and reliability of information and records. Further, there is a need to look into IFMIS implementation given the COG's sentiments [12].

Hypothesis

The general hypothesis of the study was to determine the influence of integrated financial management system on supply chain effectiveness in Kirinyaga County Government.

Hence the study sought to test the following hypothesis:

H01: The Integrated Financial Management Information System does not have a significant Influence on Supply Chain Effectiveness.

H01a: Electronic Document and Records Management System has no significant influence on Supply Chain Effectiveness.

H01b: Internal Controls have no significant Influence on Supply Chain Effectiveness.

H01c: E-Purchasing has no significant Influence on Supply Chain Effectiveness.

Organization of the Study

This study is organized into five broad sections. The first section is introduction which provides a background of the study, problem statement and objectives of the study. A second section is on the literature review which has presented a review of studies done on the e-procurement, the opinions of scholars and findings of other scholars as wells as theoretical concepts. The third part is on the research methodology which outlines how data was collected and analyzed while the last two parts are on the results and conclusions of the study.

LITERATURE REVIEW

Electronic Document and Record Management System and Supply Chain Effectiveness

Information starts life as data which is raw unrelated facts that have little value on their own. Information is processed, combined and contextualized data [13]. Researchers view information quality from the following different dimensions, first consider the following characteristics: content, recency, frequency and accuracy [14]; Second measure information in terms of accuracy, credibility, frequency and availability of forecast [15]; Third measure information quality by accuracy, currency, and completeness [16]; Fourth measure information intensity and quality [17].

Information quality is an important determinant of the usefulness of an information system. Sum, Yang, Ang and Quek (1995) researched on data accuracy and found out that it affects customer service and efficiency [18]. McGowan (1998) argued that information systems are actually useful when the information is readily accessible, high quality, relevant and accurate. IFMIS is an information system that is management

oriented. Its success depends on ensuring that information quality is high and reliable. It is also important to note that SCE depends on information quality [19].

An information system is a set of interrelated complementary components that collect, process, store and disseminate information to support decision-making, coordination, control, analysis and visualization in an organization [20]. Information Systems shape the reason for directing business nowadays. In numerous organizations, it turns out to be practically difficult to contend at a national and at a worldwide level without the utilization of data frameworks. Effective business requires data frameworks for monitoring bona fide proof of business movement. This confirmation of business exchanges is principally contained in both physical and electronic records [21].

There are two disciplines that contribute to the problems, issues, and solutions in the study of information systems which include; technical and behavioural disciplines [20]. Previously, organizations mostly applied the technological approach but the behavioural approach is also gaining ground [21]. This study will dwell on the technical part of the information system looking at IFMIS as a system and how it has influenced the supply chain. Laudon and Laudon (2006) view information systems from the following dimensions: organizations; management and; technology [20].

In the organisation dimension, information systems are a piece of associations. Data frameworks will have embedded inside them the way of life, individuals, structure, business processes and legislative issues of an association. In Management, Information Systems supply apparatuses and data required by managers to distribute, facilitate and screen their work, decide, make new products and settle on long-run key choices. Technology: Management utilizes Information System Technology (equipment, programming, stockpiling and broadcast communications) to do their capacities [20].

It is important to talk about the different types of Information Systems when looking at IFMIS. Laudon and Laudon (2006) outline four types of information systems: executive support systems (ESS) at a strategic level; management information systems (MIS); decision-support systems (DSS) at management level, and transaction processing systems (TPS) at the operational level. In this case, we are interested in Management

Information Systems (MIS) which provide managers with the reports and online access to the organization's performance and historical records [20]. MIS are oriented exclusively to internal, not environmental or external events. MIS provide information to support tasks, management and decision-making functions in an organization [22]. There are different information systems but this study will look at Management Information Systems and more specifically Integrated Financial Management Information System.

It is important to differentiate between a record and a document. A document is recorded information, an object which can be treated as a unit and a record of information created, received, and maintained as evidence and information by an organization or person, in pursuance of a legal obligation or a business transaction. Documents provide evidence of business transactions and can exist in any format [23]. A record is recorded information independent of form or medium and which serves as evidence of a transaction, preserved for the evidential information it contains [21]. A document is a living piece of communication that can be changed or revised. A record, on the other hand, gives evidence of what has already occurred, cannot be revised or altered and should be controlled throughout its life cycle [21].

A document, whether in electronic form or paper, is a basic communication device in what is considered an unstructured form (as opposed to structured data records), which in some cases can be embedded within different electronic documents that are used in most organizations. A record has evidential value as it gives evidence to an organization's functions, policies, decisions, procedures, operations or other activities of a government agency or corporation [24]. Documents are created in conjunction with the daily tasks of the organization to record and convey information. They may have transitory, collaborative, or referential value to the organization. Records are created and retained to meet operational and legal requirements by accurately recording a business event [25].

There is a need to differentiate records management and documents management. Records Management is the process of ensuring the proper creation, maintenance, use and disposal of records to achieve efficient, transparent and accountable governance [21]. Document management is about managing a single item, the first part of the life cycle, while records management manages the entire life cycle. Records management

involves managing document retention and preservation and reducing the risk of lost content. It goes on to state that a good records management system include people, processes, and technology [26].

Electronic Document Management System and Electronic Records Management System are types of computer systems that are used for the management of information. EDMS is the management of electronic documents contained in an information technology system, which uses hardware and software to manage, control, locate and retrieve information in the electronic system [21]. EDMS and ERMS are types of computer systems that are used for the management of information [27]. EDMS is a computerized system that supports the creation, capture, organization, storage, retrieval, manipulation and controlled circulation of documents in electronic format. The ERMS definition also supports the life cycle view by stressing that ERMS are designed to manage the maintenance and disposition of records [28].

ERMS is an electronic system for managing records on any media. An electronic system for managing paper records in a record centre or registry would be an ERMS [28]. The driving factor towards the implementation of document management systems is the sharing of knowledge and collaboration capabilities that can be enhanced by having a document repository in place. On the other hand, a records management system is more focused on maintaining a repository of evidence that can be used to document events related to statutory, regulatory, fiscal, operational or historic activities within an organization [27]. It is clear that ERMS are designed to automate records management controls while EDMS lack the capabilities for records control [21].

EDRMS has the electronic capability that helps in the management of both electronic and physical records. In the case of physical records, it records their location and other information about them [27]. ERMS prevents records modification, controls record deletion, include an arrangement structure which is maintained by the administrator, may support day-to-day working, but is also intended to provide a secure database for meaningful business records. Some of its key features are a declaration, classification, access control, disposition, and long-term preservation [21]. The decision to implement EDRMS results from the need to ensure that documents in an EDMS that qualify as records will be designated as such and specially treated and given protection they require [28].

The EDMS involves a software system for managing documents and a database for managing the metadata of documents. It also includes other technologies such as document imaging, document retrieval, reporting, character recognition, document management, workflow, form processing, content management, digital signature management, and storing and archiving technologies [29]. Additionally, the need for EDRMS is being fueled by a number of key business drivers. The following sub-section will discuss significant drivers for acquiring EDRMS [27]. Recent literature has used the term ECM to refer to the same technologies for managing documents and records, hence the researcher will in some cases use EDRMS and ECM as interchangeable, depending on the source used [21].

Business drivers from EDRMS just like other electronic systems include compliance; effectiveness; efficiency, and; continuity. Compliance is to laws, regulations, policies, standards and good practice [4]. Most organizations are forced more than ever to show an ability to be compliant and demonstrate that compliance. The organization may need to prove that it has taken certain decisions or has complied with records management requirements [21].

Effectiveness derives from a need to do things better in a way that is sensible for the business or organization. Examples of the improved effectiveness that EDRMS usually brings to the organization include; not losing records, sharing records, finding records easily and getting a complete picture of what is going on in an organization for audit and archival purposes which are core requirements for improved Supply Chain Performance. Efficiency is closely related to cost savings. Cost is always a factor, with the current global recession and companies, big and small, are constantly looking at ways of cutting cost and at the same time maximizing output. Effectiveness is rated as a bigger driver than efficiency as it provides more benefits. Companies are becoming aware of the cost of keeping or managing information. Continuity means being able to maintain and recover information in the event of a breakdown or disaster.

Internal Controls and Supply Chain Effectiveness

Internal controls can be defined as the mechanism used by organizational leaders to convey strategy, vision, and desires to the rest of the organization. They exist in the form of standards, policies, procedures and rules. Proper internal controls ensure effective risk management [30]. Internal control system represents all the approved policies and procedures used by the management in order to achieve and effective management of business. The control system includes internal control and internal procedures [31]. Warranty provided by the auditors is to reduce the risk of distortion. Auditors should establish confidence in the market and maximize shareholder's wealth [32].

Lack of internal controls and their deficient operation make companies vulnerable to a number of risks, such as improper recording of accounting transactions, making unauthorized transactions, fraud, all these having a significant impact on financial performance and competitiveness [33]. Internal controls are also defined as measures for the detection and prevention of fraud risk. In Procurement and Supply Chain management specifically, internal controls are important because they are the functions responsible for developing and managing of commercial contracts relationships [31].

Individuals in the procurement functions are exposed to fraud risk because They Operate in a stewardship role, responsible for custodianship of finance and assets which are owned by shareholders of the business; potentially control very large sums of organizational funds; are faced by many opportunities to commit financial fraud or to misuse systems, power or information for personal gain; Are in a position of trust within a business; Are responsible for the standing, credibility need reputation of the organisation in its dealings with supply chain partners and other stakeholders [34]. Below are supportive mechanisms(internal controls) for good governance: Robust internal policies, checks and control mechanisms; effective budgeting, control and monitoring of procurement spend; clearly defined roles, responsibilities, accountabilities and reporting structures for procurement; controls over the authority levels of individual buyers; clear requirements for approvals and authorizations; clear audit trails; segregation or division of procurement duties; use of e-procurement tools to minimize cash transactions; minimize potential

fraudulent intervention in procedures; internal audit of procurement processes, decisions and controls, [33]. This actually indicates that IFMIS has greatly applied internal controls to ensure good governance.

Internal controls are defined as a process because an internal control system is not an end in itself but a means to an end. Internal control is a “process, effected by an entity’s board of directors, management and other personnel, designed to provide reasonable assurance regarding the achievement of objectives in the following categories: Effectiveness and efficiency of operations, Reliability of financial reporting, Compliance with applicable laws and regulations” [35]. The Basel committee on banking supervision defined internal controls as a “process effected by the board of directors, senior management and all levels of personnel. It is not solely a procedure or policy that is performed at a certain point in time, but rather it is continually operating at all levels within the bank” [36].

Internal controls can also be perceived as a system. A system is a set of interrelated and interdependent components that interact in a way to achieve a set goal. These components or sub-systems are interdependent and the failure of one component leads to the failure of the whole system [32]. An organization which is divided into various sub-systems and thus needs a system of controls over units, divisions and departments, for its effectiveness and survival. An effective internal control system is an integrated system with interrelated components, supporting principles and attributes [31]. There are three major components of internal controls; control environment, accounting system and control procedures [37].

An internal control system available to firm consists of management oversight and the control culture; risk recognition and assessment; control of activities and segregation of duties; information and communication and monitoring activities and correcting deficiencies [38]. Internal Control Integrated Framework by Committee of Sponsoring Organisations (1992) classifies organisations’ internal control system into five integrated components which should be embedded into business processes across organisation, in its efforts to achieve objectives [39]. The components are; control environment; risk assessment; control activities; information and communication and; monitoring activities [40].

The internal control system is an integrated system, with management processes to attain organizational goals. For an organization to achieve

its organizational objectives, the five control components of the control environment, risk assessment, information and communication and monitoring must be integrated into management processes through the entire organization [31]. Like the body system, the internal control components and business processes must interact seamlessly for effective internal control [40]. Control objectives and measures that are derived from the monitoring and assessment of risks should be integrated into business units and business practices, through an effective information and communication control component that ensures effective flow of information to individuals in charge of internal controls in the entity [41].

The effectiveness of an internal control system depends on how flexibly and seamlessly the system interacts with itself and how embedded it is in the organization's business processes. Again for an internal control system to be effective and provide that needed assurance to the top management, there should be some "agents of effectiveness". Therefore there is need for management and the board to evaluate and assess the effectiveness of the internal control system periodically [31]. An internal control system can be said to be effective if the top management believes that the system facilitates the achievement of organisational objectives [39]. An internal control framework emphasizes on explanations and details of the components of the system and methods for their design but assumes details on how each to measure the components to assess their effectiveness is a deficient control system [40].

Assessing the effectiveness of internal controls should consider the components of internal control. Judging effectiveness of an internal control system of an organization is subjective, this results from the assessment of the working of the five components of internal control system in the organization [35]. IFMIS has specifically embedded internal controls including segregation of duties, levels of authority and approval, the flow of information, access controls including passwords and user names which with the intent of curbing fraud and increasing efficiency and effectiveness in the supply chain [3].

E-Purchasing and Supply Chain Effectiveness

E-Sourcing and e-Procurement are major components of the purchasing cycle. E-Procurement is "using the internet to operate the transactional

aspects of requisitioning, authorizing, ordering, receipting and payment processes for the required services or products.” [34]. Typically, e-Procurement is the focus of local business administrators and/or empowered users which ensures decentralization of the procurement cycle, ranging from requisition, authorization, order, receipt and payment. E-Procurement is mostly associated with to the transactional/compliance level of purchasing [42].

Public sector agencies globally have prioritised procurement (e-Procurement) while implementing e-Government. Electronic procurement is business-to-business purchasing practice that utilizes electronic commerce to identify potential sources of supply, to obtain organisational needs, to pay, and to interact with suppliers [43]. E-procurement manages supply chains in the procurement of goods and majorly uses internet information systems and electronic markets. An organisational procurement function is categorized into strategic and operational procedures because the activities involved are different [44].

E-procurement can be used together with various technologies of electronic commerce like as document imaging, workflow management and e-mail to support business process re-engineering. E-Procurement is strategic and therefore benefits an organization in achieving strategic goals [34]. E-procurement consolidates orders leading to discount and economies of scale. It enhances efficient flow of information between buyers and suppliers, which reduces administration costs and time, allowing procurement professionals time to focus on more strategic greater value adding activities [45]. Governments globally have placed importance on e-procurement systems to ensure efficiency, accountability and greater transparency [46]. However, there is limited evaluation of e-procurement undertakings by scholars [47]. Many researchers agree that the intensely competitive nature of the business environment makes the effective use of e-procurement an operational necessity for firms; e-procurement is an initiative that must be given strategic consideration in the short-term and the long-term to increase chances of achieving organisational objectives.

E-procurement ensures some benefits including integration between buyer and suppliers, reduced staff time required, enhanced coordination, reduced costs of transactions, shorter procurement cycles, lower inventory levels, and greater transparency. E-procurement is considered an electronic integration and management procurement activities, including

purchase request, authorization, ordering, delivery and payment between a purchaser and a supplier [48]. Croom (2000) argues that e-procurement systems, are a reflection of the procurement process by providing two different, but connected, infrastructures internal processing and external communication with suppliers [49]. According to Tatsis et al., (2006) e-procurement integration, management, automation, optimization and enablement of an organization's procurement process, using electronic tools and technologies and web-based applications [50].

Sourcing is the determination of how and where to obtain goods and services in order to fulfill an organizational need [34]. Organizations have always practiced some level of Sourcing. At its most basic, it is the process of analyzing the spend of the organization, understanding the opportunities to reduce spend, based on an understanding of the external environment comparing with internal needs develop a strategy to manage the organisational spend, conduct Request For Information, Request For Quotation and Request For Proposals, negotiate contracts, manage contracts and monitor supplier performance [42].

Sourcing is complex and was previously a manual process. The following are activities in sourcing: Prioritise organisation requirements for goods and services sourced [34]; obtain information on the supply market; identify and select suppliers that will meet organisational needs; add value through negotiation with suppliers; supplier relationship management and integration; innovate value adding and cost-reducing ideas [2]; continuously monitor the market for better supplier opportunities and more effective sourcing methods; develop strategic business relationships; manage performance against agreed indicators; ensuring achievement of strategic goals, cost saving programmes and efficiencies [42].

With the current trend of applying ICT in organizational processes, most operations have been automated. This brings us to the electronic processes. The perception of what e-Sourcing is has strongly evolved over the last years. E-Sourcing is "the Sourcing process enabled with the appropriate web-enabled, collaborative technology to facilitate the full life-cycle of the procurement process for both buyers and suppliers." [42]. E-sourcing is a strategic activity carried out by the procurement professionals to develop and manage contracts to ensure compliance. These contracts are made available by the Purchase 2 Pay (P2P) process. E-sourcing involves the buying process, with full discretion to a specialist buyer, which

includes Knowledge (for example spend analysis, specification), Request for Quotation/e-Tender/e-Auction and contract evaluation/negotiation, tracking, forecasting and monitoring savings [34]. E-sourcing is the process of identifying next supplies for a specific spend category, using internet technology usually the internet itself [51].

E-sourcing whether through an electronic, online auction is one of the most efficient and economical way of accessing suppliers leading improved supply chain performance. Finally, e-sourcing frees up purchasing personnel to focus on more strategic activities like supply base development, facilitating suppliers into innovation processes. E-sourcing solutions add value by reducing spend costs, optimizing processes and supporting innovation.

The benefits of supporting the sourcing process with the necessary tools can be categorised into four: Analysis (spend, process, performance); Process and knowledge management; Collaboration and negotiation; Compliance [34]. The end result is that e-Sourcing allows the purchasing department to act more effectively and increase its credibility and its footprint in the organization.

RESEARCH METHODOLOGY

This study adopted a descriptive research. The purpose of descriptive research is to observe, describe and document aspects of a situation as it naturally occurs. The study mainly focused on the 1500 employees including those from supply chain management, user departments, finance and accounts, 500 suppliers who were working with Kirinyaga County Government in 2016 and 50 National Treasury IFMIS staff. A County Government in Kenya is a fully fledged organization with two arms of government including Legislature and Executive. It provides services in several industries like health, Infrastructure, agriculture, trade, mining, transport, fire-fighting, law enforcement and tourism. This provides a good representative population for a society. The Finance and Supply Chain departments are the major users of the IFMIS. Others user departments primarily use the IFMIS for budgeting, procurement requisitions and reporting. IFMIS staff located in the National headquarters are the back-end and support for the IFMIS. They primarily focus on technical areas. The suppliers use IFMIS to access procurement

opportunities and monitor their payments. This explains the distribution of the target population samples. The Supply Chain department has more knowledge and experience in regard to use and interaction with the system. Thus the use of the sample was a good representation of the entire population of interest (Table 1).

The data was collected through in Kirinyaga County Government and the IFMIS headquarter in Nairobi, Kenya through questionnaires. Univariate analyses were done using Linear Regression models that fit to assess the influence of each of factors on supply chain effectiveness. The coefficients and their confidence interval were reported as well as P-values. In this study, the results and conclusions are presented using graphs, charts, and $Z = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + \epsilon$ is presented as follows:

b_0 is the regression intercept; Z is the dependent variable (supply chain effectiveness); X_1 is Electronic data records management; X_2 is internal control systems; X_3 is E-Purchasing; b_1 to b_3 are the regression coefficients; ϵ is the error term.

The b_0 represents the coefficient or the value of Z when the rest of the factors were not taken into consideration. The regression coefficients shows the actual effect of the independent variables on the dependent variables while the error term values showed the contribution of other factors which were not part of the model.

Table 1. Sampling size.

Category	Population	Sample size	Percentage
Supply Chain management	60	30	30
User departments	1290	20	20
Finance and accounts	150	10	10
Selected suppliers	500	30	30
IFMIS staff	50	10	10
Total	2050	100	100

The study used Ordinary least squares (OLS) regression to test the effect of the independent variable on the dependent variable. However, OLS is sensitive to outliers or influential observations which can give inefficient

estimation. Inefficient estimator has a large variation from sample to sample. This means that the estimator tends to be too sensitive to the particularities of the given sample. To overcome this challenge, the study used robust regression as method in STATA as an alternative to OLS regression which is less sensitive to outliers and still defines a linear relationship between the outcome and the predictors.

RESULTS AND INTERPRETATION

The study had a response rate of 85%. This is considered excellent [52].

Influence of Electronic Document and Record Management System in IFMIS on Supply Chain Effectiveness

The first hypothesis of the study focused on determining the influence of EDRMS on the effectiveness of the supply chain in Kirinyaga County. This section therefore, provides findings on the influence of Electronic Document and Record Management Systems (EDRMS) on the effectiveness of the supply chain in the county government of Kirinyaga.

Descriptive Statistics of Electronic Document and Record Management System

The descriptive test undertaken is shown in Table 2.

Table 2 displays the results on the use and application of the EDRMS in the County Government of Kirinyaga.

The study shows that most (mean = 3.7 out of 5) of the respondents store their documents in electronic formats. There was relatively wide dispersion (SD = 1.2) as to whether they stored documents electronically or not. Most of the respondents (mean = 4.0 out of 5) agreed that use of electronic platform for the documents provided easy access of information in the systems.

Table 2. Descriptive statistics—EDRMS.

EDRMS	N	Mean	SD
We store documents electronically	83	3.7	1.2
Easy access of information in the system	85	4.0	1.0
Stored information in IFMIS cannot be corrupted	84	3.5	1.2
Stored information in IFMIS cannot be lost	85	3.5	1.2
Can generate reports from the system	85	4.1	0.9
Only authorized individuals can modify documents	83	4.1	1.0
Records cannot be lost from IFMS	85	3.8	1.1
Information can easily be retrieved from the system	85	4.2	0.8
Stored document can easily be tracked	84	4.3	0.7
System provides an audit trail	82	4.2	0.8

When asked whether the stored information in the IFMIS could be corrupted, the value of the Standard Deviation (SD = 1.2) was 1.2 showing that some of the respondents felt that such files could be corrupted. Further, respondents showed wide dispersion of opinions as to whether information stored with IFMIS could not be lost. This in turn showed lack of consensus implying that some of the respondents believed that information stored in IFMIS could get lost as well.

The mean was 4.1 implying that on average the respondents agreed they could generate reports from the system. The mean value of the statement was 4.1 indicating that respondents generally agreed that only few and authorized individuals could modify documents in the system. SD of 0.9 showed that respondents had relative consensus compared to other aspects. This further, implied that the system had some degree of controls and security.

When asked whether records could get lost from the system, the mean value was 3.8 implying that the respondents generally held a similar opinion. However, the value of the Standard Deviation 1.2 showing lack of consensus on the results. Thus there were some respondents who held a different opinion that records could get lost in the system. This shows that while most of the people believed it was leak proof, there were a significant number of others who believed it was not.

The use of the system was associated with other positive aspects. For example, the results show that majority of the respondents agreed that information could easily be retrieved from the system. The value of the mean was 4.2 while the value of standard Deviation (SD = 0.8) suggesting that there was a general consensus that the system provided easy retrieval of information. In addition, majority of the respondents agreed that the system could easily be used to track stored documents. This was confirmed by the mean value of 4.3 and a Standard Deviation of 0.7. The results implied that the responses were densely spread indicating that the findings were agreed upon by most of the people. Lastly, most agreed that the system left audittrail with a mean of 4.2 and an SD of 0.8 the respondents affirmed with a relatively high degree of consensus that it left an audit trail.

When asked on how EDRMS had impacted on effectiveness of supply chain, most of the respondents cited that it saved on time, enhanced retrieval of information, enhanced information security, improved transparency and accountability and easy access to information among others.

Regression Test on Electronic Document and Record Management System and Supply Chain Effectiveness

This section presents the results of a regression test done to establish the effect of EDRMS on effectiveness of the supply chain in Kirinyaga County (Table 3). The test was done at 95% confidence level with an Alpha value (α) of 0.05.

The simple linear regression equation was given as:

$$Z = 1.521632 + 0.5383388X_1$$

where: 1.52 represented the regression intercept; Z was the dependent variable (supply chain effectiveness); X_1 was Electronic Data Records Management; 0.54 was the regression coefficients.

Table 3. Coefficients—effect of EDRMS on supply chain.

Robust regression		Number of obs = 80			
		F(1, 78) = 20.12			
		Prob > F = 0.0000			
Supply_chain	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
EDRMS	.5383388	.1200212	4.49	0.000	.299395 .7772827
_cons	1.521632	.4791753	3.18	0.002	.5676674 2.475597

The results show that introduction of the EDRM system by 1 unit holding other factors constant would increase the effectiveness of the supply chain by 0.54 units. This shows that adopting the use of EDRM system increased the effectiveness of the supply chain activities in Kirinyaga County.

Influence of Internal Controls in IFMIS on the Effectiveness of Supply Chain

The second hypothesis of the study focused on the influence of internal controls on the effectiveness of the supply chain. Thus this section presents tests on the internal controls and how those internal controls influence the effectiveness of the effectiveness of the supply chain activities.

Descriptive Statistics of Internal Controls

This section discusses the descriptive statistics which were tested on the data collected on internal controls in the IFMIS system. The data was collected on a five-point likert scale and analysed using frequencies, mean and standard deviation. The results are shown in Table 4.

Table 4 shows the results on descriptive tests done on data collected on internal controls.

From the results, most of the respondents strongly agreed that they used a password to access IFMIS. The mean was 4.7 indicating that generally the respondents strongly agreed. Thus, one of the controls which IFMIS had

were passwords to access the system meaning that only the recognized and authorized persons could access and use the system. Majority of the respondents also strongly agreed that different roles were carried out by different people in IFMIS. The values of the mean (Mean = 4.4) and standard deviation (SD = 0.8) indicated that a general consensus that respondents agreed with the statement. The results were further affirmed by the fact that IFMIS had segregated the duties to different persons as indicated by most of the respondents (Mean = 4.3). Further an SD of 0.7 showed a relatively high degree of consensus. It can thus be deduced that, IFMIS had split the roles and duties as an internal control so that no single individual could carry out all the activities in IFMIS system.

Table 4. Descriptive statistics-internal controls in ifmis.

	N	Mean	SD
Use of passwords to access IFMIS	85	4.7	0.5
IFMIS has allocated roles to individuals to carry out different tasks	84	4.4	0.8
IFMIS has segregated duties to different individuals	83	4.3	0.7
Can only carry out the number of tasks IFMIS has allocated to me	85	4.1	1.0
Internal controls in IFMIS monitor the procurement process	83	4.1	0.9
Internal controls in IFMIS can detect fraud	82	3.6	1.1
Internal controls in IFMIS can report fraud	84	3.5	1.0
Internal controls in IFMIS promote accountability	85	4.2	1.0

Another control established was that the system only allowed a person to do the number of tasks allocated to him or her as indicated by majority of the respondents (Mean = 4.1). Majority of the respondents agreed that the system could monitor procurement processes. The mean was 4.1 and the standard deviation was 0.9 showing that the statement was generally agreed to by the respondents.

The study noted a relatively most of the respondents could not tell whether the system could detect fraud. However, the mean value was

3.6 indicating that the central position of the respondents was that it could detect fraud. The values of standard deviation 1.1 implying that a significant number respondents felt otherwise. Similarly, a significant number of the respondents could not indicate whether internal controls in IFMIS could report fraud but majority agreed it could report fraud. This was confirmed by the corresponding mean value was 3.5 while the standard deviation was 1.0. This shows that on average, the respondents felt that the system could report fraud related cases although some respondents felt otherwise. Lastly, the controls in IFMIS were perceived by majority as promoting accountability in supply chain activities. The mean was 4.2 and standard deviation was 1.0 indicating some slight differences on opinion by the respondents. These results prompted the supposition that the use of the IFMIS internal controls promoted accountability in supply chain activities.

Further, the respondents also indicated other effects and benefits on how internal control had influenced the effectiveness of the supply chain. These include enhancing accountability and transparency, ease in monitoring and regulation of the process, improving information security (no unauthorized access), made the processes faster (less time consuming) and general improvement in service delivery.

Regression Test on the Internal Control and Effectiveness of the Supply Chain

This section provides the results from the simple regression on the effect of the internal controls. The test was done at 5% level of significance and the probability value of 0.05 was used to determine statistical significance. The findings are shown in the following tables and interpretations.

Table 5 shows coefficients of the regression test. The resulting regression equation was given as:

$$Z = 0.6568265 + 0.7252798X_2$$

where: 0.6568265 represented the regression intercept; Z was the dependent variable (supply chain effectiveness); X₂ was internal controls and 0.7252798 was the coefficient of internal control.

The results imply that a unit increase in internal controls holding other factors, increased the effectiveness of the supply chain by 0.7252798. This shows that internal controls in IFMIS affected the effectiveness of the supply chain positively.

Influence of E-Purchasing in IFMIS on Supply Chain Effectiveness

The third hypothesis of the study was on the influence of the e-purchasing on the effectiveness of the supply chain. This section covers the findings on hypothesis three of the study on the e-purchasing and its influence on the effectiveness of supply chain. The results are shown and discussed in the following tables and sub-sections.

Descriptive Statistics on E-Purchasing

This section discusses the descriptive statistics which were tested on the data collected on e-purchasing in the IFMIS system. Similar to section 4.4.1, the data was collected on a five-point likert scale and analysed using frequencies, mean and standard deviation.

Table 6 shows that most of the respondents agreed that IFMIS enabled county staff to search for new suppliers. The corresponding value of mean was 3.5 and the standard deviation was 1.2. This shows that the central position of the respondents on the statement was that it allowed search of new suppliers but some held different opinions. A mean of 3.2 showed that some of the respondents could not indicate whether the system allowed them to interact with new suppliers or not. The value of Standard deviation was 1.3 showing some significant differences in the respondent's opinions. When asked whether they could evaluate the capabilities of suppliers through the system, most of the respondents agreed that they could evaluate. However, the mean value was 3.1 indicating that respondents could not tell whether they could evaluate suppliers. The standard deviation was 1.2 implying mixed perceptions about that aspect in IFMIS.

With a Mean of 3.3 a significant proportion of the respondents indicated that the system facilitated electronic search of supplier location although

a significantly large percentage had doubt about that. The standard deviation of 1.2 shows that there was lack of consensus among the respondents on that aspect of the system. On the ability to float tenders electronically, majority agreed that the system enabled them to float tenders electronically.

Table 5. Coefficients—effect of internal controls on the effectiveness of supply chain.

Supply_chain_ef-s		Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Internal_controls		.7252798	.1136359	6.38	0.000	.4990932	.9514663
_cons		.6568265	.4734036	1.39	0.169	-.2854598	1.599113

Robust regression

Number of obs = 81
 F(1, 79) = 40.74
 Prob > F = 0.0000

Table 6. Descriptive statistics—e-purchasing.

	N	Mean	SD
Electronically search for new suppliers electronically	64	3.5	1.2
Electronically interact with new suppliers	84	3.2	1.3
Electronically evaluate new supplier capabilities	84	3.1	1.2
Electronically search for supplier location	83	3.3	1.2
Electronically float tenders	81	3.5	1.1
Electronically order for goods and services	84	3.1	1.3
Procurement approvals are done electronically	82	4.0	1.2
Supplier invoices are sent electronically	83	3.1	1.3
Electronically process payment to our suppliers	82	4.3	0.9

This was based on 3.5 mean. However, the value of the standard deviation was 1.1 showing that some stated they could not float tenders electronically.

A significant percentage of the respondents indicated that the system allowed them to electronically order for goods and services. The average value was 3.1 and the standard deviation was 1.3. This shows that the central position of the respondents on the issue was that it allowed them to order for goods and services online. However, the Standard deviation shows that a relatively large percentage of the respondents (SD = 1.3) held other views on the same. In connection to that, majority of the respondents agreed that procurement approvals could be made electronically. This was supported by a mean of 4.0 although the value of standard deviation was 1.2 implying that the average or central position of the respondents was not a consensus and that other respondents felt the system could not allow approvals to be done electronically.

In terms of financial documents, majority of the respondents indicated that IFMIS allowed supplier invoices to be sent electronically. The mean was 3.1 and the standard deviation was 1.3 indicating that variability of the responses was significantly large. Thus the central position of the respondents on this aspect was unclear as some agreed and others did not. The system could however, process payments to the suppliers as indicated by majority of the respondents. On average, the respondents agreed (Mean = 4.3) that they could process payments to suppliers electronically.

Further the respondents cited other effects of E-Purchasing on supply chain. The most common ones included saving time and resources, increasing accountability and transparency of the processes, improved supplier competition, ease of procurement processes, reduced workload and better record keeping among others.

Regression Test on E-Purchasing and Effectiveness of the Supply Chain

This section provides the results from the simple regression on the effect of the e-purchasing on the effectiveness of the supply chain in the county government of Kirinyaga. The test was done at 5% level of significance and the probability value of 0.05 was used to determine statistical significance (Table 7).

The resulting simple linear regression equation was given as:

$$Z = 2.332697 + 0.389334X_3$$

where: 2.33 represented the regression intercept; Z was the dependent variable (supply chain effectiveness); X_3 was e-purchasing and 0.39 was the coefficient of e-purchasing.

The result shows that a unit improvement in the e-purchasing holding other factors constant increased the effectiveness of the supply chain activities by 0.39 in Kirinyaga County. This shows that e-purchasing has a linear effect on the effectiveness of the supply chain in then Kirinyaga County.

Overall Effect of IFMIS System on the Effectiveness of Supply Chain

This section discusses the effectiveness of supply chain activities in the County government of Kirinyaga. The section has descriptive statistics, correlation and regression tests.

Descriptive Statistics

This section provides the descriptive statistics on the extent of effectiveness of the supply chain activities in Kirinyaga County.

Table 8 shows that the extent of effectiveness of supply chain operations in Kirinyaga County. As per the results, most of the respondents indicated that supply chain was integrated in the County. The median was 4 and the interquartile range was 1 implying that in general the likeliest response was that integration was done to a great extent. The competitiveness of the suppliers was rated to a great extent by majority of the respondents implying that there was quite a rivalry among the suppliers probably due to the effectiveness of the supply chain processes.

Out of the respondents who participated in the study, most of them indicated that supply chain processes were transparent to a great extent. A relatively large percentage indicated that the level of accountability was to a great extent with a median and mode of 4.

Table 7. Coefficients—effect of e-purchasing on the effectiveness of supply chain.

Robust regression					Number of obs =	81
					F(1, 79) =	31.54
					Prob > F =	0.0000
Supply_cha~s	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
E_purchasing	.389334	.0693277	5.62	0.000	.2513406	.5273273
_cons	2.332697	.2444834	9.54	0.000	1.846064	2.819329

Table 8. Descriptive statistics—effectiveness of supply chain.

	Median	Mode	Skewness	IQR
Supply chain integration	4	4	-1.0	1
Competitiveness of suppliers	4	4	-0.7	1
Transparency in our supply chain	4	4	-0.8	2
Accountability in the supply chain	4	4	-1.0	1
External customer satisfaction	4	4	-0.6	1
Internal customer satisfaction	4	4	-0.6	1.25
Corruption levels in the county	3	4	-0.1	2
Procurement transaction costs	4	4	-0.6	1
Data integrity	4	4	-0.6	1
Audit trail	4	4	-0.5	1
Employee productivity	4	4	-0.2	1.75

This shows that the supply chain processes and activities were to a great extent accountable and transparent.

On satisfaction, most of the respondents indicated that external customers were satisfied to a great extent. Similarly most of them indicated the internal customers were also satisfied to a great extent. This was confirmed by a median and mode of 4. The cost of procurement had gone down to a great extent according to most of the respondents. This shows that the

supply chain processes in the county satisfied more people at relatively low costs. This is shown by a mean and median of 4.

A significant percentage of the respondents indicated that the supply chain processes in the County provided data integrity to great extent as well as an audit trail with both having a mean and median of 4. This shows that the processes had good data integrity and some sound trail of transaction which enabled easy auditing of the transactions. The productivity of the employees working with the supply chain in the County had improved to a great extent as indicated by approximately majority of the respondents. However, despite this very promising results, most of the respondents indicated that level of corruption in the county had reduced. The median was 3 indicating that the central position of the respondents on corruption was that it was to a moderate extent although there was a variety of perceptions on this issue based on the IQR of 2.

Correlation

A Pearson correlation test was used to test the relationship between IFMIS and the effectiveness of supply chain activities in Kirinyaga County.

Table 9 shows the correlation results between different variables in this study. First, the study shows that there exists a significant positive relationship between effectiveness of the supply chain and EDRMS ($r = 0.396, p < 0.05$). The supply chain effectiveness and Internal controls had a significant positive correlation ($r = 0.599, p < 0.05$). Lastly supply chain effectiveness and e-purchasing had a significant positive effect ($r = 0.599, p < 0.05$). The study shows that the more the County used IFMIS (EDRMS, internal controls and e-purchasing) the more the County became effective in matters relating to supply chain.

Combined Effect Model (Multiple Linear Regression)

This section provides the results of a linear multiple regression (Table 10). This test was done to establish the combined effect of the three functions in IFMIS on the effectiveness of the supply chain processes in the County.

The resulting multiple linear regression equation was given as:

$$Z = 0.5286791 + 0.0855031X1 + 0.4674789X2 + 0.2469165X3$$

where, Z is the dependent variable (supply chain effectiveness); X1 is Electronic data records management; X2 is internal control systems and X3 is E-Purchasing.

Table 9. Correlations.

	Supply chain ef- fectiveness	EDRMS	Internal controls	E-Pur- chasing
Supply chain ef- fectiveness	1			
EDRMS	0.396**	1		
Internal controls	0.599**	0.490**	1	
E-Purchasing	0.559**	0.307**	0.468**	1

**Correlation is significant at the 0.01 level (2-tailed).

Table 10. Coefficients—multiple linear regression.

Robust regression					Number of obs = 81	
					F(3, 77) = 20.74	
					Prob > F = 0.0000	
Supply_chain_ef-s	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
EDRMS	.0855031	.0991277	0.86	0.391	-.1118854	.2828916
Internal_controls	.4674789	.1274654	3.67	0.000	.2136628	.721295
E_purchasing	.2469165	.0709649	3.48	0.001	.1056073	.3882258
_cons	.5286791	.4533808	1.17	0.247	-.3741174	1.431476

The study shows that without the IFMIS the level of effectiveness would be insignificant or very low as shown by the constant value ($p > 0.05$). The EDRMS component was also insignificant implying it could essentially change or influence the effectiveness of the supply chain processes in the county. However, internal control had a significant effect on the supply chain. The result shows that an improvement in a unit of internal control holding other factors constant would increase the effectiveness of the supply chain by 0.47 units. Similarly, an increase in e-purchasing by one unit holding other factors would increase the effectiveness of the supply chain by 0.25 units. The results shows that some functions in the IFMIS such as internal controls ($p < 0.05$) and e-purchasing ($p < 0.05$)

significantly affected the effectiveness of the supply chain activities in the County. The electronic documents and records management system had insignificant influence on the effectiveness of the supply chain processes in the County.

DISCUSSION AND CONCLUSION

Discussion of the Findings

The first hypothesis of the study was to determine the influence of Electronic Document and Records Management System (EDRMS) on the effectiveness of the supply chain activities in Kirinyaga County. Electronic Documents and Records Management System is a component in IFMIS, a system used by the National and County government to facilitate procurement, payment, and communication with stakeholders especially suppliers. Wainaina (2014) researched on the effects of IFMIS on Financial Performance of Commercial State Corporations in Kenya. Results indicated that 84.3% of the financial performance of commercial state corporations can be attributed to the Integrated Financial Management practices they have adopted. The study found that through IFMIS, users could store their documents electronically. This facilitated large storage of data in soft form compared to if the information was stored in hard form. The use of the system enabled easy access to information compared to hard form which was hard to find, and prone to mix up especially if the files were not well labeled [53].

The use of the IFMIS especially the EDRMS could be used for other purposes such as generating reports from the system and also by facilitating easy retrieval of information from the systems. Therefore the system facilitated easy transactions and eased the supply chain processes. This could significantly increase the efficiency of operations of the supply chain within the County. These findings agree with the views of Kwatsha (2010) who asserted that management of records would proper creation, maintenance, use and disposal of records to achieve efficient, transparent and accountable governance. The use of IFMIS also was useful for other stakeholders such as internal and external auditors. This is because the system provided for a way in which stored documents

could easily be tracked [21]. Hendriks (2012) pointed out that IFMIS was an information system that tracked financial events and summarizes financial information [3].

The findings shows that the system had also some control features as it only allowed only authorized people to modify the documents. This restricted unauthorized entry of people which could put the supply chain processes at risk. This is in accordance with Diamond & Khemani (2005) who argued for IFMIS to be effective, it required automating all repetitive operations in organisation, embedding authorizations, checks and controls [7]. However, the users of the system had mixed views on its security levels. A significant percentage of the users indicated that information stored in IFMIS could be corrupted or could get lost. This resonates with the views of Chêne (2009) whocited that IFMIS projects did not provide the expected results in developing countries, as institutional, political, technical and operational challenges affect its successful implementation [5].

A simple regression test was done to determine the effect of the Electronic Documents and Records Management system (EDRMS) on the effectiveness of the supply chain processes. The study found that EDRMS had a significant effect on the supply chain processes. Kwatsha (2010) argued that EDRMs prevented records modification, controlled record deletion and had an arrangement structure all which contributed towards making the operations effective. However, when other factors were put into the model, the effect of the EDRMS was found to be very insignificant [21].

The second hypothesis of the study was to determine the influence of internal controls on the effectiveness of the supply chain processes. Internal controls were inbuilt features for restricting access to the IFMIS, controlling the operational ability of a person on a system and usage of the system. According to Pathak (2005) proper internal controls ensure effective risk management. The study found that IFMIS had several internal control mechanism [30]. Firstly, the system had user passwords as a basic security operation feature to control access and prevent the basic or low level risks. The study found that IFMIS had allocated roles to different individual as well as segregating the duties to different people. This segregation of roles and duties ensured that no single person had the ability to carry out all the roles and operate them in the system. Also the

segregation of duties such as entry, approval levels and authorization was a major security boost. These features were noted by Hendriks, (2012) who indicated that IFMIS had specifically embedded internal controls including segregation of duties and access controls such as passwords and user names with the intent of curbing fraud and increasing efficiency and effectiveness in the supply chain [3].

In that connection also, the study found that users could only carry out certain number of tasks allocated to them. All these controls ensured that transactions could not go through the entire processes without approvals from different people which lowered the risks of fraud and misappropriation of funds. According to Hendriks (2012), some controls such different levels of authority and approval and control of the flow of information was meant to make supply chain operations effective and efficient [3]. The study noted that internal controls in IFMIS monitored the procurement process which made users to be more vigilant when doing procurement related activities. The system also provided audit trail and trackers to track all the activities happening within the system. A similar assertion was made by Rodin-Brown (2008) who argued that IFMIS would provide and support audit by providing the required audit trail. In general, internal controls in IFMIS promoted accountability among the supply chain staff and stakeholders [4].

However, despite the positive implications of the system, the study found that the system could not adequately detect or report fraud. Similar perceptions were expressed by Kahari, Gathogo and Wanyoike (2015) who said that reports were indicating high corruption levels in the counties, high levels of manipulation of systems, fraud and inefficiencies in counties [10]. A regression test done on the effect of internal control on the effectiveness of the supply chain indicated that there existed significant statistical effect of internal control on the effectiveness of the supply chain processes. This aspect was also significant when combined with other aspects of IFMIS implying that internal controls had a significant influence on the supply chain processes. Ayagre, Appiah-Gyamerah and Nartey (2014) held that internal control systems represented all the approved policies and procedures which the top leadership used in order to achieve an effective management of business [31].

The third hypothesis of the study was on the e-purchasing component of IFMIS and how it related with the effectiveness of the supply chain

processes. According to Chartered Institute of Purchasing and Supply (2012c) e-purchasing operates the transactional aspects of requisitioning, authorizing, ordering, receipting and payment processes for the required services or products [34]. The study found that IFMIS through the e-purchasing component, users could electronically search for new supplier in the system which shortened the time taken to make searches and made the processes more convenient. Secondly, the use of e-purchasing component of the IFMIS system enabled the users to interact with the suppliers electronically. The findings resonate with those of Dong et al., (2009) who argued that having e-procurement system enhances efficient flow of information between buyers and suppliers, which reduces administration costs and time, allowing procurement professionals time to focus on more strategic greater value adding activities [45].

The study noted that e-purchasing enabled the users to evaluate the capabilities of new suppliers and their locations. However, the extent of evaluation on capabilities was limited since the system only relied on the information provided and some information provided may have been altered or fabricated to suit the context and situation as at then. Dong et al., (2009) held that e-procurement enhanced efficient flow of information between buyers and suppliers, which reduces administration costs and time, allowing procurement professionals time to focus on more strategic greater value adding activities [45]. The system was found to ease the process of procurement and other supply chain processes. The findings shows that users could float tenders through the system, order for goods and services and also facilitate approvals electronically. All these activities could be done in the system electronically reducing the manual way which was time consuming, inefficient and ineffective. According to Sain et al., (2004) e-procurement considered an electronic integration and management procurement activities, including purchase request, authorization, ordering, delivery and payment between a purchaser and a supplier [48].

The study also noted that the e-purchasing was an important tool in the supply chain management in the county as it facilitated most of the roles and duties. The users of the system indicated that they could send invoices to the suppliers and process payments to them in the system. These findings agree with those of Min and Galle (2003) that electronic procurement is business-to-business purchasing practice that utilizes electronic commerce to identify potential sources of supply, to obtain

organisational needs, to pay, and to interact with suppliers [54]. Results from the simple and multiple linear regression tests shows the use and application of e-purchasing service in IFMIS had significant statistical effect on the effectiveness of the supply chain processes.

Conclusion

The study concluded that Electronic Documents and Record Management Systems influence supply chain processes through ease of access of information, quick retrievals, easy tracking of documents and provision of audit trail among others. Internal controls influence the effectiveness of supply chain through enhanced security. The system provides restricted access, creates order of operations, defines roles and duties, which reduces the level of risk in the organization. However, the users doubted the system's ability to detect and report fraud cases. The e-purchasing component facilitated quick, easy and processing of procurement logistics such as floating of tenders, ordering of goods and services, invoicing and processing of payments all of which increase the effectiveness of the supply chain operations.

Implications of the Study in Theory and Practice

In theory, there is need for more research to determine why the IFMIS system may not have been very effective in reducing corruption and improving on the audit trail. Most institutions especially government will invest in an IFMIS with corruption as a major reason.

The study also reaffirms the importance of the IFMIS, however there is need for more studies on the implementation of the system and user training.

In practice, organisations should implement ICT systems to ensure effectiveness in their supply chains. It should also be noted that there is a human aspect in success of any ICT system. ICT Systems always use the Garbage In Garbage Out principle.

Contributions of the Study to Practice and Theory

The study makes a very important contribution to procurement practice. Firstly, the study provides information on the available internal control and extent of adoption of e-procurement which shows the level of non-compliance to the legal and ethical framework which is very vital to the policy makers such as Public Procurement Regulatory Authority in Kenya as they streamline public procurement in the country.

The study also revealed the factors affecting the implementation of IFMIS among the Counties in Kenya. Such information is helpful to the IFMIS directorate that allow easy, faster and cheaper ways of diffusing technology in the government supply chain.

The study also provides more knowledge on the better and sustainable Supply Chain concepts such as integration of technology in the process of supply chain process. This provides more content to the field and how new approach to the field of supply chain especially in third world countries.

Limitations of the Study

This study collected data on IFMIS and effectiveness of supply chain from the County government of Kirinyaga only. This information is thus from one county government. However, in Kenya, the Counties are not identical and have different levels of economic, social and political structures. Thus the findings and the conclusions may not cut across all the counties and thus highly reliable for generalization.

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CHAPTER 5

VALUATION OF ENVIRONMENTAL MANAGEMENT STANDARD ISO 14001: EVIDENCE FROM AN EMERGING MARKET

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ABSTRACT

ISO 14001 (Environmental Management Standard) helps corporations to build legitimacy and goodwill, and can be also viewed as an organizational response to institutional pressure to act proactively towards the environment. The purpose of this paper is to investigate how investors in the emerging country value voluntary environmental management standard ISO 14001 certification. The impact of voluntary environmental management standard ISO 14001 on market performance is still not clear. By using event study methodology, this study matched ISO-certified firms with non-certified ones based on three different matching principles that include return on assets, size, and industry. The findings indicated that investors negatively valued ISO 14001 in both

the short and long run. The study recommended policy implications for managers, policy makers, and non-government organizations.

Keywords: ISO 14001; legitimacy; institutional forces; environmental system; event study approach; emerging markets

INTRODUCTION

Firms around the globe are increasingly concerned about the different sustainable environmental strategies to legitimize their operations among various stakeholders (Dbouk et al. 2018; Gavronski et al. 2008). ISO 14001 is considered to be one of those sustainable firms' strategies (De Jong et al. 2014). ISO 14001 is the most widely adopted environmental strategy, which not only fosters firms' environmental performances (Russo 2009; Potoski and Prakash 2005) but also increases firms' financial performances (De Jong et al. 2014; Darnall and Edwards 2006), promotes an environmentally friendly supply chain (Curkovic and Sroufe 2011), and indicates current environmental management objectives. ISO 14001 ensures that firms implement environmental policies with the objective to eliminate environmental pollution. It is a plan–do–check–act approach that regulates business entities to develop an environmental policy that aims for better environmental performance by minimizing the hazardous wastes, and monitors the outcome of implemented environmental policies (von Zharen 2001).

India is the world's fastest growing economy, with a fast growth output. However, India has been in trouble by increasing environmental degradation, which has raised the attention of the globe. Indian firms are actively adopting ISO 14001 to attain legitimacy among various stakeholders, to show that they are employing environmentally proactive techniques in their operations. The number of ISO 14001-certifications India rocketed in the past years. India recorded a 99% increase in ISO 14001 certifications from 2010 to 2016 (ISO 2015).

The increasing trend of certifying environmental management systems (EMSs) with ISO 14001 encouraged different scholars to investigate the financial benefits of its adoption (De Jong et al. 2014; He et al. 2015). A number of existing studies explore the impact of ISO 14001 on financial and market performances of the organizations (Paulraj and De Jong

2011; Wahba 2010; Cañón-de-Francia and Garcés-Ayerbe 2009; Aarts and Vos 2001; Dowell et al. 2000). These empirical investigations provide helpful insights in the related literature. However, these studies are mainly focused on the organizations of the developed market, and paid no or little attention to the firms of developing markets like India. The findings of these studies are vague and inconclusive, as some scholars found positive market responses to ISO 14001 (Martín-de Castro et al. 2016; Lee et al. 2017; Jacobs et al. 2010; Paulraj and De Jong 2011) while others reported negative relationships (Lee et al. 2008; Zhao 2008; Cañón-de-Francia and Garcés-Ayerbe 2009; Aarts and Vos 2001). The regulatory and institutional settings of developing economies sharply differ from those of emerged ones, owing to poor judicial systems and corporate governance, greater information asymmetry, and weak regulatory monitoring (Lee et al. 2008). The weak institutional and regulatory environment encourages organizations to symbolically adopt ISO 14001, which yields negative or no effects on the environmental initiative's efficacy. In the arena of competitions, to get legitimacy, organizations might adopt ISO 14001 in response to the isomorphic pressure prevailing in the market (Boiral and Henri 2012).

When organizations implement any environmental policy with the intention to gain institutional legitimacy instead of adoption in reality, discrepancies may arise in the application of that environmental policy (Delmas and Toffel 2008; Delmas and Montes-Sancho 2010). We state that the adoption of ISO 14001 symbolically can be a double-edged sword which can damage the initiative's trustworthiness, which in result harms the firm's legitimacy among various stakeholders and is negatively valued by them (Aravind and Christmann 2011). Additionally, in any institutional setting with no proper checks and balances, and where public rules and regulations are vague, the voluntary environmental strategies such as ISO 14001 certifications are not taken authentically by the stakeholders. Moreover, environmental responsiveness and protection is not the foremost concern in developing markets, since the utmost priority of investors is material security (Globerman and Shapiro 2009). Such cultural values, prevalent beliefs, and societal norms, in fact, influence the cognition of the investors towards environmental protection (Majeed et al. 2015). Keeping in view the above arguments, India, being an emerging economy, might demonstrate different market valuations by certifying with ISO 14001.

This study investigates the impact of ISO 14001 certification on the market performance of Indian domestic firms. For the larger extent, we are convinced that the domestic firms get certified with ISO 14001 as a result of mimetic pressure from international ones (Christmann and Taylor 2006). As compared to international firms, domestic firms lack strict observation by international stakeholders to fortify certifications and attain effective, sustainable strategies (Maclean and Behnam 2010). In response, investors make their investment choices on past efficacious outcomes attained from implementing environmental strategies and negatively evaluate it. With the purpose to empirically test our hypothesis, 62 domestic Indian companies were used over the time period of 2010–2017.

This study contributes to existing body of knowledge in the following important ways. Firstly, most of the existing literature on the financial impacts of ISO 14001 focused on emerged economies, and much less attention has been given to emerging economies. Secondly, the association between market performance and ISO 14001 is inconclusive and slightly mixed. Some researchers reported a positive association (Chen et al. 2018; Flammer 2013; Jacobs et al. 2010; Wahba 2010; Dowell et al. 2000; Melnyk et al. 2003; Klassen and McLaughlin 1996) while others found negative or weak associations (Lee et al. 2008; Cañón-de-Francia and Garcés-Ayerbe 2009; King and Lenox 2001; Aarts and Vos 2001). Therefore, it is still unclear whether ISO 14001 enhances the market evaluation of the firms or not. The results of this empirical investigation increase the understanding of the financial outcomes of ISO 14001 in India by throwing light on institutional and social factors that shape this phenomenon. Drawing on institutional theory and market learning perspectives, this study establishes the importance of social traits in the performance of the financial markets. Lastly, this study focuses only on domestic firms, whereas the prior studies were largely concerned on multinational companies. To investigate the market evaluation of ISO 14001 of domestic firms is empirically and theoretically vital, because domestic organizations face low institutional pressure to certify with ISO 14001 as compared to multinational firms (Husted et al. 2016).

PRIOR LITERATURE

Globally, around 600,000 firms have attained certifications consisting of numerous management standards such as ISO 9000, ISO 14001, etc. (Boiral and Roy 2007). Various studies explain the importance of implementing these ISO certifications in regard to the firms' objectives to attain legitimacy and acceptability in the working environment. Delmas and Montes-Sancho (2010) highlights this importance, and states that firms adopt ISO 14001 standards as a management tool to gain legitimacy and improve their reputation among their key stakeholders, for instance societies, governments, regulators, environmental groups, customers, suppliers, etc. Boiral and Henri(2012) identify its importance for internal efficiency in terms that ISO 14001 presents an opportunity for the firms to improve their daily environmental performances by promoting it as a precautionary approach. Furthermore, these standards require their implementation inside whole organizational systems to achieve the continuous environmental performance. Delmas and Montes-Sancho (2010) state that firms meet societal expectations to fulfill the environmental obligations by implementing these standards, which in return help firms to attain legitimacy and external appreciation. Heras-Saizarbitoria and Boiral (2013) call for comprehensive research on the adoption of EMAS and its impact on firms' outcomes. Existing literature discusses institutional theory while explaining the use of ISO 14001 standards by the firms.

Suchman (1995) explains that as per the institutional theory, firms adopt ISO 14001 to reinforce the precision of their operations in a certain defined set of rules, guidelines, principles, customs, values, or norms. Firms take different initiatives to build their reputations among different key stakeholders and achieve legitimacy that helps firms to survive in domestic and international environments and increases their business values (Parida and Wang 2018; Mellahi et al. 2016). These strategies help firms in their survival and avoid regulatory burdens. He and Shen(2017) demonstrate that firms achieve the latest technologies and resources by implementing ISO 14001, which can be used to gain efficacy, and improve environmental performance and effectiveness that ultimately enhances firms' profitability, performance, and reputation (Russo 2009; King and Lenox 2001; Klassen and McLaughlin 1996).

According to the institutional theory, a corporate strategy attains a symbolic value when it spreads across the population and gains popularity in terms of providing legitimacy. Hence, firms adopt these strategies, such as the ISO 14001 standard, by realizing their positive effects and by being influenced by mimetic pressure from competitors (Christmann and Taylor 2006). Alternatively, as more and more firms around the globe start adopting a specific corporate strategy, it becomes a taken-for-granted strategy. Based on this argument, Zajac and Westphal (2004) suggest that, as usual, acceptance toward a specific corporate strategy such as ISO 14001 certification varies globally, and such corporate strategies turn out to be dominant among dominant multinational firms. Domestic firms probably adopt these strategies because of mimetic pressure from competitors. ISO 14001 certification is considered to be a strategic response to those initiative pressures that do not cover the trade-offs among the real environmental reactions and the symbolic environmental obligations between the organizations (Delmas and Burbano 2011). Stakeholders are usually unable to monitor the firms' environmental performances and underlying policies, and thus firms' environmental managing systems purposefully present firms' environmental commitments in front of stakeholders (Bowen and Aragon-Correa 2014). Delmas and Montes-Sancho (2010) state that, being influenced by competitive pressure, firms may adopt ISO 14001 symbolically. But in reality, they have poor environmental performance (Boiral 2007).

Adoption of corporate strategies mainly influences the perceptions of key stakeholders, specifically the investors, regarding the performance of the firms, and ultimately controls the corporate strategies' market values. Zajac and Westphal (2004) discuss this market learning perception and state that perceptions of the investors regarding a corporate strategy mainly depend on the historical records related to gaining the effective advantages by adopting that particular corporate strategy. Empirical evidences help market participants and key stakeholders to know about any corporate strategy and take decisions based on the empirical findings. Market learning perspective assumes that if empirical evidences indicate less favorable outcomes from a specific organizational strategy, investors consider it less fruitful and make decisions based on prior efficacy outcomes. Based on the perspectives of market learning and efficiency of corporate strategies, empirical evidences related to the use of corporate strategies and their effective outcomes keep updating over time (Zajac

and Westphal 2004). Basically, this stored, publicly available empirical information helps investors to make better decisions related to current and future investments, as investors mainly prefer efficient and effective outcomes (in some cases they also consider the prior efficient outcomes of corporate strategies). Hence, markets partners make decisions regarding the adoption by considering the market value of a specific strategy based on past experiences.

Boiral and Henri (2012) indicate that companies are gradually adopting the ISO 14001 certification without in fact executing the standards. As the environmental managing standards are not properly executed, these do not improve the efficiency related to economic and environmental outcomes (Boiral 2007). In return, as firms fail to execute these standards over time, their projected efficient advantages based on the implementation reduce, and the response of the investors consequently deteriorates. All these efficient outcomes and failed executions are available globally based on the empirical findings for the domestic firms. ISO 14001 certification offers a gateway for firms to gain legitimacy among numerous stakeholders, and provides an inside-managing tool. However, this aspect of outward appreciation is frequently considered to be the purpose of adopting the ISO 14001 standard, but it is still not inevitably linked to the aim of achieving efficacy and enhanced environmentally friendly practices, or compatible with these objectives (Heras-Saizarbitoria and Boiral 2013; Delmas and Montes-Sancho 2010). Therefore, firms dissociate their ongoing compliance practices from their former environment-related managing practices by positioning and organizing the prevailing recognized structures, while evading the incorporation of these standards into day-to-day operations of the firms.

Implementation of ISO standards by the firms to confirm the dominant institutional reasons, and then by overlooking the actual execution of the standards, makes the efforts unproductive (Boiral 2003). Existing findings on organizational dissociation reveals that these kinds of reputational managing strategies may bring a loss to the internal and external legitimacy that ultimately affects the outcomes of the firms. MacLean and Behnam (2010) claim that firms' efforts to achieve legitimacy through dissociation produces a legitimacy deception. This legitimacy deception allows non-compliance or institutional misconduct, and eventually creates a loss in terms of reductions in external legitimacy. Observing the comprehensive influence of symbolic implementation

of ISO 14001 certifications, Aravind and Christmann (2011) also explain that dissociation of execution from the certification jeopardizes the market trust, as the certification cannot exactly indicate the better environment-related performance and impress the external stakeholders such as government, investors, communities, etc. MacLean et al. (2015) state that dissociation of recognized certifications generates inauspicious impacts on perceptions of the initiatives' related to the legitimacy for numerous stakeholders and firms' results.

The empirical findings related to investigating the influence of implementation of ISO 14001 certification by the firms on their performances vary across the firms and regions, and the findings still appear to be indecisive. The advocates of adoption of ISO 14001 certifications claim that organizations adopt voluntary systems to overcome environmental issues and build their social image (Pacana and Ulewicz 2017), and adoption of ISO 14001 certification can be considered favorable among the firms in the financial market as it shows financial and environmental assurances, and enhances operational competences and helps firms to attain legitimacy (Delmas and Montiel 2007). Dowell et al. (2000) analyze the impacts of adoption of ISO 14001 on the market-based valuation of USA's transnational companies, as represented by Tobin's Q ratio, and find a substantial positive effect. Similarly, Wahba (2010) also used Tobin's Q ratio to measure the market performance, and the findings suggest that firms' performances are positively influenced by the adoption of ISO 14001 certification. Lo et al. (2012) investigate the financial impact of ISO 14001 on textile and fashion firms. They show that ISO 14001 helps firms to get short-term financial gains. They report that financial gains started in the implementation period and remained for one year after the certification. Announcement of the adoption of the ISO 14001 standards helps to gain a substantial positive effect on the stock values (Jacobs et al. 2010). Chen et al. (2018) also indicate a positive financial impact of green performances. Klassen and McLaughlin (1996) also show a positive effect of ISO 14001 certification on the valuation of the stocks. Nevertheless, the extent of its impact differs across countries. Flammer (2013) argues that investors' reactions are positive towards pro-environment corporate actions and negative towards the environmentally destructive corporate actions.

However, there exist some studies indicating no or negative effects on market performance of the adoption of ISO standards. For example, Aarts

and Vos (2001) find no significant association among firms' certification announcements and corporate performance in cases of New Zealand firms. Lee et al. (2008) investigate the behavior of Taiwanese firms and reveal that certification announcements cause a negative impact on corporate performance. Likewise, Cañón-de-Francia and Garcés-Ayerbe (2009) show that in case of Spanish firms, the adoption of ISO 14001 standards is linked with lower share prices and reduced shareholders' wealth. These varying results about the influence of adopting ISO 14001 certification on the corporate performances are mainly because of different research settings and likely endogeneity problems (King and Lenox 2001). Heras-Saizarbitoria et al.(2011) investigate selection versus treatment effects of ISO 14001, and whether better financial performance is due to ISO 14001 or ISO 14001 precedes financial performance. They find that the firms with better financial performance have a higher propensity to certify their EMSs with ISO 14001. They also find that there is no significant increase in financial performance after certification. Positive significant impacts due to pro-environmental initiatives are more likely to arise in well-developed countries, while such financial advantages might not exist in developing countries, such as India (Docking and Downen 1999).

Based on the above detailed discussion over existing studies and considering the diverse evidences, this study can argue that the association among market performance and adoption of ISO 14001 certification is indecisive, i.e., it can be positive, neutral, or negative. But importantly, it can be considered as the first step towards the more enhanced EMAS system. Yadav et al. (2016) identify the key factors, such as socio-cultural setting, regulatory framework, economic conditions, stakeholders trust, and institutional complexities, while determining the effect of environmental management systems on corporate outcomes. Along with these factors, different laws and rules related to environmental management and different economic systems of various countries create the scarcity of resources for the firms, which in return generates different effects of firms' environmental policies on their performances (MacLean et al. 2015). These factors can vary, specifically due to the inefficient institutional settings of emerging countries in terms of business ambiguity and risk evasion, political instability, poor implementation of standards, and inefficient markets as compared to developed countries (Dixon-Fowler et al. 2013). According to the perspective of corporate finance, financial

responses (in terms of investors and stock market) to the implementation of corporate strategies indicate the evaluation of the market to assess the efficiency gains achieved through adopting the environment-managing tools by the firms. That evaluation is mainly affected by the existing empirical evidences. These efficiency advantages are strictly related to the successful implementation of corporate strategies.

So, to bridge the literature gap and address the empirical limitations, employing event study methodology by Barber and Lyon (1996) this study aims to determine whether investors in India appreciate the adoption of ISO 14001 by domestic firms, in terms of their market performance.

DATA SOURCES AND METHODOLOGY

Sources of Data

The focus of this study is on listed domestic firms of India. There is no database in India containing the ISO 14001 statuses of the firms, so we manually collected the ISO 14001 information of the firms from their websites, and quarterly and CSR reports. As there are thousands of firms listed on Mumbai Stock Exchange, it was difficult to manually search all the firms, and so we randomly selected 1000 listed Indian domestic firms. This study defines 2012 as its event year in order to capture the long-term effects of ISO 14001 adoption. In the initial search, we found 749 ISO 14001-certified firms from India. We selected only domestic firms, and this filter drastically decreased our sample to 196 firms. We only included firms that were certified in the year 2012. After removing the firms with missing ISO 14001 certification year and those which were certified in years other than 2012, our number of firms reduced to 69. Next, we removed financial firms from our sample, leaving the sample with 64 firms. Finally, we searched the financial information of the remaining firms from the OSIRIS database. After removing the financial firms and the firms with missing or incomplete financial information, we were left with 62 ISO 14001-certified firms.

Methodology

This study employs the event study and control methodology to examine the impact of ISO 14001 on market performances of the certified firms, as proposed in a seminal work of Barber and Lyon (1996). This methodology has been extensively used by prior studies to investigate the financial performances of ISO standards (Corbett et al. 2005; De Jong et al. 2014; Candido et al. 2016). This methodology can be used to compare the performances of the firms certified with the ISO 14001 standard with the firms without certification. There are three critical choices while employing an event study and control methodology (Barber and Lyon 1997), which are discussed below:

- **Well-Defined Event:** On the top, the initial task of employing event methodology is to define the well-defined specific event of interest and to isolate the time period for which the financial outcome proxies (Retrun on sales, Return on assets, Tobin's Q, etc.) in the particular well-defined event will be investigated, known as the "event window". This study defined ISO 14001 certification as the event of interest and defined the event period as the year in which firms got certified with ISO 14001. The abnormal performance in the Tobin's Q is investigated over a long post-event window of four years.
- **Selection of Control Firms:** The primary objective of the event study is to isolate the short-term impact of a specified event as the underpinning theory, efficient market hypothesis theory (Fama 1991), emphasizes on short-term performance. Therefore, the use of event study to measure long-term performances might be biased. Particularly, there are two issues associated with event study methodology while evaluating long-term performance (Hendricks and Singhal 2005). The first problem is to find the factors that are required to be controlled while evaluating the long-term analysis. Prior researches identified previous performance and size of the firm as important factors that affect a company's performance (Carhart 1997; Fama and French 1996). Following prior literature (De Jong et al. 2014; Candido et al. 2016; Corbett et al. 2005), we used ROA and total assets as control variables. The second problem associated with event study methodology

is the cross-sectional dependency caused by overlapping time periods among the sample firms while evaluating long-term performance variables. Prior studies suggested one-to-one matching to overcome this issue (Lyon et al. 1999; Barber and Lyon 1997; De Jong et al. 2014). Therefore, this study also used one-to-one matching criteria, where each certified firm is matched with a non-certified one that has a close pre-event ROA, size, and industry (using two-digit SIC codes).

For each certified (sample) firm, this study selected three types of non-certified (control) firms on the basis of three different matching criteria: ROA and size, ROA and industry, and size and industry. In the first matching criteria, we selected the control firm that had a pre-event ROA between 90% and 110% of the sample firm's ROA, and the total assets of the control firm had pre-event total assets of between 50% and 200% of the sample firms' total assets. We restricted the control firms' pre-event ROA to be between 90% and 110% of sample firm's ROA, because the results would be more meaningful when the control firm's ROA was closest to sample firm's ROA before the event. In the second matching criteria, we selected control firms using one-to-one matching criteria. Those firms which had a pre-event ROA between 90% and 110% of the sample firm's ROA were selected as control firms, and the control firm must belong to same industry. Lastly, in the third matching criteria, we selected control firms again using one-to-one matching criteria. Those firms which had pre-event total assets between 70% to 130% of the sample firms were selected as control firms. Here, we used much stricter criteria for total assets to ensure reliability of our results. Our ambition was to select the ISO 14001 non-certified firms that were closest to the ISO 14001-certified firms in term of assets. In doing so, we further restricted the non-certified firms' assets to lie between 70% to 130% of the certified firms.

Expected and abnormal performance: The expected performance is defined as the performance that would be expected if no specific event were to take place, and the abnormal performance is the difference between expected and actual performances of the sample firms. The

$$AP_{i,t-1,d} = P_{i,t-1+d} - [P_{i,t-1} + (PI_{i,t-1+d} - PI_{i,t-1})] \quad (1)$$

where $AP_{i,t-1,d}$ is the abnormal performance of firm i from year $t-1$ to $t-1+d$,

using $t-1$ as the base year; $P_{i,t-1+d}$ is the actual post-event performance of firm i (sample firm) during the period $i,t-1+d$; $P_{i,t-1}$ is the actual performance of firm i (sample firm) during the base year $t-1$; $PI_{i,t-1+d}$ is the actual post-event performance of firm i (control firm) during the period $i,t-1+d$; $PI_{i,t-1}$ is the actual performance of firm i (control firm) during the base year $t-1$; $[P_{i,t-1} + (PI_{i,t-1+d} - PI_{i,t-1})]$ is the expected performance of firm i without the event in the period $i,t-1+d$, and it is the summation of the sample firm's performance before the event during the period $t-1$.

This study used paired sample t -tests (parametric), Wilcoxon signed-rank (WSR) tests (parametric), and Binomial sign tests (non-parametric). The WSR test is more powerful and appropriate than its counterparts (Barber and Lyon 1996). Therefore, we interpreted the significance of our results with the WSR test. Additionally, findings employing the t -test and Binomial sign test are also reported.

ANALYSIS AND RESULTS

Table 1 shows descriptive statistics for the sample and control firms matching for ROA and size in the year 2011 (one year before the event). The mean values of the sample firms reported total assets of \$6637.753 millions of dollars, sales of \$6845.763 millions of dollars, return on assets of 9.425%, return on sales of 12.528%, and a Tobin's Q ratio of 1.578.

Table 1. Descriptive statistics for sample and control firms matched by ROA and size (year 2011).

	Mean	Median	Standard Deviation	Maximum	Minimum
Sample firms					
Total Assets	6637.753	4012.324	7684.287	31,452.125	637.427
Sales	6845.763	3995.985	7985.958	44,348.223	898.64
Return on Assets	9.428	7.24	9.421	30.19	-7.3
Return on Sales	12.528	9.989	14.62	62.78	-9.217
Tobin's Q	1.578	1.352	1.304	5.317	0.041
Sales	1792.634	1385.156	18,925.846	12,856.245	387.519
Control firms					
Total Assets	2784.646	1372.073	4394.864	29,876.567	359.526
Return on Assets	8.412	8.135	10.254	34.39	-16.87
Return on Sales	8.658	7.556086	10.745	44.251	-22.0945
Tobin's Q	1.552	1.352	1.474	5.985	0.03

Meanwhile, the mean values of the control firms reported total assets of \$2784.646 millions of dollars, sales of \$1792.634 millions of dollars, return on assets of 8.412%, return on sales of 8.658%, and a Tobin's Q ratio of 1.552. For the purpose of comparing the sample firms with the control firms, we mainly focused on return on assets and size of the firms, and it can be seen from the descriptive statistics that the ISO 14001-certified firms were close to non-certified firm in the pre-event year (2011).

Main Results

The abnormal performances in the market performance of the firms, which we measured through Tobin's Q, are reported in Table 2. The mean and median columns show the abnormal performances in the Tobin's Q of the sample firms along with Wilcoxon Signed rank test (WSR), *t*-test, and sign test. We can see from the table that there were no significant differences between ISO 14001-certified and non-certified firms before the event, which prove that we best selected the control firms with sample ones. Table 2 shows the short-term and long-term abnormal performances in market performance over the four-year time period (from 2013 to 2016).

Table 2. Abnormal performance in market valuation, matched by ROA and size.

Base Year	Final Year	Abnormal Performance (Mean)	Abnormal Performance (Median)	<i>p</i> -Value (WSR Test)	<i>p</i> -Value (<i>t</i> -Test)	<i>p</i> -Value (Sign Test)
2010	2011	0.147	0.082	0.171	0.534	0.164
2011	2012	0.313	0.204	0.115	0.399	0.164
2012	2013	-0.366	-0.189	0.002 ***	0.004 ***	0.000 ***
2013	2014	-0.355	-0.073	0.000 ***	0.000 ***	0.000 ***
2014	2015	-0.619	-0.635	0.000 ***	0.000 ***	0.000 ***
2015	2016	-0.628	-0.524	0.000 ***	0.000 ***	0.000 ***
2011	2013	-0.048	-0.044	0.021 ***	0.000 ***	0.000 ***
2011	2014	-0.203	-0.067	0.000 ***	0.000 ***	0.000 ***
2011	2015	-0.305	-0.228	0.000 ***	0.000 ***	0.000 ***
2011	2016	-0.377	-0.313	0.000 ***	0.000 ***	0.000 ***

*** denotes $p < 0.01$.

The first row (2010–2011) shows the abnormal performances for the year before the year of certification, i.e., when firms decided to take ISO 14001 and start working on it. The second row (2011–2012) reports the abnormal performances (in Tobin's Q) in the event year. The third row

(2012–2013) shows the abnormal performances after the event year, and so on. The rows 2011–2013, 2011–2014, 2011–2015, and 2011–2016 show the accumulated or long-term abnormal performances of certified firms for four years.

It can be noted from the results that abnormal performances in market performance, proxied by Tobin's Q, were negatively significant in both the short and long run. The investors negatively valued ISO 14001 certification following the certification year. However, it can be seen from the results that the magnitude of abnormal performances in Tobin's Q was less in the long term as compared to the short term. The mean abnormal performance in Tobin's Q in the period 2013–2014 was -0.073 . In 2014–2015, it was -0.635 and for 2015–2016 it was -0.524 . One notable difference in the abnormal performances in the long run is that the negative outcomes were gradually increasing, from -0.044 to -0.313 , though the magnitude was less than that of short term. Keeping in view the findings of our analysis, we state that the market negatively valued the ISO 14001 certifications in the short term, as well as in the long run.

Alternative Tests

With the purpose of ensuring the reliability and robustness of our findings, and to ensure that our findings were not specific to the selection criteria of control firms, we re-estimated our results with two more different one-to-one matching criteria of selecting control firms. In the first robustness test, we selected control firms on the bases of pre-event returns on assets and industry, and we selected those firms which must have had ROA that lie between 90% and 110% of sample firms' ROA and also belonged to same industry as the sample firms, identified by two-digit SIC codes. In the second robustness test, we selected control firms on the bases of pre-event total assets and industry. We selected those firms which had total assets that lie between 70% and 130% of the sample firms' total assets and belonged to same industry as the sample firms, identified by two-digit SIC codes. In the second robustness test, we employed much stricter criteria for the total assets, to ensure the robustness of our findings. The abnormal performances in the Tobin's Q with these two matching criteria are reported in Table 3 and Table 4. It can be observed

from the results of the alternative tests that our findings here are similar to the main findings reported above. Specifically, after the event period, there were clear statistically significant negative abnormal performances observed in the Tobin’s Q values. Like the main results, the magnitude of the abnormal performances in Tobin’s Q were more in the short run than in the long run. The patterns of abnormal performance in Tobin’s Q were very similar to the main results. So, we conclude that using a different matching criterion for control firms does not change the nature of the main findings.

Table 3. Alternative test: Abnormal performance in market valuation, one-to-one matched by ROA and industry.

Base Year	Final Year	Abnormal Performance (Mean)	Abnormal Performance (Median)	p-Value (WSR Test)	p-Value (t-Test)	p-Value (Sign Test)
2010	2011	0.035	-0.102	0.002 ***	0.001 ***	0.001 ***
2011	2012	0.431	0.084	0.488	0.571	0.771
2012	2013	-1.113	-0.89	0.00 **	0.024 ***	0.02 ***
2013	2014	-0.533	-0.817	0.5006	0.6767	0.3621
2014	2015	-0.521	-0.558	0.08 **	0.192	0.301
2015	2016	-0.464	-0.39	0.07 **	0.312	0.01 ***
2011	2013	-0.448	-0.423	0.02 ***	0.04 ***	0.02 ***
2011	2014	-0.478	-0.536	0.00 ***	0.00 ***	0.00 ***
2011	2015	-0.489	-0.574	0.00 ***	0.00 ***	0.00 ***
2011	2016	-0.484	-0.542	0.00 ***	0.00 ***	0.00 ***

** denotes $p < 0.05$ and *** denotes $p < 0.01$.

Table 4. Alternative test: Abnormal performance in market valuation, one-to-one matched by size and industry.

Base Year	Final Year	Abnormal Performance (Mean)	Abnormal Performance (Median)	p-Value (WSR Test)	p-Value (t-Test)	p-Value (Sign Test)
2010	2011	0.03	0.02	0.807	0.728	0.754
2011	2012	1.64	1.01	0.1587	0.112	0.2145
2012	2013	-2.59	-2.56	0.076 **	0.042 ***	0.435
2013	2014	-2.34	-2.24	0.00 ***	0.00 ***	0.00 ***
2014	2015	-2.24	-2.16	0.00 ***	0.00 ***	0.00 ***
2015	2016	-2.33	-2.35	0.00 ***	0.00 ***	0.00 ***
2011	2013	-0.035	0.04	0.712	0.812	0.952
2011	2014	-0.501	-0.646	0.004 ***	0.002 ***	0.000 ***
2011	2015	-0.667	-0.852	0.000 ***	0.000 ***	0.000 ***
2011	2016	-0.714	-0.104	0.000 ***	0.000 ***	0.000 ***

** denotes $p < 0.05$ and *** denotes $p < 0.01$.

CONCLUSIONS AND DISCUSSION

This study analyzed the empirical effects of ISO 14001 on stock market performance in cases from India. Prior studies on ISO 14001 revealed

that, commonly, ISO 14001 and market equity relate positively, with a consistent performance in the long run. These privileges are backed by the conception that image building and organizational legitimacy can be achieved through environmental management systems (EMS) (Zajac and Westphal 2004; Castka and Prajogo 2013). In contrast, the current study does not support the positive relationship between ISO 14001 and stock market performance in the case of emerging economies, i.e., India. Our results are consistent with the studies which find that ISO 14001 negatively related with market performance (Fisher-Vanden and Thorburn 2011; Aarts and Vos 2001; Cañón-de-Francia and Garcés-Ayerbe 2009). This conflicting result is because of the different cultural contexts of emerging countries, consisting of different norms, culture, economic conditions, beliefs, and institutional environment (Zhong 2015). The current study contributes to the existing literature by providing a relationship between environmental and financial performances in the following manners.

Firstly, there is sufficient discussion about ISO 14001 and firms' performances, but most of the studies are focused on developed countries (Aarts and Vos 2001; Cañón-de-Francia and Garcés-Ayerbe 2009; Wahba 2010; Dowell et al. 2000; Paulraj and De Jong 2011) with very little focus on emerging countries. Social, regulatory, and market forces are different between emerging and developed countries, and these forces are the key determinants of the organizational environmental tactics, which would result in adverse effects on financial outcomes in developing economies. By considering India, the current study contributes to the existing body of literature by empirical validation of the relationship between financial outcomes and ISO 14001 in an emerging economy.

Secondly, the prior studies focused on international/multinational firms and neglected domestic firms. The current study is a first study of its kind to examine the relationship among ISO 14001 and market performance in cases of domestic firms. Derivative and isomorphic forces are the key forces from multinational firms to domestic firms regarding environmental policy implementation to be sustained in the marketplace. Thirdly, the current study additionally explores the probable justification regarding the revealed negative relationship between market performance and ISO 14001 in cases of emerging countries.

In an emerging economy like India, customer priorities and environmental guidelines are different from those of developed economies (Marquis et al. 2011). The results of the current study are consistent with the prior studies' results which quoted a negative relationship between market performance and ISO 14001 (Aarts and Vos 2001; Zhao 2008; Cañón-de-Francia and Garcés-Ayerbe 2009). In emerging economies, the greatest investor concern is material security, and they considered ISO 14001 to be an additional cost on the firm (Globerman and Shapiro 2009). The investors' decision behaviors can be described by investor-specific norms and customs (Hong and Kacperczyk 2009). In the same vein, investors act according to their mental biases, based on their norms and customs, instead of acting rationally. Thus, specified norms and socio-ethnic factors may affect investors' perceptions and actions regarding corporate environmental creativity. Environmental consideration is the manifestation of good-life afar the money-oriented concerns, which results in increasing security and prosperity under the developed world. In cases of emerging economies, i.e., India, the situation is quite the opposite. The organizational concern regarding environmental protection is not significantly important to investors in India, as they are more concerned about monetary profits. Furthermore, investors are important players of the society, where societal customs and norms have significant implications on their decision-making processes. They assess adoption of environmental strategies like ISO 14001 negatively.

In light of this perception, environmental management systems are supposed to be a responsive initiative to the mimetic pressure from international firms towards domestic firms, rather than true implementations of ISO 14001. Similarly, trust in investors' decisions also supports the negative relationship among environmental management and stock market performance in developing markets. A wide range of prior literature quoted that where organizations enjoy investors' loyalty, confidence, and trust, investors do not vacillate while paying high premiums (Yee et al. 2010; Hammond and Slocum 1996). On the other side, this positive image of the firm, in the lenses of investors, positively affects organizational performance. Furthermore, the scenario may be quite different in cases of developing countries where weak regulatory bodies, ambiguous public policies, and poor judicial systems exist (Montiel et al. 2012). In light of the above discussion, finally, the current study argues that mental approaches of investors and ISO 14001 are

negatively associated in cases of emerging countries of the region which, in response, affects the firms' performances negatively.

This research has important policy implications for managers and policy makers. The negative association between market performance and ISO 14001 in the case of emerging markets has significant interference for the enhancement of environmental management systems. It is necessary for managers and policy makers to dig out the main invisible causes of this negative association. To cope with the issue, changing the awareness of investors' is very important regarding the welfares of environmental management schemes (Jacobs et al. 2010), for example with mind-changing initiatives of the investors regarding environment management schemes by the management of firm aiming to certify with ISO 14001. Furthermore, the efforts of government offices and NGOs should be directed towards investors' awareness regarding environment management. Similarly, firms having ISO 14001 certifications should also address their investors and all the stakeholders regarding the benefits of voluntary ISO 14001 adoption.

The study points out its limitations to provide venues for future research. This study does not study the interaction between EMAS and ISO 14001. Firms already having EMAS are left with less space to get benefits from ISO 14001. Furthermore, the current study is only focused on India and domestic firms. Further studies should be conducted on other emerging countries and multinational firms for more suitable inferences. Further survey-based studies should also be conducted to identify the factors responsible for the negative positioning of environmental strategies in the lenses of investors in emerging countries. The current study revealed that environmental management schemes do not help in achieving legitimacy and, as a result, harm market performance. Further studies can be conducted to determine the forces that can help ISO 14001 to get legitimacy among stakeholders. Further researches can also be conducted to analyze selection effects versus treatment effects, in order to get a clearer picture of whether ISO 14001 leads to better financial performance or firms with better financial performance have improved performance preceding ISO 14001 adoption. Lastly, other methodological approaches, i.e., using Panel or Difference and Difference methodologies, may advance the current aspects of the study, as the event study cannot clarify all the dimensional explanations and was also unable to investigate the

possible interference of other macro- and micro-level control variables (like environmental regulations in the country, growth opportunities, size, and industry) on the relationship between ISO 14001 and market performance.

Author Contributions

H.R. reviewed the relevant literature and wrote the first draft of the article; A.S. contributed to research positioning and manuscript development; M.S.B and N. conceived, designed, and performed the experiments; and Z.A.K analyzed the data and proofread the paper.

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CHAPTER 6

FACTORS, OUTCOME, AND THE SOLUTIONS OF SUPPLY CHAIN FINANCE: REVIEW AND THE FUTURE DIRECTIONS

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ABSTRACT

In the current highly competitive and fast-changing business environment, in which the optimisation of all resources matters, creating an efficient supply chain is crucial. Earlier studies on supply chains have focussed on aligning product/services and information flows while neglecting the financial aspects. Due to this, in recent times, importance has been given to align financial flows with the other components of the supply chain. The interest in supply chain finance rose after the financial crisis when the bank loans declined considerably, as the need for better management and the optimisation of working capital became obvious. This paper reviews the articles on supply chain finance based on three themes—factors, outcomes, and solutions—while at the same time providing directions for future research on supply chain finance. This article is unique, as it investigates the factors affecting supply chains according to the existing literature. It also sheds light on the outcome of the supply chain without

limiting the discussion only to the benefits. Further, it addresses the question: what are the solutions constituting supply chain finance?

Keywords: Supply chain management; supply chain finance; working capital; factors; outcomes; solutions; optimisation

INTRODUCTION

In the modern fast-changing business environment, competitive pressures have become more acute. To maintain a competitive advantage and be on top of the game, focus and attention have been given to make supply chains more effective and efficient, in contrast to competing as a single company. A lot of academic research studies have been devoted to improving the physical flow of goods or services and the informational flow of the supply chain. However, the financial aspect of the supply chain has been heretofore neglected (Lamoureux and Evans 2011; Bailey and Francis 2008; Pfohl and Gomm 2009; Caniato et al. 2016). If the supply chain is to be more efficient and the companies are expected to maintain a competitive advantage or even to compete, all the components of the supply chain need to be given proper attention.

Supply chain finance (SCF) became more critical after the financial crisis of September 2008, when the loans from banks and financial institutions receded very drastically. Considerably, other alternative forms of financing, especially trade credit from suppliers, became more demanding. However, an extension of trade credit is subjected to the bargaining power whereby weaker suppliers will be forced to increase the payment period or forcibly delay the repayment (Fabbri and Klapper 2016). This can create risk or disruption in the supply chain (Boissay and Gropp 2007; Coricelli and Masten 2004; Raddatz 2010; Caniato et al. 2016). Therefore, there is a need for the better management and optimisation of working capital in the supply chain which SCF endeavours. SCF has also been touted to improve the accessibility of funds to small and medium enterprises (SMEs). Besides, it also assists with viewing working capital management from the supply chain perspective, rather than a single entity perspective. However, although most of the works on SCF deal with working capital, it is important to note that it is not limited to optimising short-term financial flow; it may also cover long-

term financing. SCF can create win–win situations for the supply chain (SC) partners. A lot of academic research works have come up in the last few years that address this area of supply chain.

According to Xu et al. (2018), the research on supply chain finance (SCF) can be traced back to the 1970s; for example, Budin and Eapen (1970) worked on the net cash flow that is generated in business operations during a cash-planning period, and the effect of such changes on the policies relating to trade credit and inventories. Haley and Higgins (1973) studied the relationship between trade credit policy and inventory policy. However, the formalisation of the definition of SCF occurred only during the 21st century. According to Pfohl and Gomm (2009), Stemmler and Seuring (2003) were amongst the first ones to use the term SCF where they spoke of the control and optimisation of financial flows induced by logistics. Hofmann (2005) defined SCF as “located at the intersection of logistics, supply chain management, and finance” and as “an approach for two or more organisations in a supply chain, including external service providers, to jointly create value by planning, steering, and controlling the flow of financial resources on an inter-organisational level”.

Pfohl and Gomm (2009) defined SCF as the inter-company optimisation of financing and the integration of financing processes with customers, suppliers, and service providers to increase the value of all of the participating companies. Gomm (2010) defined it as “optimising the financial structure and cash flow within the supply chain”. The researcher also stated that the objective of SCF is to optimise financing across borders to decrease the cost of capital and increase the speed of cash flows. Further, SCF is defined as “the use of financing and risk mitigation practices and techniques to optimise the management of the working capital and liquidity invested in supply chain processes and transactions” (Global Supply Chain Finance Forum n.d.; Babich and Kouvelis 2018). Thus, this definition added a dimension of risk mitigation to supply chain finance.

It can be seen that the main aim of supply chain finance is to optimise the inter-organisational flow of funds (Hofmann 2005) preferably through the solutions implemented by financial institutions (Camerinelli 2009) or technology service providers (Lamoureux and Evans 2011). The ultimate aim is to align financial flows with other components of the supply chain, i.e., physical and information flow, within the supply chain, improving

cash flow from a supply chain perspective (Wuttke et al. 2013b).

As the interest on the SCF grew in the 21st century both in academics and practice, research and contributions to SCF increased. However, there have been differences in the approach to SCF, and thus there emerged different perspectives to the definition of SCF. Gelsomino et al. (2016b) showed that the SCF literature lacked a single definition, and there are two main perspectives to a SCF: financial-oriented perspective, and supply chain-oriented perspective. There is another perspective to SCF, which is called the ‘buyer driven-oriented perspective’, which mainly focusses on ‘reverse factoring’, and can be considered as a subset of the ‘finance-oriented perspective’. The finance-oriented perspective considers SCF to be a set of (innovative) financial solutions and concentrates on short-term financing and particularly on the financing solutions relating to receivables and payables. The role of financial institutions or banks concerning SCF solutions is mandatory in this perspective. The ‘supply chain-oriented perspective’ of SCF includes, within the SCF framework, the optimisation of the inventories along the chain (or at least between the customer and the supplier) to reduce the working capital. Therefore, the need for financing or working capital shifts to the player with a better availability of cash and/or a lower financing cost. Further, it does not limit SCF to only short-term financing, and there is no mandatory role of financial institutions and banks in SCF solutions. Thus, it can be said that the ‘supply chain perspective’ of SCF has a broader view of SCF than the ‘finance-oriented perspective’.

There have been literature review articles relating to supply chain finance, e.g., Gelsomino et al. (2016b) and Xu et al. (2018). Gelsomino et al. (2016b) did a review of the existing literature based on three themes, i.e., concept and definitions, expected benefits, and SCF initiatives in place. Although the expected benefits have been touched on by Gelsomino et al. (2016b), the outcome or consequences of SCF do not just pertain to benefits as evident from the literature; as such, the current researchers felt the need to explore the outcome. Xu et al. (2018) performed a bibliometric analysis of the SCF literature. They provided bibliometric information on the published articles relating to SCF, including the identification of four research clusters of SCF. However, they did not touch upon the main focus of this current article, i.e., the factors, outcomes, and solutions of SCF. By focusing on three themes—the factors, outcomes, and solutions of SCF—this paper will contribute to the existing literature.

METHODOLOGY

This paper is more oriented towards a structured literature review, as it focusses on the systematic method, meaning a detailed plan of the path and steps undertaken to select, scan, and analyse the literature to reduce biases and improve transparency (Tranfield et al. 2003; Hofmann and Bosshard 2017). A structured literature review is generally applied to close the research–practice gap (Touboulic and Walker 2015; Hofmann and Bosshard 2017) and for developing the propositions and future research directions. This article adapts the procedures used by Denyer and Tranfield (2009) and Hofmann and Bosshard (2017), as shown in Figure 1.

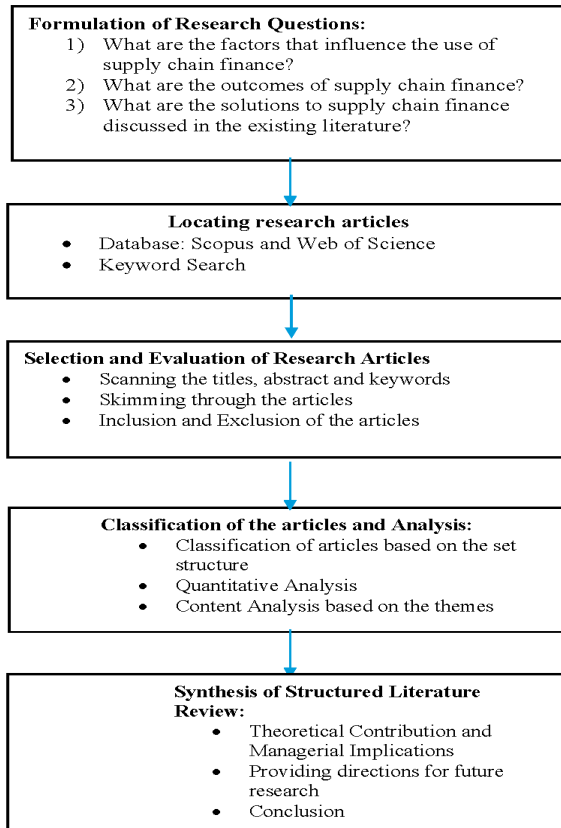


Figure 1. Literature review procedure (adapted with permission from Hofmann and Bosshard 2017).

FORMULATION OF RESEARCH QUESTIONS

This literature review is motivated by the following three research questions:

RQ1: What are the factors that influence the use of supply chain finance?

RQ2: What are the outcomes of supply chain finance?

RQ3: What are the solutions to supply chain finance that have been discussed in the existing literature?

The article aims to answer these three research questions, and the researchers believe that answering these questions will lead to the contribution of this article to the supply chain finance literature. Therefore, the paper focuses on the three themes, i.e., the factors, outcomes, and solutions of supply chain finance.

LOCATING THE RESEARCH ARTICLES

Articles were searched from the scientific research databases of Scopus and Web of Science using a string of keywords, i.e., “Supply Chain Finance” OR “Supply Chain Financing” OR “Financial Supply Chain” OR “Financial Value Chain”. From the search results, conference proceedings were removed. Scopus produced a result of 182 articles and Web of Science produced a result of 45 search results. This review article concentrated specifically on three themes:

- Factors influencing supply chain finance
- The outcome of supply chain finance
- Solutions of supply chain

First of all, the abstract of the articles was read; then, the body of the articles was also carefully read, and only those articles fitting to the themes were selected for final review. The majority of the articles in the Web of Science were overlapping with that of Scopus. It is understandable that the Web of Science indexed a lesser number of journals, and most of them are listed in Scopus as well. Finally, 70 articles were considered for the review. The process of the identification, screening, derivation of eligibility documents, and final inclusion of the documents for review is given in Figure 2.

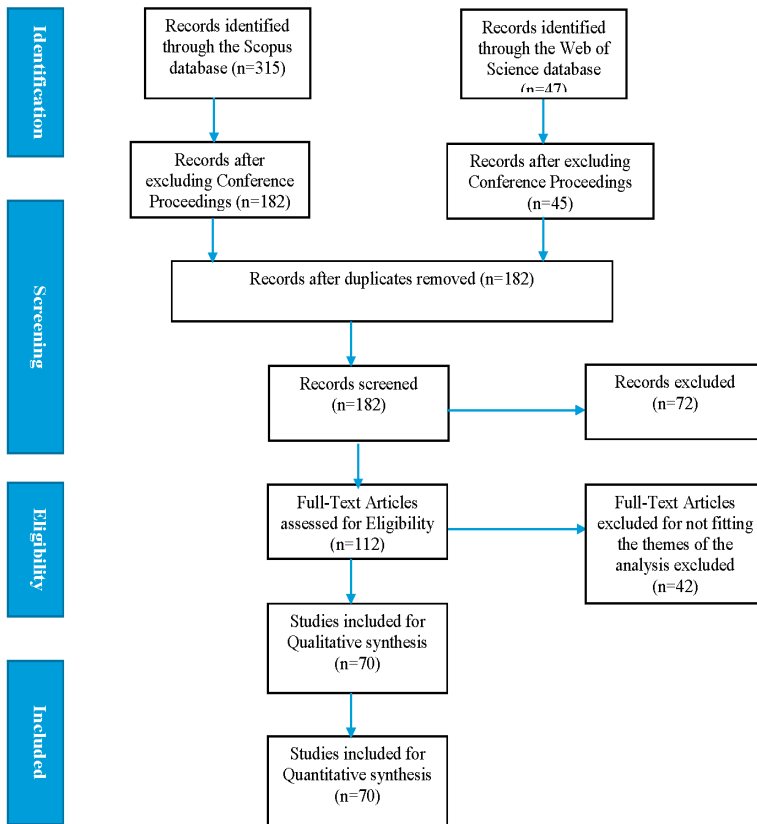


Figure 2. Procedure for locating, screening, and selecting documents.

CLASSIFICATION OF THE ARTICLES

The classification of selected and collected literature is done as per the format shown in Table 1. Initially, the findings of the articles reviewed were grouped in the head ‘findings’. However, whether the findings were related to ‘factors’ or/and ‘outcomes’ was further analysed. Thus, separate heads for ‘factors’ and ‘outcomes’ were created. The rest of the heads under which categorisation was done are shown in Table 1, which was completed using Microsoft Excel.

Table 1. Categorisation of the articles.

Category	Information
Author(s)	Contributor(s) to the article
Source	Journal or book in which the considered article was published
Year	Year in which the article was published
Volume and issue	Volume and issue of the articles reviewed
Country	Country of the corresponding author's affiliation
Keywords	Keywords stated by the articles to help with visibility
Objectives of the paper	Aims/objectives/research questions of the paper
Methodologies	Methodologies used in the study. If multiple methodologies were used, then all of the methodologies were recorded in the first round. Then, for the final categorisation, only the main methodology was considered.
Findings	Findings/results/outcomes of the paper
Factors	Forces or factors that are discussed explicitly or implicitly to influence supply chain finance
Outcome	The consequences or outcome of supply chain finance, whether positive or negative and discussed explicitly or implicitly in the literature
Solutions	Various instruments or initiatives or modes that help facilitate supply chain finance
Limitations and gaps	Limitations/gaps/future directions mentioned in the paper or that can be observed in the paper

SYNTHESIS OF STRUCTURE LITERATURE REVIEW

This article does not claim to cover the entire literature on the supply chain finance exhaustively; instead, based on the articles reviewed, it provides a snapshot of the supply chain finance regarding three themes: factors, outcomes, and solutions. Also based on the analysis and review, it provides a path for future research work.

RESULTS AND FINDINGS

Methodologies

Figure 3 shows most of the published articles have followed an analytical modelling methodology (37 articles), followed by case studies (15 articles). These two methodologies make up 74% of the total articles reviewed.

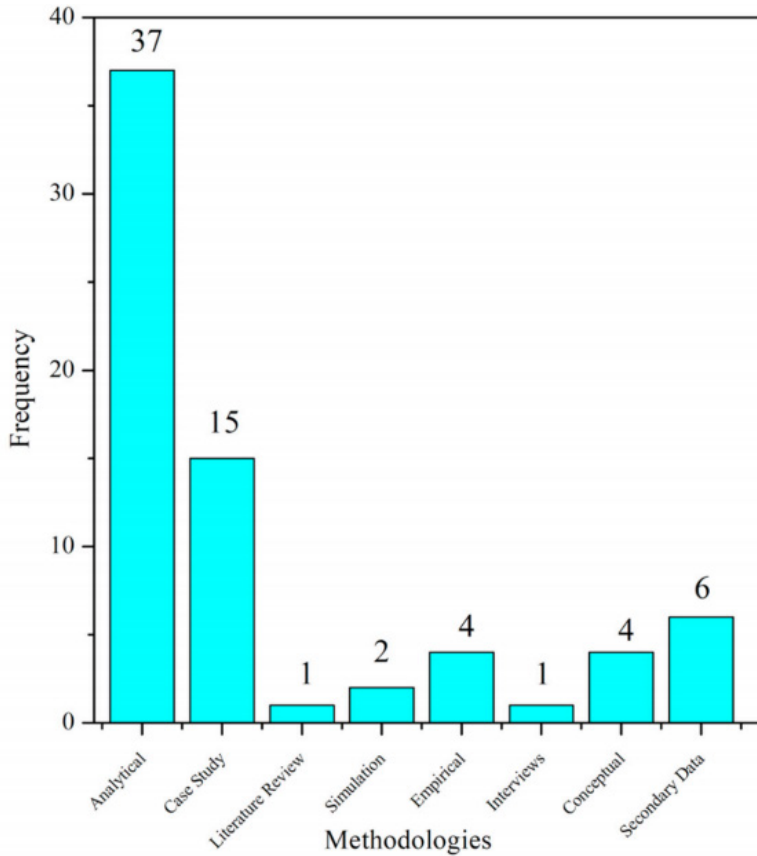


Figure 3. Methodologies of the reviewed articles.

Year of Publication

Figure 4 shows that the years with the highest numbers of published articles were in 2018 (13 articles), 2017 (13 papers), and 2016 (12 papers). It is expected that by the end of 2018, the number of publications in 2018 will exceed that of the previous year. The number of publications has increased considerably in the last four years, showing that supply chain finance has been of high academic interest.

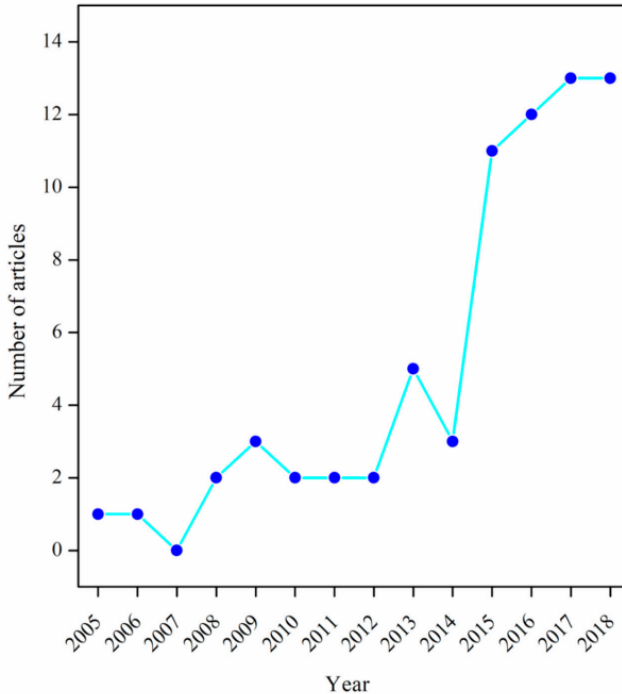


Figure 4. Number of articles per year.

Source of Publication and Top Cited Papers

The highest number of reviewed articles is found in International Journal of Physical Distribution and Logistics Management (six papers), followed by International Journal of Production Economics (three papers), Revista de la Facultad de Ingeniería U.C.V (three papers), Supply Chain Forum (three papers), Sustainability (three papers), Applied Stochastic Models in Business and Entity (two papers), The European Journal of Operations Research (two papers), The International Journal of Applied Business and Economic Research (two papers), The International Journal of Logistics Research and Applications (two papers), The International Journal of Production Research (two papers), The International Journal of Simulation: Systems, Science, and Technology (two papers), Manufacturing and Service Operations Management (two papers), and Supply Chain Management (two papers). These articles cover 50% of the total articles reviewed, showing how diverse the sources of the

publications have been. Table 2 shows the distribution of the sources of articles in terms of the 'Name of the Journal' and the number of articles reviewed.

Table 2. Distribution of reviewed articles by sources of publication.

Name of the Journal	No. of Articles
International Journal of Physical Distribution and Logistics Management	6
International Journal of Production Economics	4
Revista de la Facultad de Ingeniería	3
Supply Chain Forum	3
Sustainability	3
Applied Stochastic Models in Business and Industry	2
European Journal of Operational Research	2
International Journal of Applied Business and Economic Research	2
International Journal of Logistics Research and Applications	2
International Journal of Production Research	2
International Journal of Simulation: Systems, Science, and Technology	2
Manufacturing and Service Operations Management	2
Supply Chain Management	2
Advances in Transportation Studies	1
Agro Food Industry Hi-Tech	1
Amfiteatru Economic	1
Asian Journal of Law and Society	1
Asia-Pacific Journal of Operational Research	1
Boletín Técnico/Technical Bulletin	1
Business Process Management Journal	1
International Federation for Information Processing (IFIP)	1
International Journal of Integrated Supply Management	1
International Journal of Islamic and Middle Eastern Finance and Management	1
International Journal of Logistics Systems and Management	1
International Journal of Operations and Production Management	1
International Journal of Revenue Management	1
International Journal of Services, Technology, and Management	1
Journal of Applied Accounting Research	1
Journal of Business Logistics	1
Journal of Corporate Finance	1
Journal of Cases on Information Technology	1
Journal of Industrial and Management Optimization	1
Journal of Management Information Systems	1
Journal of Purchasing and Supply Management	1
Journal of Modelling in Management	1
Journal of Supply Chain Management	1
Journal of the Operational Research Society	1
Journal of Shanghai Jiaotong University (Science)	1
Logistics and Supply Chain Innovation: Bridging the Gap between Theory and Practice	1
Logistics Research	1
Management Science	1
Omega	1
Metallurgical and Mining Industry	1
OR Spectrum	1
Research Journal of Applied Sciences, Engineering, and Technology	1
Research Journal of Applied Sciences, Engineering, and Technology	1
Shenzhen Daxue Xuebao (Ligong Ban)/Journal of Shenzhen University Science and Engineering	1
Xitong Gongcheng Lilun yu Shijian/System Engineering Theory and Practice	1

Table 3 also provides the top 10 cited papers from both Scopus and Web of Science.

Table 3. Top 10 cited papers from Scopus and Web of Science.

Scopus		Web of Science	
Author(s)	Times Cited	Author(s)	Times Cited
Pfohl and Gomm (2009)	63	Raghavan and Mishra (2011)	37
Randall and Farris (2009)	63	Wuttke et al. (2013a)	35
Raghavan and Mishra (2011)	58	Shang et al. (2009)	20
Wuttke et al. (2013a)	43	Johnson (2008)	20
Wuttke et al. (2013b)	34	Yan and Sun (2013)	17
Gomm (2010)	31	Wuttke et al. (2016)	8
Johnson (2008)	30	Van der Vliet et al. (2015)	7
More and Basu (2013)	29	Yan et al. (2014)	7
Fairchild (2005)	26	Yan and Sun (2015)	6
Shang et al. (2009)	25	Chen et al. (2017)	5

Country

Figure 5 depicts the contributing countries to the supply chain finance literature. The highest contribution has come from China (29 articles), followed by Germany (eight articles), the United States of America (USA) (eight articles), and Switzerland (five articles). China alone has contributed about 40% of the total reviewed papers. In comparison, all of the above-mentioned countries—i.e., China, Germany, the USA, and Switzerland—contributed 77% of the total articles reviewed. Among these countries, there are similarities and differences in the patterns of contribution to the field, e.g., China and Germany's main contributions have come in the form of analytical articles, followed by case studies and conceptual articles. However, in the case of China, around 86% (25 out of 29) of the articles have been analytical, whereas in the case of Germany, it is 50% (four out of eight). With regards to the USA, the majority of the articles have been in the form of studies based on secondary data (five out of eight), and in the case of Switzerland, more articles have been in the form of empirical studies based on surveys. It is interesting to note that there is no article present in the sample that is considered for the review from the regions such as Africa and South America. It can be said that there is still a lack of exploration and studies on supply chain finance in certain parts of the globe.

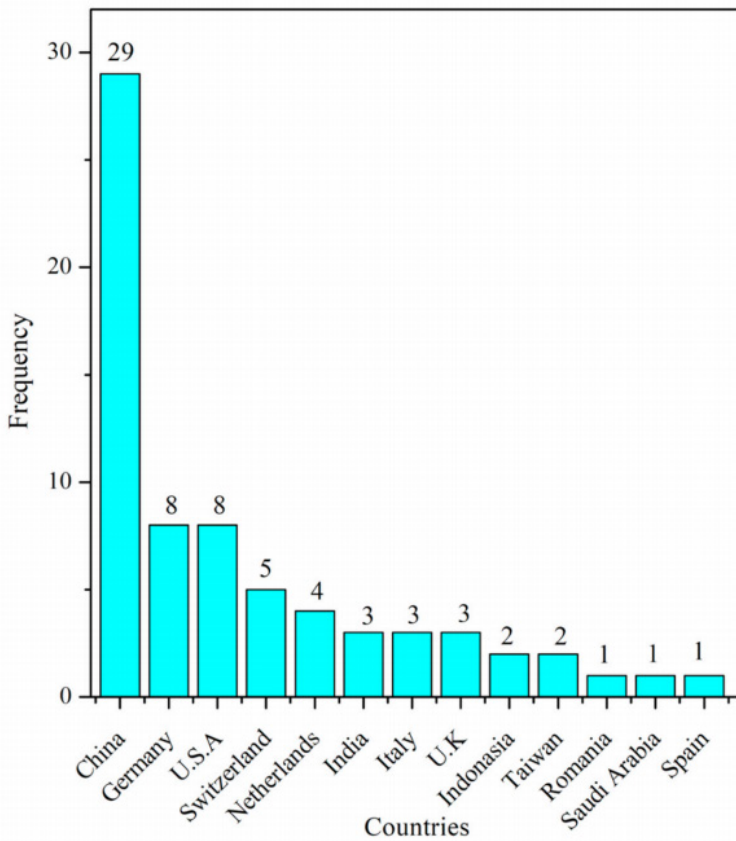


Figure 5. Contributing countries.

Factors Influencing the Acceptance of Supply Chain Finance

Several researchers discussed the varied number of factors that are expected to affect the acceptance of supply chain finance amongst firms in the supply chain. The most widely discussed factors in the literature are collaboration, the automation of trade process/level of digitalisation, trust, reputation, image or track record, bargaining power, coordination, financing cost, information sharing, cooperation, availability of external financing, financial attractiveness, supply chain integration, credit rating, dependence, objectives, information visibility, workforce, and joint decision making.

Collaboration is one of the important factors that have been widely discussed as having an effect on the use of SCF (Fairchild 2005; Pfohl and Gomm 2009; Wuttke et al. 2013a, 2013b; Popa 2013; Silvestro and Lustrato 2014; Wandfluh et al. 2016; Caniato et al. 2016; Protopappa-Sieke and Seifert 2017; Zhang 2016; Blackman and Holland 2006). It is clearly understood that SCF is a collaborative form of financing, and thus, collaboration as a factor plays an important role in its use and successful adoption. Not only inter-firm collaboration, but intra-firm collaboration as well, i.e., between departments of the organisation, is found to be essential for SCF (Wandfluh et al. 2016; Caniato et al. 2016). Trust is an integral part of supply chain financing, and several researchers have stressed that trust is essential (Randall and Farris 2009; Wuttke et al. 2013b; Liebl et al. 2016; Martin 2017; Blackman and Holland 2006; Karyani et al. 2015; Ta et al. 2018). Martin (2017) stated that trust exists when there is honesty and benevolence. The parties involved in the supply chain need to maintain trustworthiness, and Ta et al. (2018) mentioned that changes in the trustworthiness can play a crucial role in maintaining a relationship. It is important for the SC partners to maintain openness (Randall and Farris 2009) and fairness (Chen et al. 2017). In line with this, several articles also stressed reputation, image, or track record (Iacono et al. 2015; Liebl et al. 2016; Chen 2016; Zheng and Zhang 2017). While Iacono et al. (2015) showed the importance of a bank's track record in reverse factoring, Liebl et al. (2016) stated that buyers extend reverse factoring to the suppliers with a proper track record. Chen (2016), while working on the supply chain financing and the function and role of logistics enterprises, pointed out the need for the focal company to have a good reputation, i.e., the logistics company in this case. Zheng and Zhang (2017) viewed the SCF for Business to Business (B2B) cross-border e-commerce business, and demonstrated that reputation is essential. The higher the reputation, image, or track record, the better the trustworthiness and facilitation of SCF will be. Besides, the SC partners need to maintain cooperation (Jiang et al. 2016; Zheng and Zhang 2017; Yu and Zhu 2018) and coordination (Shang et al. 2009; Silvestro and Lustrato 2014; Gomm 2010; Yu and Ma 2015), as well as share risk, reward (Randall and Farris 2009), and information (Silvestro and Lustrato 2014; Wandfluh et al. 2016; Jiang et al. 2016; Ding et al. 2017); and jointly make decisions (Raghavan and Mishra 2011; Wuttke et al. 2013b). Carnovale and Yeniyurt (2015) demonstrated that the supply

chain network is crucial for the firm's performance, and a well-connected network is associated with better performance.

Power is defined as “the ability of one firm to influence the actions and intentions of another” (Maloni and Benton 2000; Martin 2017), and it also plays a role in SCF, which several articles have highlighted (Wuttke et al. 2013b; Caniato et al. 2016; Wuttke et al. 2016; Protopappa-Sieke and Seifert 2017; Chen et al. 2017). In the literature, power has been mostly associated with the bargaining power of the buyer (focal company), as the buyer has been assumed to be a larger enterprise to their supplier. Caniato et al. (2016) used a term called “financial attractiveness” to refer to the bargaining power of the focal company to the financial institutions, which help in offering SCF solutions to their supplier, as in the case of reverse factoring. If the bargaining power of the focal firm, which is the buying firm in this case, is high, the buyer tends to reduce the purchase prices, whereas if it is low, then the buyer will try to improve the relationship with key suppliers. Similarly, the dependence of one firm on another, which is the reciprocal of power, influences the supply chain financing (Wuttke et al. 2013a; Martin 2017). Wuttke et al. (2013a) goes further, and divided dependence into ‘pooled dependence’ and ‘dispersion of dependence’.

Caniato et al. (2016) mentioned that there is a plurality of objectives behind adopting SCF, i.e., improving the adopter's financial performance and securing the supply chain, and these objectives play a crucial role in SCF adoption. Other studies by Iacono et al. (2015), Liebl et al. (2016), and Zhou et al. (2018) also confirmed the influence of objectives on SCF.

The level of automation of trade processes or the level of digitalisation is another important factor that the literature stressed (Fairchild 2005; Wuttke et al. 2013b; Gomm 2010; Caniato et al. 2016; Chen 2016; Blackman and Holland 2006; Zhou et al. 2018). The automation of trade processes may occur in various ways, e.g., electronic invoicing, reconciliation databases, electronic payment systems, trade platforms, and forecasting platforms, among others. These technologies or automation may be offered by banks or financial service providers (Silvestro and Lustrato 2014), or it may need the involvement of another party in the supply chain financing, i.e., a technology service provider (TSP) (Martin and Hofmann 2017). TSP may act as a bridge between the funders and buyers, as well as the sellers. Due to the significance of technologies and vast opportunities

arising out of it, Fintechs are also starting to get involved in SCF (Tsai and Peng 2017). Although for the traditional SCF solutions, a higher level of automation may not be needed, for innovative SCF solutions, a higher level of automation may be required. The visibility of information across the trade process and the supply chain is desirable. In supply chain financing, the same is desired (Silvestro and Lustrato 2014; Jiang et al. 2016), and the level of automation can increase the visibility.

The studies of Yan and Sun (2013) and Martin (2017) highlighted that the availability of external financing affects the supply chain partners' participation in SCF, and the easier accessibility of external financing may reduce the use of SCF.

The frequency and volume of transactions matter in supply chain finance, as the transactions need to be financially attractive, especially for the financial service provider. However, the same may hold true for the buyer as well, e.g., in the case of reverse factoring, where the buyer may be motivated to use reverse factoring only for those suppliers with an attractive enough volume of receivables (Pellegrino et al. 2018; Hofmann and Zumsteg 2015; Iacono et al. 2015).

Supply chain integration has also been discussed as an influence on supply chain financing. Wuttke et al. (2013a) considered it as an umbrella that includes the joint decision, joint investment, real-time sharing of operational information, regular meetings, engagement in collaborative planning, and sharing cost information, among others. Not only should the supply chain partners be integrated upstream and downstream, but SC integration should also exist among financial service providers (FSPs) as well.

The talent, skill, and expertise of the workforce may also affect supply chain financing. Jiang et al. (2016) input it in a factor called 'basic condition', which consisted of personnel quality, and other factors similar to this concept include innovation ability, technical ability, quality, and financial condition.

Yan and Sun (2013) performed several analytical methodologies such as the Stackelberg game, coordination analysis, and numerical analysis, and showed that an "appropriate financing scheme/solution" matters, and influences the retailer's decision to order.

The literature has discussed several factors influencing SCF. However, it may be possible to classify them into broader groups based on similar characteristics. It is understandable that many of these factors will be overlapping between categories, but for simplification and clearer understanding, classification of the factors is desirable. Table 4 shows the categorisation of these factors into five categories, i.e., operational factors, financial factors, relationship factors, and informational factors.

Table 4. Categorisation of factors.

Operational Factors	Financial Factors	Relationship Factors	Technological Factors	Informational Factors
Coordination	Financial attractiveness	Collaboration	Automation of trade process/level of digitalisation	Information sharing
Frequency and volume of transactions	Financing cost	Trust		Information visibility
Objectives	Availability of external financing	Bargaining power		Reputation/image
Workforce	Credit rating	Cooperation		
	Appropriate financing scheme/solutions	Dependence		
		Joint decision making		
		Shared risk and reward		
		Supply chain network		

The Outcome of Supply Chain Financing

One of the benefits of SCF that the literature has widely highlighted is the reduction of cost of financing (Van der Vliet et al. 2015; Iacono et al. 2015; Gelsomino et al. 2016b; Zheng and Zhang 2017; Ding et al. 2017; Babich and Kouvelis 2018; Yu and Zhu 2018; Yang et al. 2018). It helps to facilitate offering finance at a lower cost to the SC partners, who generally are not privileged to receive capital at lower cost. It leads to financial service providers extending finance at lower interest rates. Supply chain finance not only facilitates a lower cost of financing, it also helps reduce the overall cost in the supply chain, e.g., cost of producing and delivering goods/services (Blackman and Holland 2006; Iacono et al. 2015; Gelsomino et al. 2016b; Jiang et al. 2016; Liu and Wen 2017; Babich and Kouvelis 2018). SCF has been widely touted to offer

solutions to the problems faced by SMEs in availing finance; the literature on SCF revealed that SCF improves the accessibility to funds, particularly for smaller SC partners (Suayb Gundogdu 2010; Wang et al. 2012; Yan and Sun 2015; Hofmann and Zumsteg 2015; Liu and Wen 2017; Ding et al. 2017; Chen and Wen 2017; Zheng and Zhang 2017; Li et al. 2011). The major problems in approaching working capital optimisation from a single-company perspective involve larger enterprises exercising their bargaining power and optimising the working capital at the expense of other enterprises in the supply chain, which can cause cash flow risk and disruptions in the supply chain. SCF, on the other hand, helps reduce cash flow risk (Wuttke et al. 2013b; Jiang et al. 2016; Martin 2017; Yan and Sun 2015; Gelsomino et al. 2016b; Liu and Wen 2017) and disruptions in the supply chain (Blackman and Holland 2006; Wuttke et al. 2013b; Jiang et al. 2016). It helps unlock and improve the working capital position, e.g., in factoring, reverse factoring, inventor financing, or warehouse financing, a supplier can avail the needed funds before the payment period. Although financial institutions may need to offer to fund at lower rates, SCF ensures an increase in transactions (Hofmann and Zumsteg 2015; Jiang et al. 2016), and helps increase revenue and income for FSPs (Iacono et al. 2015; Zheng and Zhang 2017). Several articles discussed the ability of SCF to enhance the profitability of the individual enterprises as well as that of the supply chain (Wang et al. 2012; Hofmann and Zumsteg 2015; Yan and Sun 2015; Grüter and Wuttke 2017; Bi et al. 2018a; Yu and Zhu 2018; Zhou et al. 2016). There are also other articles that merely touched on the benefits as improving the financial performance (Gomm 2010; Yan et al. 2014; Shi and Wang 2015; Caniato et al. 2016; Carnovale and Yenyurt (2015); Zhang 2016; Liu and Wen 2017). It is understandable that all of the above-discussed points contribute to the overall financial performance. Pfohl and Gomm (2009) stated that SCF affects the firms by influencing three areas: volume, cost, and duration. The solutions will affect one or more of the dimension(s), and some of the solutions will have a greater effect than the other (also see Gelsomino et al. 2016b).

The visibility of information in the chain is essential for the efficiency and effectiveness of the chain, and SCF aids in reducing information asymmetry in the supply chain (Fairchild 2005; Hofmann and Zumsteg 2015; Ding et al. 2017; Gelsomino et al. 2016b; Li 2017; Song et al. 2018). Several researchers are also of the view that supply chain finance also helps reduce financing risk (Wang et al. 2012; Tsai and Peng 2017).

While Wang et al. (2012) stated that SCF can reduce the financing risk for the commercial banks, Tsai and Peng (2017) approached the reduction of financing risk from perspective of the larger enterprise offering loans to the suppliers through online SCF platforms. The main reason for the reduction of risk for larger enterprise as per Tsai and Peng (2017) is due to greater familiarity with their suppliers. Although the approach may be different, nevertheless, SCF can help reduce the financing risk for the finance provider.

Supply chain finance also helps to improve the collaboration between functional departments within the firm, as well as that between enterprises (Bi et al. 2018a; Bi et al. 2018b; Yang et al. 2018). It also helps improve the coordination in the supply chain (Huff and Rogers 2015; Bi et al. 2018a; Bi et al. 2018b). In fact, it improves the relationship in the chain by reducing the conflicts and issues and improving collaboration and coordination.

Some of the articles discussed SCF as improving the overall supply chain (Yu and Ma 2015; Protopappa-Sieke and Seifert 2017; Chen et al. 2017). It may be said that SCF offers a win-win situation for all of the supply chain partners. Overall, it can be said that SCF provides both financial and non-financial benefits.

On the other hand, there are also articles that discussed the possible negative effects of SCF. The major issues that could arise from SCF are risk, uncertainty, and vulnerability. Johnson (2008) demonstrated that risk/uncertainty/vulnerability can occur due the leakage of documents, as supply chain partners may be transacting through financial institutions. The researchers also characterised the threat of loss by examining search patterns in peer-to-peer networks, and also showed the linkage between firm visibility and threat activity. Karyani et al. (2015) stated that if there is a congestion of cash flow in one of the perpetrators, it will cause a ripple effect on the other partners of the supply chain as well. Martin (2017) found that suppliers may also face uncertainty on future terms besides being uncertain about buyers to offer them a financing alternative or solutions.

Supply Chain Finance Solutions

Supply chain finance is not a single solution-based mode of financing. As it is a medium to optimise the flow of funds and cover the supply chain, various solutions or instruments make up the SCF solutions. Table 5 shows various SCF solutions discussed in the literature.

Table 5. Some of the widely discussed solutions in the literature.

Solutions	Definition	Source	Frequency in the Sample
Reverse Factoring	In reverse factoring, the buyer sells the accounts payables and works together with the supplier and the banks to optimise the flow of funds.	Liebl et al. (2016)	7
Accounts Receivables Financing	Accounts receivable financing refers to the act of borrowing from a commercial bank with the accounts receivable that have not yet been received.	Ramezani et al. (2014); Wang (2017)	5
Purchase Order Financing	"Purchase order financing allows banks to offer loans to suppliers by considering the value of purchase orders issued by reputable buyers, and assessing the risk of the supplier delivering the order successfully."	Babich and Kouvelis (2018)	5
Agricultural Supply Chain Finance	A supply chain financing generally of pre-harvest, trade services financing, and post-harvest, which is applied in the agriculture sector.	Suayb Gundogdu (2010); Li et al. (2011); Karyani et al. (2015);	5
Factoring	"Factoring is a type of supplier financing in which firms sell their creditworthy accounts receivable at a discount (generally equal to interest plus service fees), and receive immediate cash."	Klapper (2006)	4
Online SCF Platform	An online platform that facilitates in networking the parties involved in supply chain finance (SCF).	Hofmann and Zumsteg (2015); Martin and Hofmann (2017); Gao et al. (2018)	5
Inventory Financing	A short-term loan from a financial institution to finance inventories.	Caniato et al. (2016)	4
Warehousing Financing	Warehouse financing means that co-operators mortgage their goods in warehouses for pledge loans.	Jiang et al. (2016)	4
Buyer Direct Financing	In buyer direct financing, the buyer (manufacturer) issues both sourcing contracts and loans directly to the suppliers.	Babich and Kouvelis (2018)	4
Vendor-Managed Inventory	"The supplier is given the freedom to plan its own production and decide upon the replenishment schedule as long as the agreed customer service levels are met. This enables suppliers to stabilise their production and to optimise the transportation cost"	Waller et al. (1999); Claassen et al. (2008)	3

Table 5. Cont.

Solutions	Definition	Source	Frequency in the Sample
Raw Material Financing	It is a part of inventory financing whereby the funds are given to finance raw materials.	Basu and Nair (2012); More and Basu (2013)	2
Third Party Logistics Financing	A logistics service provider buys goods from a manufacturer and obtains an interim legal ownership before selling them to the manufacturers' customers after a certain time.	Caniato et al. (2016); Song et al. (2016)	2
Dynamic Discounting	"Dynamic Discounting (DD) utilises trade process visibility granted by an information and communication technology (ICT) platform to allow the dynamic settlement of invoices in a buyer-supplier relationship."	Gelsomino et al. (2016a)	2
Early Payment Discount Program	A programme in which the supplier offers a cash discount to encourage the buyer to pay quickly.	Ho et al. (2008)	2
Buy Back Guarantee	"It refers to a kind of supply chain financing [in which] the bank helps the capital-constrained retailer settle the payment, based on the core supplier's buyback guarantee."	Chen et al. (2017)	2
Credit Guarantee	"A credit guarantee where the deep-pocket manufacturer represents a promise of timely payment for the retailer with high default risks in the supply chain."	Yan et al. (2014, 2017)	2
Bank Guarantee	A bank guarantee is a promise from the debtor's bank that the liabilities of the debtor will be met in the event of failure to repay.	Martin and Hofmann (2017)	1
Manufacturer Collateral	"The manufacturer assumed to be the core enterprise of a chain, provides her retailer with collateral to help him borrow from the bank at a low-interest rate."	Bi et al. (2018a)	1
Supplier's Subsidy	The supplier allows the retailer a delay in payment, and provides a subsidy contract to alleviate its problems if it is profitable.	Bi et al. (2018a)	1
Pre-selling	In a preselling program, firms offer to sell their products, possibly at a discounted wholesale price, long before the selling season.	Xiao and Zhang (2018)	1
Trade Credit	Trade credit is a short-term loan between firms that are tied in both timing and value to the exchange of goods between them. It occurs when there is a delay between the delivery of goods or the provision of services by a supplier and their payment.	Ferris (1981); and García-Teruel and Martínez-Solano (2010)	1

Reverse factoring is the most widely discussed solution in the supply chain literature (Liebl et al. 2016; Lekkakos and Serrano 2016; Caniato

et al. 2016; Iacono et al. 2015; Grüter and Wuttke 2017; Popa 2013; de Goeij et al. 2016). In fact, there are some articles that considered reverse factoring to be SCF. Gelsomino et al. (2016b) put it as ‘buyer-driven perspective’, which is a subset of the financial-oriented perspective of SCF. Besides, there are other solutions mentioned, such as payables discounting (Silvestro and Lustrato 2014), approved payables financing (Martin 2017), and payables extension finance (Basu and Nair 2012; More and Basu 2013), which in substance are similar to reverse factoring, i.e., based on payables.

Several articles also focused on ‘accounts receivables financing’, which is the mode of financing in which enterprises use receivables as the underlying asset (Basu and Nair 2012; Popa 2013; More and Basu 2013; Silvestro and Lustrato 2014; Wang 2017). Two forms of accounts receivables financing are evident from the literature, i.e., accounts receivables pledging and accounts receivables factoring. Although factoring may be a part of accounts receivables financing, various articles touched on factoring specifically as the mode of financing (Caniato et al. 2016; Tang et al. 2018; Martin and Hofmann 2017; Yu and Ma 2015).

The suppliers may avail of financing using the ‘purchase orders’ before the repayment period from the buyers. This form of financing is known as ‘purchase order financing’ (Basu and Nair 2012; More and Basu 2013; Silvestro and Lustrato 2014; Tang et al. 2018; Babich and Kouvelis 2018).

Supply chain finance may also be used to finance the agricultural supply chain, and is known as ‘agricultural supply chain finance’. Karyani et al. (2015) and Karyani et al. (2016) categorised it into ‘pre-harvest financing’ and ‘trade services financing’. Suayb Gundogdu (2010), while studying the Islamic structured trade finance on cotton production, grouped the financing modes into pre-harvest (Salam) and post-harvest (Murabaha and Mursharakah). Zhou et al. (2018) grouped agricultural supply chain finance into four categories: microcredit, microloans, supply chain and industrial model, and online and offline lending.

One of the solutions through which SCF can take place is through the online platform. It could be a platform through which e-factoring or e-reverse factoring could take place, or it may occur in the form of peer-to-

peer lending, or where the smaller supplier or retailer may get a necessary funding from their SC partner, which could be buyer or manufacturer (Wuttke et al. 2013a; Hofmann and Zumsteg 2015; Martin and Hofmann 2017; Tsai and Peng 2017; Gao et al. 2018). Caniato et al. (2016) also dwelled on the online form of SCF by calling them an ‘advanced form of reverse factoring’ and ‘seller-based invoice auction’. The online platform could also be that which connects the supply chain partners, i.e., buyer, supplier, and service provider, where the documentary process involved in the transactions could be managed more quickly, visibly, and cost-effectively. Yuan (2007) did a case study on the TradeCard solution, which helps connect the supply chain partners through better managing the documentary process of international transactions. TradeCard is stated to be replacing letters of credit or open accounts in international transactions.

Suppliers may avail funding through ‘inventory financing’, which uses inventory as an underlying asset (Li et al. 2011; Popa 2013; Tang et al. 2018; Babich and Kouvelis 2018; Chen and Kieschnick 2018). Warehousing financing is also another popular form of financing where the concerned party may avail financing by generally pledging the warehouse receipt (Popa 2013; Luo et al. 2015; Jiang et al. 2016; Chen and Wen 2017).

Buyer direct financing is a mode through which a seller may avail funds from the buyer through advances or loans, and has also been discussed in several articles (Popa 2013; Tang et al. 2018; Babich and Kouvelis 2018; Chen and Kieschnick 2018).

Besides the above-mentioned solutions of SCF, the literature on SCF revealed several solutions such as vendor-managed inventory (Basu and Nair 2012; More and Basu 2013; Caniato et al. 2016), raw material financing (Basu and Nair 2012; More and Basu 2013), third-party logistics financing (Basu and Nair 2012; More and Basu 2013), dynamic discounting (Caniato et al. 2016; Martin and Hofmann 2017), early payment discount programmes (Basu and Nair 2012; More and Basu 2013), buy-back guarantees (Chen et al. 2017; Yu and Ma 2015), credit guarantees (Yan et al. 2017), bank guarantees (Martin and Hofmann 2017), manufacturer collateral (Bi et al. 2018a), supplier’s subsidy (Bi et al. 2018b); SME closed-loop supply chains (SMECLSCs) (Zhang 2016), and supply chain carbon finance (SCCF) (Yang et al. 2018). Martin (2017) also included

letters of credit, bank guarantees, insurances, and credit assessment as risk mitigation aspects of SCF. Trade credit, which is a form of credit offered by the supplier to its buyer in the form of deferred payments, is discussed as ‘supplier-led solutions’ by Babich and Kouvelis (2018).

Although there are many solutions to SCF, it may be possible to group them based on certain characteristics, e.g., pre-shipment, in-transit, and post-shipment financing (Basu and Nair 2012; More and Basu 2013), traditional and innovative financing solutions (Caniato et al. 2016), traditional and integrated SCF practices (Martin and Hofmann 2017, and buyer-led and supplier-led supply chain finance (Babich and Kouvelis 2018).

CONTRIBUTION TO THE EXISTING LITERATURE

Our study contributes to the existing literature on supply chain finance, and extends the work of Gelsomino et al. (2016b) and Xu et al. (2018) in the following ways. 1. We identified and consolidated the factors that influence SCF. Further, we also grouped these factors into five categories based on certain common characteristics. This grouping can help simplify the understanding of the factors. 2. The current study also identified various outcomes that could emerge out of the use of SCF. We did not limit ourselves only to the expected benefits resulting out of the SCF. 3. We also addressed the question: what constitutes the supply chain finance solutions? We identified several SCF solutions that have been discussed in the extant literature. In addition, we also showed which solutions are most widely discussed and which are understudied.

MANAGERIAL IMPLICATIONS

We believe our study offers managerial implications in the following ways. 1. The parties involved in the supply chain finance, whether the supplier, buyer, financial service provider, or technology service provider, can understand the important factors that influence the use of SCF. This study can help them concentrate on these factors to improve the adoption and effectiveness of SCF. 2. The parties can understand the expected outcome when SCF is implemented. Understanding this is crucial, as it

can improve and enhance the adoption of SCF. For example, SMEs that are generally unaware and reluctant to explore different instruments may be encouraged to participate in SCF. Larger buyers can be encouraged to opt for viewing working capital from the SCF perspective, as it can offer a win-win situation rather than trying to think about its own gain. These buyers may also be able to bring on board their smaller suppliers under SCF by making them aware about the benefits that can be expected out of SCF. FSPs can also know that there are benefits in offering SCF solutions. FSPs and technology service providers can promote their solutions and services better to their potential clients. 3. We have identified and covered many of the SCF solutions that have been discussed in the literature. This can help create awareness for the suppliers and buyers alike, and increase an interest to explore more of these SCF solutions. Technology service providers may also benefit from knowing the various SCF solutions, and can make better decisions and steps to offer technology-fitting solutions.

CONCLUSIONS, FUTURE DIRECTIONS, AND LIMITATIONS

Supply chain finance as a concept has seen a rise in the early 21st century. It received more attention and got a thrust after the financial crisis of September 2008, as the loans from the banks and financial institutions declined considerably. This article reviewed the articles based on three themes: SCF factors, outcomes, and solutions. We used a string of keywords, i.e., “Supply Chain Finance” OR “Supply Chain Financing” OR “Financial Supply Chain” OR “Financial Value Chain” and searched the Scopus and Web of Science databases. After removing the duplications, conference proceedings, and the articles that did not meet the themes of the paper, finally, we reviewed 70 research articles. We found that analytical and case studies are the most widely used methodologies. There has been a growing interest in the SCF in academics whereby the highest number of publications have come in the last three years. The sources of publications have been quite diverse. Most of the publications have come from the countries such as China, Germany, the USA, and Switzerland. There is a lack of contributions from the regions such as Africa and South America.

The most widely discussed factors in the literature are collaboration, the automation of trade process/level of digitalisation, trust, reputation, image or track record, bargaining power, coordination, financing cost, information sharing, and cooperation, among others. For the simpler understanding of the factors influencing SCF, the authors also classified these factors into five categories, i.e., operational, financial, relationship, technological, and informational factors.

Outcome-wise, a lower cost of financing, reduction in cost, improvement in accessibility to financing, reduction in information asymmetry, improvement in financial performance, and enhancement of profitability were the most recurring areas in the research. Overall, the benefits of SCF can be grouped into financial benefits and non-financial benefits. The Cash-to-Cash cycle (C2C) is a metric that has been widely discussed in the literature to demonstrate the financial benefits of SCF (Randall and Farris 2009; Hofmann and Kotzab 2010; Popa 2013; Silvestro and Lustrato 2014; Hofmann and Zumsteg 2015). C2C is a time-based measure comprised of Days Sales Outstanding (DSO), Days Inventory Outstanding (DIO), and Days Payables Outstanding (DPO).

$$C2C=DSO+DIO-DPO$$

The shorter the C2C, the higher the net present value of cash generated by the assets and the overall increase in the value of the firm will be (Soenen 1993). The C2C metric is a component for enhancing the value of shareholders. C2C optimisation can be approached from a single entity perspective; however, in such cases, the focal firm may end up optimising at the expense of the supply chain partners, and can be counterproductive for the supply chain and the focal firm in the long run. As such, it is vital to view C2C from a supply chain collaborative perspective. The literature has discussed some of the instances of how SCF can manage C2C optimally at the supply chain level, e.g., shifting the inventory upstream to the suppliers, as the cost of the product is lower upstream in the chain, and the ability to shift inventory further up, even for a few days, will create savings for the entire chain. Some SC partners have strong credit and a lower weighed average cost of capital (WACC), and can reduce the cost of capital of the whole supply chain. Being able to shift the financial needs and burdens of the SC transactions to the partner with lowest WACC will result in an optimal C2C for the SC. Thus, SCF

can offer a win–win situation for the SC partners (Randall and Farris 2009; Hofmann and Kotzab 2010). Not only a win–win situation in the case of a dyadic buyer–supplier relationship, but SCF can also create a ‘triple win situation’ (TWS) when the financial service provider (FSP) is also involved in the SCF, although there are caveats (see Hofmann and Zumsteg 2015).

The literature also revealed that the consequences of SCF might even be negative, and these may be due to risk, uncertainty, and vulnerability.

Amongst the solutions, the most widely covered solutions were reverse factoring, accounts receivables financing, purchase order financing, and agricultural supply chain finance. Although there are lots of SCF solutions, and more are expected to emerge with more innovation and need to improve the financial flow, it is possible to group them based on certain characteristics, e.g., pre-shipment, in-transit, and post-shipment financing; traditional and innovative financing solutions; traditional and integrated SCF practices; or buyer-led and supplier-led supply chain finance.

A lot of work in the literature has been analytical, case study, and simulation-based. We identified several factors from the extant literature; however, more empirical studies will be needed for validation. Although a few articles such as those of Martin (2017) and Wuttke et al. (2013b) have attempted to explain SCF with existing organisational theories, the SCF literature needs more theoretical underpinning, and surveys of the existing theoretical frameworks would be especially beneficial. Innovation diffusion theory (IDT), social exchange theory, and transaction cost theories, among others, may be especially worth considering, in order to give a framework for survey research on SCF. Out of the identified factors, some factors may be more critical than others. It will be worth exploring the relationship between these factors. For this, total interpretive structural modelling (TISM)—and with a larger survey dataset, structural equation modelling (SEM)—can be used in the future research. The same can be applied in the case of identified outcomes of SCF. Even the analytical modellings have mostly concentrated on a single period or buyer–supplier or manufacturer–retailer dyads. Future studies may look into a more complicated multi-time period or multi-level in the supply chain. Some of the solutions for SCF such as dynamic discounting,

manufacturer collateral, and supplier's subsidy, among others, are very understudied. Most of the studies on SCF have viewed SCF by focussing on single solutions, and it may be possible, especially in empirical studies, to consider more than a single solution. Future research may focus on studying more than a single SCF solution. It may be difficult to take up all of the solutions of SCF, but concentrating on the particular category of SCF solutions, such as buyer-led or supplier-led; pre-shipment or post-shipment, etc. may be more manageable for empirical research. Currently, most of the contributions have come from China, followed by Germany, USA, and Switzerland. However, we found a lack of contributions from regions such as Africa and South America. More research contributions from such regions and countries with lesser contributions will be beneficial for the overall research in supply chain finance. Tsai and Peng (2017) discussed the Fintech revolution and the regulation involved therein by using it as a case study. They viewed Fintech in terms of a larger focal company offering online supply chain financing to their supplier or distributor without the intermediation of banks or financial institutions. However, Fintech companies may not necessarily offer direct financing, but may help in facilitating the SCF by linking the parties in the SCF. More study on the role of Fintechs on SCF and their regulations will be beneficial. All of the studies based on secondary data have been from USA and United Kingdom (UK), and it will be worth exploring the various aspects of SCF such as the expected benefits, risk, and cost, among others, using secondary data from other countries, especially from emerging countries. Another exciting area would be to link SCF with other emerging technologies such as blockchain, the Internet of Things (IoT) and big data.

The limitations of the paper are as follows. 1. The findings of this article are based on a review of 70 papers. We used a search string- "Supply Chain Finance" OR "Supply Chain Financing" OR "Financial Supply Chain" OR "Financial Value Chain"—to identify articles, and this may have caused the exclusion of some of the relevant papers. 2. While performing a qualitative analysis of the documents on the focussed themes, personal biases might have occurred. 3. We also did not include 'grey papers', and this may provide material for further insights into SCF.

Author Contributions

Z.R.M. conceptualised the idea which eventually led to the formulation of research questions, reviewed and tabulated the literature on Supply Chain Finance. He also performed both quantitative and qualitative analysis and worked on the discussions of the results besides offering theoretical and managerial implications of the paper. D.P. offered a valuable contribution in terms of developing the process and framework for literature review, quantitatively analysing the results of the reviewed articles besides editing and refining the drafts of the manuscript.

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CHAPTER 7

THE ROLE OF ENTREPRENEURIAL STRATEGY, NETWORK TIES, HUMAN AND FINANCIAL CAPITAL IN NEW VENTURE PERFORMANCE

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ABSTRACT

In the current era of globalization and competitive edge, the survival of newly established ventures has become a big challenge. Numerous studies have been carried out to discover factors that are essential for newly initiated ventures but the results are still fragmented. This study focuses on measuring the effect of entrepreneurial strategy, network ties, human capital and financial capital on new venture performance. A structured questionnaire was used to collect data from 196 registered firms located in the emerging market Pakistan. The results indicate that entrepreneurial strategy, network ties and financial capital have a significant positive effect, while human capital showed an insignificant effect on new venture performance. This research recommends owners

and managers of new firms build effective entrepreneurial strategies, expand their networks with external bodies (other firms, government and financial institutions) to acquire useful resources that in turn can spur their performance. Further implications are discussed. Policy makers and responsible authorities are advised to encourage and support new ventures which in turn can contribute to GDP and economic development. Practical implications and suggestions are also discussed.

Keywords: Financial capital; network ties; human capital; entrepreneurial strategy; new venture performance; South Asia; Pakistan

INTRODUCTION

In today's turbulent markets, the success of newly established ventures has become a key and challenging question. In response to this, numerous studies have been conducted in developing and developed countries. In other words, some of the studies have focused on the factors that may cause the failure of enterprises while others have discussed the success, growth, and performance (e.g., Ahlstrom 2010; Yang et al. 2018; Anwar et al. 2018a). However, the growth and success of newly established ventures are relatively low in emerging economies as compared to more developed, often Western ones. One area of research has discussed the failure of newly built ventures while others have focused on new venture success (e.g., Messersmith et al. 2018; Baidoun et al. 2018).

Major causes of the failure of new ventures include lack of resources, lack of support, lack of financial capital, environmental uncertainty and weak institutional support (Anwar 2018; Manev et al. 2005). In contrast, factors leading to the success of ventures include a strong relationship with external bodies, adequate resources, effective strategies and human resources (e.g., Adomako et al. 2018; Bruton et al. 2000; Milosevic 2018). Still a few shortcomings exist in previous studies as many of them have been conducted in developed economies while emerging economies were less often discussed. Moreover, the role of certain factors such as entrepreneurial strategy, network ties, human and financial capital in new venture success is rarely debated in emerging economies in South Asia, such as Pakistan.

Thus, this study examines the role of contemporary factors (e.g., entrepreneurial strategy, network ties, human and financial capital) in new venture success. Newly started firms face severe competition in dynamic markets. It is very difficult for them to enter into an unknown market. Hence, they require a unique entrepreneurial strategy and network ties to be successful in their mission. Strategy helps them to enter into the market while network support firms to create new customers, suppliers and business partners which can result in higher performance (Lechner and Gudmundsson 2014; Saha and Banerjee 2015).

Network ties are the characteristics of social capital. Network ties refer to the linkage and association of firms with customers, suppliers and business partners, etc. (Anwar et al. 2018b). At the early stage of a business startup, network activities play a significant role because entrepreneurs are afraid of failure but the network encourages them to proceed (Zhang and Li 2010). Human capital is comprised of the entrepreneur's knowledge, skills, experiences and background ability, etc., for the success of the firm. Particularly, the growth of new established firms is significantly influenced by human capital (Danso et al. 2016). Financial capital refers to finance, money, as well as financial resources, owned by a firm. For the startup of a new business, financial capital is a core driver because business at the initial stage face various unexpected shocks and finance can help them in these case (Cooper et al. 1994).

Small and medium-sized enterprises (SMEs) in Pakistan significantly contribute to economic growth and GDP. The State Bank of Pakistan defines SMEs as "small enterprises are those which have employees up to 20 and annual sale up to Rs.75 million. While medium enterprises in the services sector have employees from 21–250 and in manufacturing sectors the employees from 51–250 and annual sale for services and manufacturing enterprises from Rs.75 million to Rs.400 million". According to the World Bank Report (2009), there are 3.2 billion SMEs in Pakistan, which comprise of 95% of all businesses and contribute more than 40% to the country GDP. SMEDA (Small and Medium Enterprises Development Authority) established in October 1998 provides different policies and programs for the development and growth of SMEs. Hence, the survival of SMEs in such regions is important to alleviate poverty and to enhance economic growth.

The current study is an attempt to contribute to the existing literature of entrepreneurial strategy, network ties, human, financial capital and new venture success in several ways. For instance, as discussed earlier, previous studies have contributed much to the research of entrepreneurs' success and performance using different approaches and factors (e.g., Anwar et al. 2018a; Messersmith et al. 2018; Baidoun et al. 2018). However, few studies have examined the impact of entrepreneurial strategy, network ties, human, financial capital on new venture performance in emerging economies. There is a great need to explore the factors that can enhance the survival of SMEs in the long run and to protect them from failure in developing markets. In other words, SMEs in emerging economies contribute a significant portion to GDP and help in poverty alleviation (Degong et al. 2018). Still, many newly born ventures are unable to survive for the long run in emerging markets (e.g., Anwar and Shah 2018). Hence, this research facilitates SMEs to take a sustainable competitive position and enhance their growth in the dynamic market. Second, using the factors of entrepreneurial strategy, network ties, human and financial capital, this study contributes to the resource-based view (RBV) and social network theory. RBV theory claims that unique, rare and immutable tangible and intangible resources (e.g., human capital, network ties, strategies and financial capital) help firms to perform over other firms (Barney 1991). The social network theory indicates that strong ties with external bodies and partners enables ventures to gain valuable resources and spur growth (Burt et al. 2013). Furthermore, the failure of new ventures has become a challenge for SMEDA, policy makers and practitioners in emerging and developed economies. This research helps them modify their strategies for the growth and survival of newly initiated firms which in turn contribute to economic growth and development.

This research is organized as follows: First, it discusses the background and importance of the study. In the proceeding section, the theoretical background, methodology and analysis are discussed. Finally, the discussion, contributions and conclusion are presented.

THEORETICAL BACKGROUND

Existing theories about entrepreneurial orientation have limited evidence and information regarding the importance and contributions of entrepreneurial strategy, network ties and human, financial capital in the growth and success of new ventures. However, it is claimed that the combination of these factors; financial capital, social capital and human capital, are crucial and necessary for the success of new ventures (Mallon et al. 2015). In the initial stage, venture performance is significantly affected by several factors; particularly, human capital and financial capital are thought to play a significant role (Ahlstrom et al. 2018b; Cooper et al. 1994). A new venture needs adequate resources and support to enhance its growth (Anwar et al. 2018b). RBV theory claims that a venture having enough tangible and intangible resources (human capital, network ties, strategies and financial capital) performs over other firms (Barney 1991). Resources can be acquired through social capital and network. A well-formed network and social capital strengthen the spirit of an entrepreneur to start a new business (Tata and Prasad 2015). The social network theory indicates that strong ties with external bodies and partners enables ventures to gain valuable resources and spur growth (Burt et al. 2013).

HYPOTHESES DEVELOPMENT

Entrepreneurial Strategy and New Venture Performance

Strategy is a systematic plan of efforts to achieve long-term objectives (Cohen and Cyert 1973). From a business perspective, strategy is associated with different kinds of objectives. Enterprise strategy has been defined from different perspectives as per the study need and outcome. Table 1 provides a brief detail of the definitions of strategy used in previous studies.

Table 1. Enterprise Strategy Defection in Strategic Literatures.

Prospective	Author (Year)	Enterprise Strategy Definition
Society relationship	Schendel and Hofer (1979)	A strategy which directly discourses the relationship of an organization with society.
Mission and Vision	Freeman (1984)	Consists of the answer to the question "What do we stand for?"
Value creation	Steyn and Niemann (2008)	It is a tool for combining societal expectations, values, norms, and standards into the firm's strategic decision-making processes.
Environmental issues	Stead and Stead (2000)	Ethical foundation spirits beyond the human community to discourse environmental issues.
Competitive Advantage	Porter (1980)	Firm strategy to achieve comparative advantage and superior performance on the basis of cost and uniqueness of product in dynamic markets.

From a resource-based view perspective, strategy is defined as an “ongoing search for rent or above the normal rate of return. Rent is received through the effective utilization of an organization’s capabilities and resources to gain competitive advantages” (Chandler and Hanks 1994). In the present study, we aim to use the strategy suggested by Porter (1980) who described a strategy as a firm’s plan to achieve competitive advantage and superior performance. According to Porter (1980) competitive advantage and superior performance can be achieved through the cost leadership strategy and differentiation strategy which simply refers to competitive strategy. In a cost leadership strategy, a firm aims to provide products and services to their customer at the lowest price i.e., firms aim to be the lowest cost producer in the market and industry. In a differentiation strategy, firms aim to provide unique kinds of products and services to their customers i.e., the customers may perceive that the product is a new one (Porter 1980). Porter’s competitive strategy is also known as the business strategy as well as enterprise strategy.

Both the cost leadership strategy and differentiation strategy (hereafter referred to as entrepreneurial strategy) were found to be significantly and positively related to new venture performance (Teeratansirikool et al. 2013). Especially in emerging economies such as Pakistan, entrepreneurial strategy plays a significant role in the competitiveness and success of newly established ventures (Anwar et al. 2018a). Similarly, some other studies also concluded that competitive strategy (entrepreneurial strategy) has a positive and significant impact on the firm’s performance (Lechner and Gudmundsson 2014; Acquah and Agyapong 2015; Sun et al. 2016). Therefore, we hypothesize:

Hypothesis 1 (H1). *There is a significant positive relationship between entrepreneurial strategy and new venture performance.*

Network Ties and New Venture Performance

Networks are defined as a group of actors (people, divisions or businesses) and their strategic links (community, family, finance & business alliances, etc.) with each other (Johnsen and Johnsen 1999). Network is the concept of social capital and social capital is characterized by norms of recognized behaviors and trust, which permit participants to act effectively together in search of shared objectives (Flora 1998). Social capital is an important element which enables emerging entrepreneurs to establish networks with customers, suppliers, creditors, other businesses and institutions. Networks also identify opportunity and generate innovative and proactive ideas (Manev et al. 2005). Building relationships with government, other businesses and financial institutions is very important for newly started ventures in emerging economies such as Pakistan (Anwar et al. 2018b).

Both formal and informal network support are essential for enterprises to create the relationship with actors in their environment to gain essential resources, knowledge and support which cannot be accessed by them directly. Network ties, trust, and shared vision have been found to affect the performance of small firms by creating resources, providing knowledge and mounting new capabilities (Saha and Banerjee 2015). Firms try to establish different networks for different purposes. For example, marketing networks depend on the firm's management capacity and the firm's culture which results in a high business reputation. In general, all kinds of networks are carried out for the firm's growth and performance (Lechner and Dowling 2003).

The formal network with business association and industry association provides a variety of benefits such as managerial, financial and technical services as well as legal advice. Network ties bring a considerable improvement to a firm's performance (Saha and Banerjee 2015). Networking is a significant element in emerging economies for superior performance which is characterized by relational and collective culture

(Manev et al. 2005). Based on the arguments concluded in previous studies, we propose the hypothesis:

Hypothesis 2 (H2). *There is a significant positive relationship between network ties and new venture performance.*

Human Capital and New Venture Performance

Human capital theory describes human capital as the core driver to improve enterprise performance (Huang et al. 2016). Human capital uses various resources such as skills, knowledge, and abilities to improve the firm's performance, e.g., it has a strong relationship with the firm's profitability (Delaney and Huselid 1996; Samagaio and Rodrigues 2016). The importance of human capital increased recently because of its prominent role in newly started ventures (Felicio et al. 2014). Entrepreneurial human capital is an essential element in tumbling the firm's insolvency fear in high technological firms, however results are not significant in low technological firms (Kato and Honjo 2015). It is also argued that human capital has a strong but weak relationship with entrepreneurs' success. Results also suggested that human capital dimensions have a different influence on venture success. A few dimensions are significant while others have an insignificant impact on entrepreneur success (Unger et al. 2011). Human capital matters much in the growth and development of newly initiated ventures as it is considered a critical driver of newly born firms (Capelleras et al. 2018).

Human capital results higher performance in young audit firms in competitive markets (Danso et al. 2016). Performance of new firms can be improved through a combination of complementary skills such as technical education, commercial experience as well as managerial technical skills (Ganotakis 2012). Human capital has become an intangible resource for the success of new venture performance. It has a positive influence on a firm's profitability and growth (Chen and Chang 2013; Doong et al. 2011). Therefore, we propose the hypothesis for human capital and firm performance:

Hypothesis 3 (H3). *There is a significant positive relationship between human capital and new venture performance.*

Financial Capital and New Venture Performance

Financial capital plays a significant role in the profitability of firms (Coleman 2007). Entrepreneurs with sufficient financial capital have low risk. Sufficient finance allows a firm to use resources effectively and to gain competitive advantage. However, newly established firms face a lot of financial troubles due to lack of internal finance. Particularly, initial capital (also referred to as internal funds) plays a significant role in business operations and sustainability (Huang 2016). In emerging markets such as Pakistan, adequate financial resources enable firms to expand and grow their business easily (Songling et al. 2018). In the initial stage of new ventures, financial capital is one of the most significant tool; it can generate a shield against accidental shocks and allows firms to pursue unique kinds of strategies that cannot be imitated by competitors (Cooper et al. 1994). In general, a firm's financial capital plays a crucial role in the operational and business cycle. Liabilities can be paid on time and new opportunities can be explored with sufficient funds. A new venture needs enough resources to improve performance as well as gain competitive advantages (Huang et al. 2012). Entrepreneurial finance has a significant influence on venture success (Huang 2016). Based on the available arguments, we propose the hypothesis:

Hypothesis 4 (H4). *There is a significant positive relationship between financial capital and new venture performance.*

The research model is presented in Figure 1.

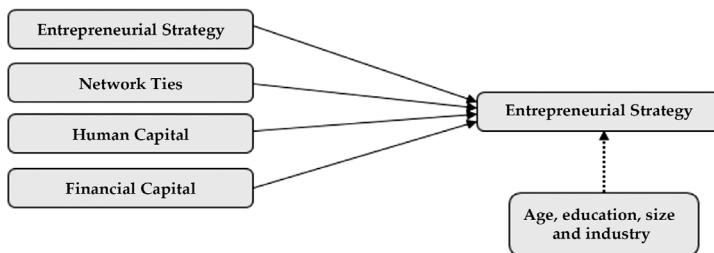


Figure 1. Research Model.

METHODOLOGY

Sample and Data

Data were collected from SMEs operating in Rawalpindi and Islamabad using a structured questionnaire. The registered SME list was taken from the Islamabad Chamber of Commerce and Industry (ICCI), which has approximately 4000 registered firms, and from the Rawalpindi Chamber of Commerce and Industry (RCCI), which has about 5408 registered firms. Therefore, the study population is approximately 9408. These firms include manufacturing, services, and traders. However, we focused on newly established firms operated since the last 10 years.

Procedure

We distributed 250 questionnaires among the firms and asked them to be filled by the owners, executives and top managers because of their awareness about performance and strategies (Anwar et al. 2018c). SMEs are often reluctant to provide their information, so we ensured them about the information obtained through the questionnaire. We used a hard copy approach because an email survey gives a very low response rate and takes more time. We received 207 questionnaires back, of which 196 were only usable and the remaining were excluded from data analysis because they were not completely filled and some of them had missing information. The response rate achieved in this research was 67.6%.

Measurement of Variables

Dependent Variable

The study uses the firms' performance as a dependent variable. Firms' performance can be measured via subjective and objective measures. The subjective measure uses self-reported data, collected through questionnaire and interview. Objective measure uses data collected from accounting records, financial statements, the stock exchange and the

state bank. In the present study, we relied on the subjective measures of firms' performance because of several reasons.

1. Financial data of SMEs is not publicly available. Owners, executives, and top managers are not willing to provide accurate accounting data about their firms (Dibrell et al. 2014).
2. Previous studies suggested that there is a strong association between subjective and objective measures of firms' performance (Deligianni et al. 2016; Nandakumar et al. 2011).
3. Subjective measures cover broader dimensions of firms' performance as compared to objective measures (Dossi and Patelli 2010).

The firms' performance (financial performance and non-financial performance) was evaluated based on the previous study by Charoensukmongkol (2016), where owners and managers were asked "How well your firm performs relative to your major competitors based on the factors given below such return on assets, return on equity, market shares, return on investment, customer satisfaction and customer demand etc."

Independent Variables

The study used four independent variables; entrepreneurial strategy, network ties, human capital and financial capital. Entrepreneurial strategy is measured with various dimensions and it is sometimes related to vision, mission, goal and objectives, planning and competitiveness. Different strategies were used in previous studies such as Wagner (2004), Chandler and Hanks (1994) and Zhu (2013) etc. In the present study, we relied on enterprise strategy related to the firm's competitiveness and comparative advantage. The strategy used for competitiveness, normally called cost leadership strategy and differentiation strategy, was used in previous study of Chandler and Hanks (1994).

The items used for financial capital, social capital and network ties were adopted from the previous study by Huang (2016) and were slightly modified as per the study's intended outcomes.

Instrument/Scale Used

All variables were measured using the 5 Likert scale. The independent variables were measured using the scale showing strongly disagree = 1, disagree = 2, neutral = 3, agree = 4, strongly disagree = 5. However, the firm's performance was measured using the 5 Likert scale showing 1 = extremely declined, 2 = declined, 3 = average, 4 = improved, 5 = extremely improved.

Control Variables

In order to reduce spurious results, we used the age of the firms, nature of industry and gender of owners, executives and top managers as control variables to check the impact of financial capital, network ties, social capital and enterprise strategy on venture performance. We controlled these variables as the previous studies concluded that these variables can impact firm performance. The firm's size, age, and nature of the industry were recommended to be controlled while checking outcomes of the firm's performance (Shirokova et al. 2013). The results indicated that age and size of the firms have a significant influence while educational background has insignificant influence on new venture performance.

Demographic Profile of the Ventures

Table 2 shows the demographic detail of the firms. In the descriptive statistics, the age of the firm, nature of industry and gender of the owners, managers and executives were shown with the total number and their percentage in the sample. It is clear that major firms in this study are manufacturing firms because they have a formal strategy process and plan when it comes to production and sales. A total of 188 respondents were male while only eight were female. It indicates that in Pakistan, females do not prefer to start a business because of an unsafe environment, culture, and barriers. Coleman (2007) suggested that women are less experienced, have low capital and often hold very small

firms as compared to men. They also have limited financial knowledge and resources compared to established firms in dynamic markets. Size shows that 16 firms had 20–50 employees, 33 firms had 51–100 employees, 53 had 101–150 employees, 51 firms had 151–200 and 40 firms had 201–250 employees. The educational background of owners and managers showed that 70 owners and managers were intermediate and below, 44 had a Bachelor education, 74 had a Masters education and only eight owners and managers were PhD qualified.

Table 2. Profile of Firms.

Factors	Total Number	Percentage of Total
Age of Firms		
1. 1 to 3 years	75	38.3
2. 4 to 7 years	66	33.7
3. 8 to 10 years	55	28.1
Nature of Industry		
1. Manufacturing	97	49.5
2. Trading	64	32.7
3. Services	35	17.9
Gender		
1. Male Owner, Executive, etc.	188	95.9
2. Female Owner, Executive, etc.	8	4.1
Size of the firms		
1. 20–50 employees	16	8.2
2. 51–100	33	16.8
3. 101–150	53	27.0
4. 151–200	54	27.6
5. 201–250	40	20.41
Educational Background		
1. Intermediate and below	70	35.7
2. Bachelor	44	22.4
3. Master	74	37.8
4. PhD, etc.	8	4.1
Total	196	100

ANALYSIS AND RESULTS

In this research, we executed several statistical tests such as reliability, descriptive statistics, normality, multicollinearity and correlation that are shown in Table 3. Hypotheses are tested through regression analysis given in Table 4.

Table 3. Correlation among Variables.

Variables	Mean	S.D	1	2	3	4	5	6	7	8
1. Firm Age	-	-	1							
2. Size	-	-	-0.027	1						
3. Education	-	-	0.074	0.272 **	1					
4. Enterprise Strategy	3.7474	0.72235	0.048	0.311 **	0.211 **	(0.80)				
5. Network Capital	3.1327	0.80956	0.111	0.380 **	0.115	0.378 **	(0.65)			
6. Human Capital	3.2959	0.41505	0.032	-0.020	0.020	-0.031	0.095	(0.62)		
7. Financial Capital	3.0979	0.44876	-0.036	0.155 *	0.348 **	0.326 **	0.050	-0.019	(0.76)	
8. Performance	3.4852	0.51861	0.122	0.504	0.239	0.558	0.727	0.090	0.260	(0.91)
Skewness	-	-	-	-	-	0.376	0.340	0.501	0.648	0.354
Kurtosis	-	-	-	-	-	-1.153	-1.512	-0.907	0.045	-1.488
VIF	-	-	-	-	-	1.317	1.190	1.015	1.127	1.317
Tolerance	-	-	-	-	-	0.759	0.840	0.986	0.888	0.759

Note: N = 196, * p < 0.05. ** p < 0.01.

Table 4. Hypotheses Testing (Regression).

Model	Coefficients						Adj. R ²	R ²
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	R ²		
	B	Std. Error	Beta					
1	(Constant)	2.525	0.128		19.725	***	0.270 ***	0.282 ***
	Size	0.207	0.027	0.481	7.556	***		
	Firm Age	0.082	0.039	0.128	2.080	**		
	Education	0.054	0.035	0.098	1.540	0.125		
2	(Constant)	0.730	0.248		2.945	***	0.667 ***	0.678 ***
	Size	0.086	0.020	0.201	4.267	***		
	Firm Age	0.036	0.027	0.057	1.354	0.177		
	Education	0.014	0.025	0.025	0.539	0.591		
	Enterprise Strategy	0.178	0.035	0.249	5.168	***		
	Network Capital	0.344	0.031	0.538	11.269	***		
	Human Capital	0.063	0.052	0.051	1.214	0.226		
Financial Capital	0.133	0.053	0.115	2.496	***			

Note: ** Significance at the 5% level; *** Significance at the 1% level.

Reliability

In the present study, Cronbach’s alpha reliability was executed (see Table 3) to measure the internal consistency of the observed factors. Previous studies suggested that the reliability value above (0.60) is acceptable (e.g., Anwar et al. 2017). The reliability for financial capital is (0.70), network ties have reliability value (0.65), human capital reliability value shows (0.62) and entrepreneurial strategy has value (0.80) while the highest value of firm performance found out (0.91). All the variables have reliability values within the accepted range which may be intended to provide trustable results.

Table 3 shows the mean and S.D of the study variables. The highest standard deviation is of the firm's age followed by network ties that show Standard Deviation (S.D) = 0.81, 0.80 respectively. It tells the highest variation as compared to other variables. The lowest variation in human capital shows (S.D = 0.42). The mean value of the study variables shows that all the factors have their mean value greater than 3. The data are normally distributed as all the factors have their skewness and kurtosis values in the acceptable range ± 2 (see Table 3) as recommended by George (2011). There is no multicollinearity issue in the data as all the factors have their Variance Inflation Factor (VIF) less than 3 and the tolerance values are greater than 0.10 that are shown in Table 3.

Correlation

Table 3 shows the Pearson's correlation results of two-tailed tests executed to forecast the nature of the relationships among variables. On the basis of correlation results, we cannot accept or reject the study hypotheses, however, it provides initial support for the hypotheses. There is a significant positive relationship between enterprise strategy and venture performance ($r = 0.558, p < 0.01$). Network ties are significantly and positively related to venture performance ($r = 0.727, p < 0.01$). The value ($r = 0.090, p > 0.01$) shows that there is no significant relationship between social capital and venture performance. There is a significant positive relationship between venture performance and financial capital ($r = 0.260, p \leq 0.01$).

Regression Analysis

The model summary shows that the model is fit i.e., significant. It elaborates that all the independent variables of the study bring 66.7% change in new venture performance and the significance value shows (Sig. F change = 0.000) that the model is significant. Multiple linear regression analysis was executed to test the hypotheses of the study (see Table 4). We used age, size of firms and educational background of owners and managers as control variables and entrepreneurial strategy, network ties, human and financial capital as independent variables, and venture performance as the dependent variable. Step 2 of Table 4 provides results for the main effect.

H1 of the study is supported as the resulted that entrepreneurial strategy has a significant positive impact on venture performance ($\beta = 0.178, p < 0.000$). It can be interpreted that one unit increase in effectiveness of entrepreneurial strategy brings 17.80% increase in venture performance. Further, it can be elaborated that firms with good competitive strategy perform well.

The values ($\beta = 0.344, p < 0.000$) show that network ties have a significant positive impact on venture performance, which supported H2. One percent or unit increase in network ties can result in a 34.40% increase in venture performance. H3 is not supported as the values ($\beta = 0.063, p > 0.05$) show that human capital has an insignificant impact on venture performance. However, the value is positive which describes that there is a positive but insignificant relationship between human capital and venture performance.

Financial capital has a significant positive impact on venture performance ($\beta = 0.133, p < 0.000$). These results support the study H4. Results show that one unit increase in financial capital brings a 13.23% increase in venture performance. Ventures with adequate financial capital perform well in markets. In the control variables, only the size of firms has a significance, while age and educational background do not play a significant role in the model.

Hypotheses remarks have shown in Table 5.

Table 5. Hypotheses Remarks.

Hypotheses	Remark
H1. <i>There is a significant positive relationship between entrepreneurial strategy and new venture performance.</i>	Accepted
H2. <i>There is a significant positive relationship between network ties and new venture performance.</i>	Accepted
H3. <i>There is a significant positive relationship between human capital and new venture performance.</i>	Rejected
H4. <i>There is a significant positive relationship between financial capital and new venture performance.</i>	Accepted

Interview Results

This study used a mixed approach (i.e., explanatory sequential) to explore useful insights. A mixed method approach increases the validity of results and provides a broader understanding of the phenomena (Jick 1979). Hence, we conducted a face-to-face interview with five members from top management including CEOs, HR and financial heads of newly

started ventures. We asked six questions from CEOs, HR and financial heads to gain in-depth contributions.

1. Which of the following entrepreneurial strategies do you use to improve your performance?

- Cost leadership strategy
- Differentiation strategy

Answer: Three respondents (two CEOs and one financial manager) said that they focus on cost leadership strategy to enhance their profit. However, two respondents (HR managers) said that differentiation strategy plays a significant role in the improvement of profitability.

2. To acquire useful resources that can enhance your performance, do you build relationships with external bodies?

Answer: Four entrepreneurs (two CEOs, one HR manager and one financial manager) favored networking for acquiring valuable resources required for high performance and long term survival. However, one HR manager said that he has never tried to build networks for acquiring resources.

3. Does your human capital help in long term survival?

Answer: Two CEOs confirmed the importance of human capital in their venture success and profitability. Two HR managers also endorsed human capital in their firms as a crucial and intangible asset that is effective.

4. Have you enough financial capital to smoothly run your operation?

Answer: Three CEOs and two financial managers claimed that financial capital is the most significant factor in business success.

5. Which of the following factor(s) you think is(are) more important for high profitability?

- Entrepreneurial Strategy
- Network Capital
- Human Capital
- Financial Capital

Answer: Based on the average responses of CEOs, financial and HR managers, the most important was network, followed by financial capital,

entrepreneurial strategy and the least important was human capital for high performance.

6. What others factors do you think are most significant for long term survival?

Answer: Despite the above mentioned factors, we also let them disclose factors that can spur their survival. We received fragmented information as some enterprises claimed modern technology, new opportunities and new products while others were in favor of business expansion and massive number of customers.

Comparing the results of interview to questionnaires, a significant relationship exists between both as interview results endorse questionnaires.

DISCUSSION AND CONCLUSIONS

A plethora of research has been conducted to determine new venture success especially in emerging markets. However, the present study extends the existing literature by assessing the impact of financial capital, network ties, human capital and enterprise strategy on new venture performance. To achieve reliable results, we used a self-reported questionnaire.

In this study, we used the age of the firms, nature of business and gender of the executive, owners and top managers as control variables to check the impact of financial capital, network ties, human capital and entrepreneurial strategy on new venture performance in Pakistan. The regression analysis showed that all three control variables have insignificant influence on new venture performance. The results generated outcomes that age of firms, nature of industry and gender do not play a significant role in new venture performance.

However, the present study revealed that financial capital has a significant and positive relationship with new venture performance. The results supported our Hypothesis 1 proposed that financial capital and new venture performance have a significant and positive relationship. Similar results are also portrayed in previous studies. Consistent with Huang (2016), financial capital is a key factor, particularly for new

ventures, because it helps firms to identify new opportunities and gain high performance in dynamic markets (Ahlstrom et al. 2018a). In every stage of business operation, financial capital plays a significant role because firms can easily pay current liabilities, as well firms can utilize resources if sufficient funds are available. Our study favors Cooper et al. (1994) as financial capital is a crucial driver which protects firms from unexpected shocks.

Network ties were found to be significantly and positively related to new venture performance. The sample of the present study confirmed Hypothesis 2, that there is a significant and positive relationship between network ties and new venture performance. These results are in line with the previous studies such as Lechner and Dowling(2003) who scrutinized that firms establish different kinds of networks for different purposes but the ultimate goal of all networking is to promote business and to gain superior performance. Also, Manev et al. (2005) pointed out that network ties have a significant influence on firm performance in emerging economies. Saha and Banerjee (2015) also concluded that networking is a significant element in firm performance. Manev et al. (2005) argued that networking is an important element for emerging entrepreneurs because it helps a firm establish a network with external partners which may help to identify new opportunities and increase performance. In general, network ties help firms to connect with a new market, supplier and new customers which may result in higher sales and profitability.

Human capital was found to be positive but insignificant in the present study. The present study shows that human capital increases new venture performance but insignificantly. The present results do not support the Hypothesis 3 based on significance value. The results of the present study seem to be associated with previous studies such as Cooper et al. (1994) as some of the human capital is very strict and cannot be easily changed, and risk and benefit concerned with these factors can be expected. Similarly, meta-analysis results show that human capital dimensions have varied influence on venture success. All dimensions of intellectual capital do not significantly impact on entrepreneurs' success (Unger et al. 2011). Based on the study results we conclude that human capital is not a core driver in improving new venture performance in Pakistan. Other factors have greater importance and play a key role in the performance of a new venture. Krishna (2001) exposed that enterprises with social capital report poor performance.

Moving to the Hypothesis 4 that posited that there is a significant and positive relationship between entrepreneurial strategy and new venture performance is supported by the present study results. The same results found in previous studies such as Leitner and Guldenberg (2010) documented that the firms pursuing competitive strategy perform better than firms that have no competitive strategy. Firms pursuing such a strategy utilize modern technology, search for new ways of operation and thus result in higher performance in competitive markets. Lechner and Gudmundsson (2014) also concluded that the competitive strategy of an enterprise has a significant and positive impact on firm performance. Entrepreneurial strategy helps firms plan for the future market and opportunity. It helps to reduce different kinds of expenditures related to the operation, distribution, and marketing etc. and provide unique kinds of products so that customers purchase the product in bulk because they perceive that the product is new and offered at a lower price. Ultimately, sales increase resulting in a higher profit margin.

Correspondingly, the results indicate that the age of the firms, nature of industry and gender of the owner, executive and top managers do not play a significant role in the performance of new ventures. The most significant factors are the network ties that brings greater positive change in new venture performance as compared to financial capital and entrepreneurial strategy. However, entrepreneurial strategy has a greater influence on new venture performance as compared to financial capital and human capital. The study results also show that human capital has a positive but insignificant influence on new venture performance in the firms studied in Pakistan. It is a very important lesson for an entrepreneur, owner, executive, and top manager to give considerable attention to their network ties. They have to expand their network in order to bring greater positive change in the performance of newly established firms (Peng and Zhou 2005; Wang et al. 2008). However, owners, executives and top managers must also manage financial capital efficiently and create a strategy to enter into new markets as well as to grow and survive in dynamic markets.

Implications for Practice

Based on the present study results, we can say that financial capital, network ties, and entrepreneurial strategy are the significant and core

factors followed by human capital in the success and performance of new venture creation and survival. Our findings showed that network ties are the most significant factor in the performance of a new venture that must be focused followed by entrepreneurial strategy, financial capital, and human capital. Firms with broader network ties connect with more suppliers, customers, and business partners which result in increased sales and improved performance. Particularly for new venture performance, network ties are the most significant element in the dynamic market. Similarly, entrepreneurial strategy also plays a significant role in the success of the new venture as well as financial capital. However, human capital is a less important factor as compared to other factors in the present study. So, owners, executives and top managers have to consider their network ties with external partners but not ignore entrepreneurial strategy, financial capital, and human capital.

Limitations and Future Research

This study contributes to the existing literature by adding insights from Pakistan's emerging economy. The study also extends previous literature by examining key factors such as financial capital, network ties, human capital and entrepreneurial strategy which affect new venture performance in the emerging economy. However, the study is not free of limitations such as a small sample size, focused on a narrow area, only new ventures are targeted, as well as only core variables are selected as independent variables. The paper is very descriptive and the implied causality is questionable. If an emerging or pre-enterprise venture is assessed as promising, it can shape many of the explanatory variables. Similarly, the present study used few widely used statistic tests, i.e., correlation and regression, and it may be intended that some key outcomes can be generated by using other statistical tests. The study only focused on new ventures operating in the emerging economy of Pakistan.

In addition, as the study was conducted in the emerging economy of Pakistan, it would be more beneficial to conduct a study and compare developed and developing countries. The study used four independent variables (financial capital, network ties, human capital and entrepreneurial strategy) on new venture performance. Future researchers can use opportunity recognition as a mediator as well as entrepreneurial

education as a moderator to gain more favorable outcomes. Similarly, the comparison between new venture performance and old venture performance can be conducted.

Conclusions

Ventures in the early stages face countless problems; lack of resources, lack of support and newness that hinder their growth and survival in the dynamic markets. In response to the external changes and smooth running of operational activities, they need adequate resources and support. Steered by RBV and the social network theory, this research examined the influence of entrepreneurial strategy, network ties, human capital and financial capital on the performance of newly established ventures. Hypotheses of the research were tested on a data set of 196 Pakistani firms. The results indicate that entrepreneurial strategy, network ties and financial capital significantly and positively contribute to new ventures performance while human capital does not play a significant role in the performance of new ventures. The results suggest that newly established ventures should focus initially on building effective entrepreneurial strategies, establish relationships with external ties and acquire adequate financial capital for their growth and performance. Policy makers and SMEDA are advised to encourage and support new ventures which in turn can contribute to GDP and economic development. Practical implications and suggestions are also discussed.

Author Contributions

N.U.K. has prepared the original draft of the paper. S.L. supervised the paper and academic writing. M.N.S. helped in data collection, entry and initial analysis, and Z.U.K. analyzed the data and helped in interpretation.

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CHAPTER 8

DEVELOPMENTS IN RISK MANAGEMENT IN ISLAMIC FINANCE: A REVIEW

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ABSTRACT

The purpose of this study is to review recent developments pertaining to risk management in Islamic banking and finance literature. The study explores the fundamental features of risks associated with Islamic banks (IBs) as compared to those associated with conventional banks (CBs) in order to determine the extent to which IBs engage in effective risk mitigation. The study includes a consideration of the major studies in which the fundamental features of Islamic banks and finance (IBF) and the main characteristics of risk management in IBs are analyzed in comparison with those of CBs. Specifically, these two kinds of banks are compared in relation to the types of risks faced, the characteristics of those risks, and the nature and extent of exposure to those risks. A tabular methodology approach is used in concert with a comparative

literature review approach for the analysis. The results show that there is weak support for *Shariah*-based product development due to the lack of risk mitigation expertise in IBs. The conclusion presented is that in comparison with CBs, IBs are more risk-sensitive due to the nature of their products, contract structure, legal costing, governance practices, and liquidity infrastructure. Furthermore, the determinants of the credit risk of Islamic banks in Malaysia (MIBs) are examined. Overall, bank capital and financing expansion have a significant negative impact on the credit risk level of IBs in Malaysia.

Keywords: Islamic banks; conventional banking; risk mitigation; *Shariah* jurisdiction

INTRODUCTION

Since its inception, the banking industry—whether conventional banks (CBs) or Islamic banks (IBs)—has focused on risk-return trade-off activities. Both types of financial institutions serve as intermediaries between borrowers and lenders and provide avenues through which clients can invest and/or save their money. Through borrowing, lending, saving, joint venture, and investment activities, banks take commissions, charge fees, and thus make profits. In recent decades, banking services have expanded considerably, by for example providing credit to individuals and business entities. On this basis, the structure of various types of risks has become more complex. A bank's main function is to receive money from individuals and firms who have money they do not need immediately (depositors) and then channel it to clients who need the money (entrepreneurs) for diverse projects that are subject to various types of risks. These clients include individuals, partnerships, joint ventures, and/or corporations that are either privately/family owned or publicly listed on the stock exchange (Lucia and Peters 1993). Due to the development of the international financial market in recent decades, banks now offer services that extend beyond the relatively straightforward activities associated with depositors and borrowers to encompass the complicated investment avenues of financial institutions, markets, and financial planning. CBs have become one-stop financial centers offering a complete range of financial services to local and international clients. Most of the risk associated with these services is transferred to depositors

and investors without due regard to the nature of either the risk or the investment venue. The purpose of the present study is to review various types of risks associated with the financial industry, particularly as they relate to IBs.

In general, the financial industry provides efficient services to clients although most of these services are interest-based and interest (*Riba*)-bearing. However, financial services of this kind are prohibited under Islam due to the religion's original tenets and the ethical sensitivities of some sections of the wider Islamic community. Given that this is the case, many Muslims seek interest-free (without usury) financial transactions and an ethical approach to banking services. For example, more than 1.5 billion Muslims worldwide do not participate in interest-based banking systems due to the prohibition of interest in Islamic jurisprudence, i.e., *Shariah*. Faithful Muslims believe that clear regulations are revealed by God to the Prophet Muhammad (PBHU) in the Quran, according to which all business transactions should be free from *Riba* (interest) (Lewis 2011).

The Quran clearly states the prohibition of *Riba* in any business transaction. *Shariah* permits trade and, therefore, all Islamic Banks and Finance (IBF) products and services are based on either profit loss sharing (PLS) or other risk-sharing joint ventures. *Riba* is prohibited so that fair financial transactions can take place in line with the objectives of the Islamic banking system. This *Riba*-free financial system is an avenue through which all Muslims can conduct their financial transactions according to *Shariah* law. Regulated under *Shariah*, the IBF industry is based on five fundamental principles: (i) interest-free; (ii) ethical financial activities—*halal* (permissible); (iii) asset-based and asset-backed; (iv) partnership investments based on PLS between the financier and the entrepreneur; and (v) risk-sharing.

There are diverse reviews in the literature focused on multiple issues as they relate to IBs and CBs in various jurisdictions. These reviews cover topics such as the differences and similarities between IBs and CBs in terms of performance measures, bank size, corporate governance, and risk. Some recent examples are Cerović et al. (2017), Sun et al. (2017), Khan et al. (2018), Salih et al. (2018), and Hassan and Aliyu (2018). The most comprehensive review briefly covering all areas of IBs and CBs is presented by Hassan and Aliyu (2018). The objective of the present paper

is to review the literature in the area of risk management, the features of risks and risk mitigation in IBs relative to CBs. Moreover, major differences between IBs and CBs in relation to risk-return complexities are examined. Our research also contributes to the literature through a review of major studies that analyze the fundamental features of IBF and the main characteristics of risk management in IBs compared to CBs. Further, IBs and CBs are compared in relation to the risks faced by IBs, the characteristics of those risks, and the nature and extent of the banks' relative exposure to them. A new framework is proposed for classifying risks in which the reality of market risk and unique risk is taken into account. Moreover, we investigate the determinants of the credit risk of Islamic banks in ASEAN countries via an empirical study employing data from Malaysian Islamic banks. We conclude that bank capital and financing expansion have a significant negative impact on the credit risk level of IBs in Malaysia. The remainder of this paper is structured as follows: In Section 2, we provide a detailed description of the IB industry including its history, structures, and types of contracts, and a comparison between IBs and CBs is also offered. We present a detailed discussion of the risks involved in banking and the risk management strategies used to mitigate them, particularly in regard to IBs, in Section 3. In Section 4, the determinants of credit risk for IBs in Malaysia (MIBs) are identified and considered. Section 5 concludes the study with a summary of the main themes covered and a consideration of the implications of the results reported.

ISLAMIC FINANCIAL INSTITUTIONS (IFIS)

History of Islamic Financial Institutions (IFIs)

The history of Islamic finance and Islamic Financial Institutions (IFIs) is more than a thousand years old, and during much of that time there were no major financial crises in Muslim-ruled territories in Asia, Europe, and Africa. However, in the recent past, the IBF industry has changed dramatically, due to several historical processes: the colonization of Muslim lands, which began with the rise of the European empires, such as the reconquest of Spanish Muslim territories by 1492; the overthrow of the Mughals in India in 1857; the “scramble for Africa” in the nineteenth

century by the emerging European colonial empires; and the division of the Ottoman Empire’s Arab territories as a result of the Sykes-Picot Agreement in 1915. The colonial era more or less came to an end after World War II, when Britain and then France withdrew from the majority of their colonial Muslim territories. The modern-day history of IBs and/or IFIs begins when formerly colonized Islamic countries became independent after World War II. Given this history, we can divide the history of IBF into two phases: the early days of IFI transactions and modern-day experiments and developments.

The first period starts from the time of the Prophet Muhammad (PBUH) including the period of the Orthodox Caliphate, the noble companions and the succeeding generations up to and including the Umayyad and Abbasid Eras. The second period, which encompasses modern-day IBF, actually began during the nineteenth century. The timeline is given in detail for the second period in Figure 1, incorporating IBF and IFI activities from 1962 to 2016.



Figure 1. Islamic banking history timeline.

Modern conventional banking in the Islamic world began in Egypt and India. In the 1890s, during the Ottoman Empire, Barclays Bank opened its first branch in Cairo, which immediately drew serious criticism from Islamic scholars about the interest-based nature of the financial transactions taking place there. Barclays closed the branch as a result. A similar incident occurred in British India where Islamic scholars resisted interest-based financial transactions by issuing a unanimous *Fatwah* (decree or religious ruling), which led to the birth of IBF during the 1940s. India's Muslims avoided dealing with these banks and instead sought alternative interest-free savings and loan societies, which began operating in pre-partition India. After 1947, these societies spread to newly born Pakistan. However, the development of IFIs was very slow due to a lack of trust on the part of both the general public and governments due to the absence of any formal regulatory body.

In 1975, about 35 years after the introduction of interest-free savings and loan institutions to the Indian subcontinent, Dubai Islamic Bank began operating as the first IFI for the private corporate sector. Since then, IFIs have expanded globally to both Muslim and non-Muslim countries. The fast growth of IFIs was strongly supported by Muslims who thirsted for Islamic products and services. Today, these institutions offer an extensive portfolio of products and services, including Islamic “windows,” Islamic investment banks and funds, Islamic mortgage companies, *Takaful* (Islamic insurance) companies and *Mudharabah* (profit-sharing) companies (Iqbal and Mirakhor 2007). IFIs are constantly growing both in number and in terms of the types of services offered in response to a high level of demand. However, according to Laldin (2008), in certain countries, IFIs are quite limited due to a lack of expertise and *Shariah*-compliance issues. For example, the weak legal and tax framework, which stymies the development of a viable Islamic financial market.

There are at least five types of IFIs, of which IBs constitute the first and most established Islamic institutions operating according to *Shariah* principles. In certain countries, various products and services are offered through an Islamic window established at CBs that are non-fully-fledged IBs. This Islamic window located in a CB is defined as a special arm operating within conventional banking groups. This arm offers *Shariah*-compliant products and services that are similar to those offered by IBs but with a limited product range. The Islamic window is a stepping stone to a fully-fledged IB. For example, in Malaysia in

reference to the CB industry operating there, Bank Negara Malaysia (BNM) began offering *Shariah*-approved products and services in 1993 through the Islamic window, which is also known as an Interest-Free Banking Scheme (IFBS).

Definitions and Structure of IFIs

There are various definitions of IFI and IBF in the literature. For example, Khir et al. (2008) define IBF as financial institutions in which the objective is to implement the economic and financial principles of Islam. However, a few scholars have considered IB to be an alternative to the CB system as practiced in Western countries (Akkizidis and Khandelwal 2008). Moreover, Archer and Karim (2009) argue that an IB is a company that acts as a financial intermediary between depositors and borrowers in order to connect the supply and demand of funds. IBs also provide other banking services similar to those provided by CBs. The Organization of Islamic Cooperation (OIC) defines an IB as a financial institution whose statutes, rules, and procedures expressly state its commitment to the principles of *Shariah* and to the banning of the receipt and payment of interest in any of its operations. The Malaysian Islamic Banking Act of 1983 defines an IB as a company that conducts Islamic business, i.e., a banking business whose aims and operations do not involve any element not approved by the religion of Islam. To this end, even other religious groups support the ethics and practices of IBF. For example, the Vatican has stated that Islamic finance could help Western banks in times of crisis.

IBs were established in order to (i) promote, foster, and develop banking services and products based on Islamic principles; (ii) contribute to Islamic economic development; and (iii) ensure the best allocation of resources and create equality in the distribution of wealth. IBs were established to help people regardless of their circumstances or personal characteristics, e.g., the extent of their wealth, their community or society, or their beliefs. The operations of IBs are based on *Shariah* principles. What primarily differentiates IBs from CBs is that neither *Riba* (interest), *Gharar* (uncertainty), nor *Maysir* (gambling) feature in the operations of IBs. *Riba*, which refers to interest charged on

loans or received from investments, is prohibited under Islamic law and considered *haram* (non-permissible). According to *Shariah* principles, IBs are not allowed to incur any fees for transactions or receive any interest. The second prohibition that applies to IBs is *Gharar*, which can be defined as undertaking a venture blindly without sufficient knowledge or engaging in excessively risky transactions. In IB contracts, all the terms should be specific and clearly explained, although minor uncertainty can be permitted when necessary. The last prohibition in Islamic banking is *Maysir*, which refers to the acquisition of wealth by chance, no matter whether or not it deprives another party's right or any game of chance (Ayub 2007). Examples are buying a lottery ticket, winning the lottery, making futures transactions, and engaging in short selling.

The IB system promotes profit- and risk-sharing—a practice designed to render financial transactions fair to all the parties involved. An IB can invest a depositor's money in permissible businesses to earn a variable return, which can be shared with depositors through an agreed PLS contract. Unlike CBs, the rate of return is not fixed in the early investment period. It is only known at the end of the investment period, which promotes fairness in financial matters, as IBs share actual returns with investors. The five most important pillars of Islamic banking (Ayub 2007; Khir et al. 2008) can be summarized as follows:

- Prohibition of *Riba* (interest): Under *Shariah*, Muslims are strictly prohibited from any involvement in *Riba*-based activities, whether in terms of paying interest or receiving it.
- Sharing of Equity Contribution: As *Riba* is prohibited in *Shariah*, IB operations are based on equity contributions. The supplier of a fund (investor) and the borrower (entrepreneur) are required to share the profit and risk arising from the transaction. This kind of PLS contract is at the heart of IFI.
- Money is considered a medium of exchange: In Islam, money cannot generate money on money. Instead, money should be treated as capital and any profit/loss must be shared between parties as per the proportion of their investments. All such transactions must be backed by assets.
- *Gharar*: Excessive uncertainty and speculation must be avoided because these lead to *Maysir* (gambling), which is prohibited.

- The purity of contract: Under *Shariah*, IFI contracts should have clear disclosure in order to reduce the risk of exposure to the contract. This means strict sanctity of contracts is required in IFI transactions.

All IFI contracts should be based on the five pillars. In fact, failure to adhere to any one pillar renders an IBF contract void. For example, in a sales contract, the asset (good) must exist and be permissible according to *Shariah*, and the selling price should not include *Riba*.

In IB operations, all products and services are offered based on three main types of contracts: (i) trading contracts, (ii) participation contracts, and (iii) supporting contracts (Khir et al. 2008). Participation contracts are based on a PLS agreement, whereas trading and supporting contracts are also known as non-profit and loss-sharing (NPLS) contracts. Hanif and Iqbal (2010) argue that a participation contract is a *Shariah*-based product, whereas trading and supporting contracts are *Shariah*-compliant products. In trading and supporting contracts, returns are predetermined and fixed subject to *Shariah* constraints whereas, in *Shariah*-based products, returns are not predetermined. *Shariah*-based products entail establishing a fixed agreed sharing ratio for PLS in advance. Table 1 summarizes the types of contracts (Iqbal 2011) offered by IFIs and IBs.

Table 1. Types of Financial Contracts Currently Offered by Islamic Banks.

Trading Contract		Participation Contract		Supporting Contract	
(i)	<i>Istisna</i>			(i)	<i>Al-Rahmu</i>
(ii)	<i>Ijarah</i>			(ii)	<i>Al-Kafalah</i>
(iii)	<i>Bai-Bithaman Ajil</i>	(i)	<i>Musharakah</i>	(iii)	<i>Qard Al-Hasan</i>
(iv)	<i>Bai-Inah</i>	(ii)	<i>Mudharabah</i>	(iv)	<i>Hawalah</i>
(v)	<i>Murabahah</i>	(iii)	PLS: Profit/loss sharing	(v)	<i>Tabarruu'</i>
(vi)	<i>Salam-forward</i>			(vi)	<i>Hibah</i>
(vii)	<i>Wadiah</i>			(vii)	<i>Ibraa'</i>

The prohibition against *Riba* does not prevent Muslims from engaging in trade based on PLS and thereby realizing profits from participation (equity), supporting (fee), or trading (cost-plus) contracts. According to Ariff(1988), although Islamic law forbids the imposition of interest, this does not mean that capital is without cost in Islamic banking, rather the cost incurred by the borrower is a factor of production in Islamic law.

Profit-sharing contracts constitute a viable alternative to replacing the function of interest (Kahf 1999). One example of this kind of contract is *Mudharabah* or trust financing under the participation (equity) contract. In this type of contract, the IB provides capital (*Rabb ul-mal*) and the user of the capital is the entrepreneur (trustee of the venture). The profit to be realized is predetermined based on an agreed ratio, and any loss is borne by the IB. Further, although this is the case, the IB has no say in how the entrepreneur runs the business thus funded. The second type of participation contract is *Musharakah*. Here, both parties, i.e., the IB and the entrepreneur, contribute capital investment and share profit/loss as per an agreed ratio. IBs oversee the investment in order to foster profitability (Samad et al. 2005). Some of these traits do not exist in CBs.

When IBs began operating in countries where CB services are offered, they began with trading or cost-plus principles, which though *Shariah* compliant does not entail a *Shariah*-based product. Under a trading contract, products are offered based on cost-plus or mark-up principles. That is, an IB purchases a given asset in exchange for a negotiated profit margin (Samad et al. 2005). In this case, the *Murabahah* contract is the best example of a cost-plus-profit margin in which IBs purchase an asset on behalf of the entrepreneur and later resell the asset back to the entrepreneur at a predetermined price. The resale price includes the cost and profit margin agreed to by both parties. The entrepreneur can choose to repay the IB either in the form of a lump sum or installments. IBs also offer products and services based on the supporting contract under which a small fee may or may not be charged to process the contract. For example, *Qard Al-Hasan* (benevolence financing), no fee is charged to the customer.

All types of contracts in Islamic banking are unique, accepted worldwide, and growing faster than contracts offered by CBs. Currently, IFIs dominate the industry in oil-producing countries (Iran, followed by Saudi Arabia and the GCC countries) with the exception of Malaysia, which is ranked third. In GCC countries, the country with the fastest growing IFI sector is the UAE, where this sector is expected to reach US\$265 billion by the end of 2019. This will make the UAE the fourth largest IFB market by value. Currently, there are nine IBs in the UAE with overseas branches catering to the needs of *halal* finance for Muslim minorities. The Omani IBF industry is new compared to the IBF in the rest of the GCC countries. Six banks offer IBF products, among which

are Al Noor, Al Izz Islamic Bank, and Dubai Islamic Bank. However, IBF windows and other services are provided by Bank Nizwa, Bank Muscat, and the National Bank of Oman. Yet, faithful Omanis prefer to conduct their *Shariah*-compliant banking across the border in the UAE.

Conventional Banks vs. Islamic Banks

According to Abedifar et al. (2015, p. 637), “Apart from key exceptions, the empirical literature suggests no major differences between Islamic and conventional banks in terms of their efficiency, competition and risk features.” In fact, IBs are operationally similar to CBs¹ with the exception of *Shariah* compliance. In addition to the differentiation between products and services, the composition of sources and uses of funds in IBs also differ from those of CBs. For IBs, income is derived from savings accounts, current accounts, and restricted or unrestricted investment accounts. All four sources of income are based on *Al-Wadiah* and *Mudharabah* contracts. These funds can be used in PLS or Non-PLS contracts. The depositors or investors are the shareholders and receive a return if a profit is made but also share equally with borrowers any losses. Unlike with CBs, the investment return is unknown at the beginning of the contract. However, the ratio of profit sharing and loss is determined in advance and agreed to by both parties. Consequently, IBs offer depositors the opportunity to invest in a few products suited to their investment objectives.

The financial statements for IBs differ from those of CBs with just a few exceptions. For example, fixed assets and shareholder equity, cash in IBs are strictly for cash items only, whereas cash in CBs usually consists of cash and other interest-bearing assets such as treasury bills. The differences between CBs and IBs in terms of financial statements are presented in Table 2. A comparison of the respective banks’ features is presented in Table 3. To ensure that they operated in compliance with *Shariah*, IBs in Malaysia (MIBs) were regulated initially by the Islamic Banking Act (IBA) of 1983 and overseen by Bank Negara Malaysia (BNM). However, the BNM introduced the Takaful Act in 1984 and the Islamic Financial Services Act (IFSA) in 2013. Further, the BNM set out the IFSA with the goal of promoting financial stability and compliance with *Shariah* law. Under both statutes, all IBs are required

to have a Shariah Supervisory Board (SSB), which plays a major role in advising management on *Shariah*-related issues. In fact, all products and services must be approved by the SSB. In a study on the impact of the SSB on risk based on a sample of 102 Islamic banks in 28 countries, Safiullah and Shamsuddin (2018) found operational and insolvency risks in Islamic banks decline with an increase in SSB size and the proportion of SSB members with higher academic qualifications but increase when the proportion of SSB members with reputation is higher.

Table 2. A Comparison of the financial statements of conventional banks (CBs) and Islamic banks (IBs).

Conventional Bank (CB)	Islamic Bank (IB)
Assets Cash and liquid assets (including treasury bills and notes) Investments & deposits Loan portfolios Fixed and other assets	Assets Cash and cash equivalents Sales receivable (<i>Murabahah</i> and others) Islamic financing assets including <i>Mudharabah</i> , <i>Musharakah</i> , <i>Ijarah</i> , <i>Istisna</i> , and <i>Salam</i> Fixed and other assets
Liabilities and Equity Deposit (current & saving accounts) Promissory notes Minority interest Borrowing and other liabilities Shareholders' equity	Liabilities and Equity Saving and current accounts <i>Salam</i> and <i>Istisna</i> payables Other liabilities (<i>Zakat</i> and tax payable) Depositors' share of profit

Table 3. Main differences between conventional banks (CBs) and Islamic banks (IBs).

No.	Item	Conventional Bank (CB)	Islamic Bank (IB)
1	Principle	Based on fully artificial principles.	Based on <i>Shariah</i> principles.
2	Prohibited elements	Not applicable.	Free of the following prohibited elements: 1. <i>Riba</i> 2. <i>Gharar</i> 3. <i>Maysir</i>
3	Risk sharing	Investor is certain to receive a predetermined rate of interest.	Islamic banking promotes risk sharing between the provider of capital (investor) and the recipient of capital (entrepreneur).
4	Products	Not applicable	<i>Shariah</i> -compliant products.
5	Asset-backed Financing	Banks and financial institutions deal in money and monetary papers only.	Does not recognize money as a subject-matter of trade.
6	Moral dimension	Not concerned about the moral implications of the activities financed and are not transparent.	Works within the moral values of Islam, cannot finance any projects that conflict with Islam and promotes transparency.
7	<i>Zakat</i> (religious tax)	Do not deal in <i>Zakat</i> .	It is compulsory to pay <i>Zakat</i> .
8	Penalty on default	Additional interest charged on default payment.	No extra charge on default payment.
9	Customer relationship	Relationship between a bank and its customers as a creditor and debtor.	Status of a bank is in relation to its customers as a partner, investor, and entrepreneur.
10	<i>Shariah</i> Supervisory Board (SSB)	Not applicable.	Each Islamic bank must have a <i>Shariah</i> Supervisory Board (SSB) to ensure all business activities are in line with <i>Shariah</i> .

The differences, as outlined in Table 3, suggest that IBs may be exposed to different risks which require alternative risk management approaches.

In addition to the main differences between IBs and CBs, in a number of studies conducted a comparative analysis of performance measures and bank size between IBs and the CBs are reported. For example, El Massah and Al Sayed (2015) used six years of panel data to perform an empirical comparison of IBs and CBs in terms of their performance in the UAE. The researchers drew on the financial ratio using profitability, liquidity, solvency, and credit risk as a performance measure and observed that CBs outperformed IBs. However, Olson and Zoubi (2017) observed that IBs performed better than CBs did during the financial crisis.

In regard to bank size, Abedifar et al. (2013) argued that smaller IBs have lower credit risk and insolvency risk as compared to those of the CBs. They also observed that small IBs in majority Muslim countries had a lower credit risk than did small CBs. Further, Olson and Zoubi (2017) and Beck et al. (2013) concluded that large IBs are less profitable than small CBs.

Risks in Banking

Risk is defined as the measure of uncertainty associated with any given business activity, including banking (Oldfield and Santomero 1997). Hence, both IBs and CBs are exposed to risk in their daily operations. For example, interest rate volatility² has an impact on the cost of funds and profits. According to Čihák and Hesse (2010), risk is simply a measure of uncertainty, the chance that some event will have an impact on objectives. In the case of banking operations, risk can result from the uncertainty of profit or loss in daily operations, such as deposits and loans. Risk can presage a major disaster for any financial institution including IBs. For this reason, it is critical that banks continuously define and identify the risks involved in their business activities.

In general, financial institutions are exposed to systematic and unsystematic risks, both of which have negative consequences for the institution's performance should it fail to manage operational risks effectively. Excessive risk exposure can negatively affect the profitability

of a bank, thereby placing its future in jeopardy. The 2008 global financial crisis (GFC) brought with it a rapid fall in excessive risk-taking activities. Abedifar et al. (2015) found that in the wake of the GFC, the Islamic world showed an increased interest in risk in banking. Saunders and Cornett(2006) identified five risk categories: (i) credit risk, (ii) interest rate risk, (iii) liquidity risk, (iv) underwriting risk, and (v) operating risk. Others identified three kinds of risks: (i) credit risk, (ii) market risk, and (iii) operational risk (Apostolik et al. 2009; Basel 2003; Carey and Stulz 2005).

Risk in Islamic Banking

Iqbal and Mirakhor (2007) classified risk in IFIs into four major categories: financial risk, business risk, treasury risk, and governance risk. Financial risk refers to the possibility of incurring a direct financial loss of assets and liabilities, and it is one of the first risks to appear in a discussion about risk management policy. For IFIs, financial risk is unique due to the nature of the contract. IFIs face three types of financial risk—credit risk, market risk, and equity investment risk—whereas traditional financial institutions face only credit risk and market risk (Iqbal and Mirakhor 2007; Hassan et al. 2018).

Business risk is linked to business activities and the environment, as well as to any changes or movements in regard to macroeconomics or policy, legal and regulatory factors, and the financial sector's infrastructure, such as payment systems and the auditing professions (Greuning and Iqbal 2008). IFIs are also exposed to regular business risk similar to that experienced by conventional financial institutions. However, according to Iqbal and Mirakhor (2007), IFIs are exposed to one business risk in particular: the rate of return risk. Risk of insolvency is considered a business risk because a business risks becoming insolvent when its capital is insufficient to sustain its operations and neither a capital solution nor an operational solution is forthcoming.

In reference to treasury risk, IFIs face two types of risks: liquidity risk and hedging risk. The treasury risk is related to asset and liability management, short-term liquidity management, and cash and equity management. For

IFIs, liquidity risk is considered one of the most critical risks due to: (i) the limited liability of the *Shariah*-compatible money market and inter-bank market; and (ii) the shallow nature of the secondary market for Islamic financial instruments. Ray (1995) identifies lack of liquidity as a major problem for IBs and states that there are two reasons for IBs to experience this problem: (i) a gap may exist between the central bank and the IB whereby the former refuses to provide funds on a basis other than interest lending, and (ii) the limited number of financial instruments accepted as *Shariah*-compliant.

Finally, IFIs are subject to governance risk, i.e., to risk arising from a failure on the part of the governing institution, negligence in conducting a business, and meeting contractual obligations and from a weak internal and external institutional environment. Governance risk includes legal risks whereby financial institutions are unable to enforce their contracts (Iqbal and Mirakhor 2007). Here, IFIs must deal with *Shariah* risk, whereas this is not an issue for conventional financial institutions.

We propose a framework for grouping the risks to which IBs are subject by drawing on, advancing, and adapting some of the key insights in the literature. Figure 2 illustrates the risk profile of IBs by presenting a systematic and unsystematic risk classification. In this framework, there are three risk groups: systematic, unsystematic, and a combination of the two called-systematic/unsystematic risks (SUR). In this new framework, the only kind of systematic risk is business risk. Governance risk, which consists of operational, reputation and *Shariah* risks, is classified under unsystematic risk. Financial risk and treasury risk are classified under SUR because these can be either systematic or unsystematic risks.

Consisting of credit risk, market risk, and equity risk, financial risk derives both from external and internal sources. For this reason, financial risk cannot be classified entirely under either systematic or unsystematic risk. For example, credit risk is of a default payment by the borrower, but IBs operate as an entrepreneur/buyer in that they provide financing rather than just a standard loan. Therefore, IBs face a credit risk from possible changes in the economy generally, from specific market conditions, and from internal weaknesses in the banks. Under *Shariah*, an IB is either an investor or seller when it provides financing to customers.

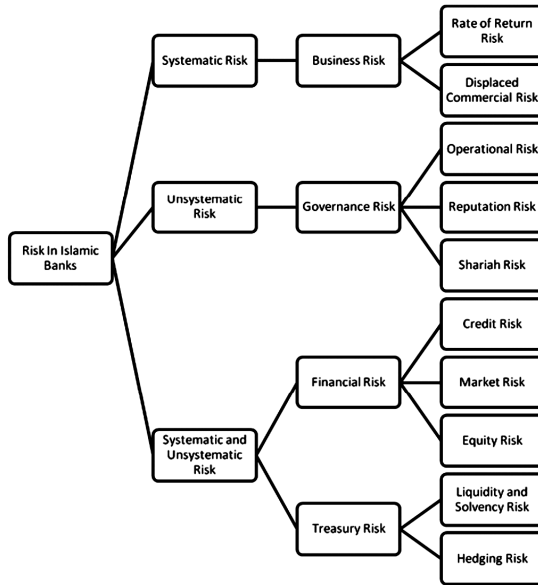


Figure 2. Classification of risks faced by IBs.

In this way, the IB can control its risk exposure when making decisions about providing any finance. Poor decisions will worsen the possibility of credit risk in the future. Further, risk has become a significant challenge for IBs in the current era of globalization. In order to ensure the survival of IBs in the finance market, effective risk management is essential to satisfy the financial needs of customers, remain in compliance with *Shariah*, and ensure the long-term future of the IB.

Unique Nature of Risk in Islamic Banks (IBs)

IBs are unique not only in terms of their principle of operations but also in relation to risk-related issues. For this reason, in a few early studies, researchers referred to the far-reaching effects of *Shariah* on banking operations to argue that IBs are subject to greater risk compared to conventional banks. This argument refers to applied research (Abedifar et al. 2013; Akkizidis and Khandelwal 2008; Čihák and Hesse 2010; Hassan and Dicle 2005; Sundararajan and Errico 2002). Ahmed and Khan (2007) contend that IBs face two types of risks: firstly, risks similar to those faced by CBs; and secondly, risks uniquely associated

with *Shariah* compliance. According to Makiyan (2008), *Shariah*-related risk can be further classified as specific to IBs, e.g., risks related to PLS contracts, and general risks associated with IBs, e.g., legal, corporate governance, and market structures.

In two studies (Abedifar et al. 2013; Čihák and Hesse 2010), researchers identify various types of risks and explore the differences between IBs and CBs in this regard. Both research groups relied on data from Islamic Cooperation (OIC) member countries at the end of the 20th century into the first decade of the 21st century: Abedifar et al. (2013) used a sample of 24 OIC member countries for the years 1999–2009 whereas Čihák and Hesse (2010) used a sample of 20 OIC member countries for the years 1993–2004. In both studies, small IBs were found to have a lower default risk than did small CBs, and larger IBs were found to have a higher default risk where insolvency risk is higher. However, Beck et al. (2013) did not find differences in these kinds in a sample of banks from 141 countries for the period of 1995 to 2007. Furthermore, based on 20 countries for the period of 1995–2010, Pappas et al. (2014) showed that in comparison with CBs similar IBs have significantly lower failure rates. In a study by Saeed and Izzeldin (2016) for a sample of seven countries for the period of 2002–2010, default rates were reported as inversely related to profit efficiency for IBs, although the opposite was shown for their conventional counterparts.

The specific nature of risk and the unlimited number of ways in which a project can be financed using either profit- or loss-sharing or non-profit or loss-sharing contracts forces IBs to take more risks than CBS take (Sundararajan and Errico 2002). Deposit and lending activities as practiced by IBs are based on either the PLS or NPLS principle. The PLS principle promotes risk sharing between the lender of the capital and the borrower of that capital. The relationship between the bank and its customers is not a relationship only between a lender and a borrower, however. It is also a relationship between an investor and an entrepreneur. This principle of sharing is an equitable way to create wealth including by fostering fairer income distribution with a general goal of furthering the cause of economic justice and thus greater and more widespread prosperity (Rosly 1999). However, this situation invites a specific risk that cannot be avoided by IBs. For example, in *Mudharabah* financing, default on the part of the entrepreneur cannot be recognized until the

contract has expired. Furthermore, IBs as the providers of capital does not have any legal control over either the entrepreneurs or the businesses thus financed. The non-profit and loss contract of financing also exposes IBs to significantly more risk than is the case for CBs. For example in *Ijarah*(leasing) financing, IBs do not have the option of transferring substantial risk and reward to the lessee because leased assets must be documented on the balance sheet of banks for the whole term of the lease (Makiyan 2008).

In regard to the risk involved in each type of contract used by IBs in taking deposits and providing financing, the main risks involved in equity-based financing (EBF) are credit and equity risks. In EBF, IBs are investors in a project proposed by an entrepreneur. In this arrangement, all parties share profits and losses as per an agreement. No collateral nor guarantee of any kind constitutes any part of EBF. All these factors expose IBs to more risks than is the case for CBs. In trading-based financing (TBF), IBs are exposed to credit, market, and *Shariah* risks. This type of financing contributes the largest proportion of the total financing in IBs, especially in Malaysia. This financing is based on cost-plus or buy-and-sell-back contracts. In most cases, an IB acts as the seller whereas the customers are the buyers of the given assets.

Sundararajan and Errico (2002) found that specific risks are attached to various non-PSLB (Profit-Sharing and Loss-Bearing) methods, for example, *Salam* and *Ijarah*. In regard to *Salam*, IBs are exposed to both credit and commodity price risks. In *Ijarah*, IBs bear all the risks until the end of the lease period, as unlike CBs, they cannot transfer ownership in lease contracts. Čihák and Hesse (2010) claim the uniquely extensive and multifaceted nature of the risks faced by IBs results both from the specific nature of the PLS and NPLS contracts and also from the legal, governance, and liquidity infrastructure of Islamic finance. These factors cause IBs to be more vulnerable to unfavorable events compared to conventional finance institutions. According to Akkizidis and Khandelwal (2008), the scarcity of hedging instruments, the undeveloped inter-bank money markets, and the market for government securities all limit the ability of IBs to handle the risks to which they are subject. IBs are constrained in using some risk mitigation instruments that their conventional counterparts use, for instance, options, futures, and forward instruments, which are not compatible with *Shariah* principles (Ahmed 2011). Additionally, IBs are prohibited from transferring risk through

debt-selling activities, popularly known as credit derivatives (Ahmed and Khan 2007). These issues send a signal to regulators to be more proactive in order to promote soundness in the IB system. Some countries, including Malaysia, provide a few facilities, e.g., the Islamic inter-bank money market and specific legal frameworks for exactly this purpose. Yet, the global IB industry needs the collective will of all countries to guard the industry against excessive exposure to risk.

Risk Management of Islamic Banks (IBs)

Risk management is a cornerstone of responsible banking operations. In short, sound risk management principles and effective risk management practices will indirectly increase the profitability of banks and ensure their survival. Acknowledging the need for sound risk management and a corresponding comprehensive risk-management framework, the Basel Committee on Banking Supervision (BCBS) introduced risk guidelines for commercial banks (Abu Hussain and Al-Ajmi 2012). In the wake of the GFC, risk management became even more important. In Rahman and Shahimi's (2010) view, risk management is more important in the financial services sector than any other part of the economic system. This is because the existence of a weak risk management system has implications that go far beyond the immediate losses borne by individual banks. Instead, extensive losses in the banking context can lead to the collapse of individual banks and even to the banking system more generally with serious implications for the economy in a broad sense.

Effective risk management protects an organization's assets and profits by reducing the potential for loss and mitigating the impact of loss when it does occur, thereby ensuring a swift recovery (Coffin 2009). According to Galai et al. (1999), financial risk management is the process by which managers identify risks involved in transactions, understand and measure those risks, determine the factors involved in them, and establish and implement procedures to reduce them. Waring and Glendon (1998) as cited in Kalapodas and Thomson (2006) contend that risk management practices are put in place in an effort to eradicate, reduce, and manage risk, and to increase the benefits of while avoiding the harm associated with taking risk. In other words, risk management can be defined as the avoidance of risky activities or when the risk cannot be avoided,

transferring the risk to a third party. In a study focused on the determinants of the risk-taking of IBs in seven countries for the period of 2006–2009, Hassan and Mollah (2014) found that the nature of *Shariah* boards does not seem to limit risk-taking. Conversely, corporate governance and financial disclosure issues are the key factors for risk-taking in IBs.

Risk management is an ongoing process that depends directly on changes in the internal and external environments of banks (Abu Hussain and Al-Ajmi 2012). For IBs, risk management is very complicated because IBs cannot simply replicate the established practices of CBs. However, in terms of the risk management process, IBs are similar to CBs. However, Kayed and Hassan (2011) have argued that the respective risk management processes of IBs and CBs are, in fact, similar, inasmuch as both kinds of banks begin with risk identification, mitigation, and efforts to control exposure to risk in order to maintain profitability. Unlike CBs, however, IBs must ensure that as the framework develops, all the tools used are in line with the requirements of *Shariah*. In the context of IBs, risk identification is a two-step process: The first is negative *Shariah* screening, which excludes *Riba-*, *Gharar-*, and *Maysir-*based transactions—this step reduces exposure to risk to a level considered to be appropriate. The second is positive screening, which emphasizes justice, ethics, and accountability issues. Every product offered by an IB must be subjected to the first screening, which is conducted by the bank's *Shariah* board.

In Table 4, a summary is presented of the research on risk management as practiced by IBs. In all the studies focused on risk management in IBs to date, as the table shows, a mixed-methods analysis is used. A brief account of each study is also presented in the table. However, we elaborate on some of the most important studies here. For example, Masood et al. (2012) found that IBs in the UAE are more likely to use newer, sophisticated and robust credit risk management techniques of credit risk management than the non-Islamic banks. Abedifar et al. (2013) found that in general, small IBs in majority Muslim states had a lower credit risk than did CBs of a similar size. Most recently, Hassan et al. (2019) published a study on the relationship between liquidity and credit risk by using a simultaneous structural equation approach to 52 IBs and CBs

for the period of 2007–2015. They observed that credit risk and liquidity risk have a negative relationship for CBs and for IBs, whereas a negative relationship between liquidity risk and stability is observed only for IBs. The researchers also found that IBs are better risk managers relative to CBs. In our paper, Figure 2 models a detailed breakdown of the risk structure through which IBs mitigate risk.

Table 4. Studies investigating risk management in Islamic banks (IBs).

Study	Methodology	Research Questions	Main Results
Hassan et al. (2019)	Simultaneous structural equation (SEM) approach	<ul style="list-style-type: none"> • What is the relationship between liquidity risk and credit risk in IBs? • What is the impact of liquidity risk on bank stability? • What is the performance difference of IBs and CBs with respect to liquidity, credit risk, and bank stability? 	<ul style="list-style-type: none"> • There is a negative relationship between liquidity risk and stability for only IBs. • Islamic banks are better than conventional in managing risk.
Mokni et al. (2015)	Descriptive statistics	<ul style="list-style-type: none"> • What is the current state of risk management among IBs and CBs in the MENA region? 	<ul style="list-style-type: none"> • Credit risk is considered the most important for both CBs and IBs followed by liquidity risk. • CBs and IBs continue to rely on traditional credit risk mitigation tools.
Abedifar et al. (2013)	Regression analysis	<ul style="list-style-type: none"> • What is the state of bank credit and insolvency risk for IBs and for CBs with Islamic windows? 	<ul style="list-style-type: none"> • Small IBs in majority Muslim states were shown to have a lower credit risk than did CBs of a similar size.
Abedifar et al. (2013)	Regression analysis	<ul style="list-style-type: none"> • What is the state of bank credit and insolvency risk for IBs and for CBs with Islamic windows? 	<ul style="list-style-type: none"> • Small IBs in majority Muslim states were shown to have a lower credit risk than did CBs of a similar size.
Masood et al. (2012)	Logistic regression	<ul style="list-style-type: none"> • What are the differences between Islamic and non-Islamic banks in the UAE in regard to credit risk management? 	<ul style="list-style-type: none"> • IBs in the UAE are more likely to use newer, sophisticated and robust credit risk management techniques of credit risk management than the non-Islamic banks.
Khalid and Amjad (2012)	Regression analysis	<ul style="list-style-type: none"> • To what extent do Islamic banks in Pakistan use risk management practices (RMPs) and techniques in dealing with different types of risk? 	<ul style="list-style-type: none"> • Islamic banks are reasonably efficient at managing risk. • Understanding risk and risk management and risk monitoring and credit risk analysis are the most influential variables in RMPs.

<p>Abu Hussain and Al-Ajmi (2012)</p>	<p>Regression analysis</p>	<ul style="list-style-type: none"> • Do bankers understand risk and risk management? • Do banks identify the potential risks to which they are exposed? • Do banks have a system in place for assessing and analyzing risk? • Do banks monitor and control risks efficiently? • Do banks have efficient risk management strategies in place? • Do banks examine credit risk efficiently? • What types of RI methods do banks use? • What types of risks are banks exposed to? 	<ul style="list-style-type: none"> • Banks in Bahrain have a clear understanding of risk and risk management and follow efficient risk-identification, risk-assessment analysis, risk-monitoring, credit risk-analysis and risk-management practices. • IBs differ from their conventional counterparts in understanding risk and risk management. • The three most important risks facing both CBs and IBs are a credit risk, liquidity risk, and operational risk. • IBs face greater risk than CBs do. • Country, liquidity, operational, residual, and settlement risks are greater for IBs than for CBs.
<p>Hassan (2011)</p>	<p>Regression analysis and ANOVA</p>	<ul style="list-style-type: none"> • What is the current state of risk management in Islamic and conventional banks in the Middle East? 	<ul style="list-style-type: none"> • There is a positive relationship between risk management practices and understanding risk, risk management, risk identification, risk assessment, risk monitoring, and credit risk analysis in IBs and CBs.
<p>Tafri et al. (2011)</p>	<p>Descriptive statistics and ANOVA</p>	<ul style="list-style-type: none"> • What risk management tools are used in IBs and commercial banks in Malaysia, and selected Islamic banks outside Malaysia? • What are the differences and similarities between CBs and IBs in the practice of managing credit risk, market risk, liquidity risk, and operational risk? 	<ul style="list-style-type: none"> • IBs and CBs differ in the extent of their use of market value at risk (VaR), stress-testing results, credit risk mitigation methods, and operational risk management tools. • Risk management tools and systems for Islamic banking are inadequate (e.g., IT professionals with relevant expertise in process integration and risk analytics).
<p>Hassan (2009)</p>	<p>Descriptive statistics and regression analysis</p>	<ul style="list-style-type: none"> • What are the main risks faced by IBs in Brunei? • To what extent do IBs in Brunei engage in risk management practices (RMP) and what are the techniques used? 	<ul style="list-style-type: none"> • Brunei IBs face three main types of risks: foreign exchange risk, credit risk, and operating risk.
<p>Siddiqui (2008)</p>	<p>Literature review comparisons Ratio analysis</p>	<ul style="list-style-type: none"> • What are the main IFS contracts used by IBs in Pakistan? • What are the main causes of risk faced by IBs? 	<ul style="list-style-type: none"> • IBs in Pakistan are mostly used for: <ul style="list-style-type: none"> (i) <i>Murabahah</i> (ii) <i>Ijarah</i> (iii) <i>Mudharabah</i> and <i>Musharakah</i> • <i>Mudharabah</i> and <i>Musharakah</i> are associated with various investment risks where information is asymmetric. These risks later lead to moral hazard and adverse selection issues.

Al-Tamimi and Al-Mazrooei (2007)	Descriptive statistics and regression analysis	<ul style="list-style-type: none"> • What are the main risks faced by IBs in UAE? • How do the different risks faced by UAE national and foreign banks compare? 	<ul style="list-style-type: none"> • The UAE faces three main risks: credit risk, operating risk, and foreign exchange risk.
Ahmed and Khan (2007)	Qualitative	<ul style="list-style-type: none"> • What are the perceptions of Islamic bankers regarding the risk inherent in various IB contracts? 	<ul style="list-style-type: none"> • Credit risk is highest for Musharakah contracts and lowest for Murabahah contracts. • Liquidity risk is highest for diminishing Musharakah contracts and lowest for Mudharabah. • Market risk is highest for Musharakah contracts and lowest for Murabahah and Istisna contracts.

Given the rapid global growth of the IB industry, it is important for IBs to have appropriate risk management frameworks and processes in place. Before the establishment of the Islamic Financial Services Board (IFSB) in 2005, IBs did not have any specific risk management frameworks or guidelines. The risk management activities of IBs depended on the initiatives of the banks themselves or the regulatory bodies of a given country or jurisdiction. For example, in Malaysia, following the establishment of IBs, all banks followed the framework used by their conventional counterparts especially in the context of ensuring adequate capital. A growing awareness that the IB system required its own risk management framework led to the establishment of the IFSB.

CREDIT RISK OF ISLAMIC BANKS (IBS)

In this section, we investigate the credit risk profiles of Islamic Banks (IBs) in ASEAN countries as the main risk faced by these countries. However, due to limitations in regard to the data available, the discussion focuses on Malaysian IBs (MIBs). IBs have operated in Malaysia for a very long time, which provides a basis for investigating the determinants of credit risk for Malaysian Banks.

We investigate the determinants of credit risk for 19 Malaysian Islamic banks (MIBs) based on data that we collected from the financial statements and annual reports of each of these banks. We used credit risk as a dependent variable with credit risk measured using the ratio of non-performing financing (NPF) to total financing (TF) for each

bank. Eight independent variables as used in the literature (Ahmad and Ariff 2007; Louzis et al. 2012; Misman et al. 2015; Salas and Saurina 2002) and one dummy was regressed with the dependent variable to identify the key credit risk determinants for MIBs. Among the variables are loan expansion, loan quality, capital buffer, capital ratio, costs of the fund, management efficiency, and bank size (See the Appendix A for definitions). A panel dataset was used to identify the factors that

$$\begin{aligned}
 \text{CR} &= f(\text{TL}, \text{LQ}, \text{CB}, \text{CAP}, \text{FCOST}, \text{MGT EFF}, \text{TA}, \text{FOREIGN}) && \text{IIBs. The} \\
 \text{CR}_{it} &= \beta_0 + \beta_1 \text{CR}_{it-1} + \beta_2 \text{TL}_{it} + \beta_3 \text{LQ}_{it} + \beta_4 \text{CB}_{it} + \beta_5 \text{CAP}_{it} + \beta_6 \text{FCOST}_{it} + \\
 &\quad \beta_7 \text{MGT EFF}_{it} + \beta_8 \text{Log (TA)}_{it} + \beta_9 \text{FOREIGN}_{it} + \varepsilon_{it} && (1)
 \end{aligned}$$

where credit risk (CR) is non-performing loans to total loans outstanding; loan expansion (TL) is total loans to total assets; CR_{it-1} is a one-year lag of CR; loan quality (LQ) is loan loss provisions to total assets; capital buffer (CB) is total equity to total assets; capital ratio (CAP) is total capital (Tier 1 and Tier 2 capital) to total assets ratio; cost of funds (FCOST) is interest expenses to total assets; management efficiency (MGT EFF) is earning assets to total assets; size (TA) is the natural logarithm of total assets; FOREIGN is a dummy with a value of 1 for a foreign IB and 0 otherwise.

We performed the analysis using unbalanced panel data for the period of 2000 to 2016. The total number of observations was 203 for the model. White's (1980) cross-section was used to adjust the standard errors for the possible occurrence of heteroskedasticity. We also checked for multicollinearity using the variance inflation factor (VIF). In our models, VIF ranges from 1.24 to 3.15 with a mean value of 2.03. This value range indicates that multicollinearity is not a concern in our models, as it is commonly held that further investigation is needed for VIF greater than 4 and correction required for VIF greater than 7 (Akguc and Al Rahahleh 2018).

We estimated Model 1 using the fixed-effect (FE), the pooled OLS method, and generalized least square (GLS) with random effects. Table 5 presents the results for the estimation models. For example, Model 1 with FE presents the results of eight BSVs and the explanatory power of the results is about 74.5% with six BSVs with significant effects on credit risk at the 1% and 10% significance level.

Table 5. Regression results for bank-specific variables (BSV) and ownership status regarding credit risk.

Independent Variables	(1)	(2)	(3)
	Fixed Effect	OLS	GLS—Random Effect
C	-25.514 *** (-3.21)	-15.213 *** (-2.17)	-19.546 *** (-3.15)
CR _{t-1}	0.491 *** (10.94)	0.654 *** (5.59)	0.589 *** (14.26)
TL	-0.048 ** (-2.36)	-0.028 (-1.19)	-0.039 ** (-2.11)
LQ	0.461 *** (4.26)	0.424 *** (2.44)	0.431 *** (4.38)
CB	0.452 *** (4.91)	0.302 *** (4.60)	0.336 *** (5.44)
CAP	-0.127 *** (-3.04)	-0.048 (-1.27)	-0.077 * (-1.94)
FCOST	0.065 (0.42)	-0.023 (-0.22)	0.021 (0.19)
MGT EFF	0.022 (1.21)	0.018 (1.15)	0.023 (1.36)
TA	1.774 *** (3.67)	0.989 *** (2.29)	1.311 *** (3.45)
FOREIGN	-0.401 (-0.23)	-0.127 (-0.18)	0.135 (0.16)
R ²	0.604	0.736	0.745
N	203	203	203

Table 5 shows that the coefficient of CR_{it-1} is positive. This result is in line with the empirical results reported by Salas and Saurina (2002). Further, Table 5 shows that financing (loan) expansion has a negative impact on credit risk in the FE and GLS-RE estimation models. This negative significant result is consistent with results reported by Rahman and Shahimi (2010).

As expected, financing quality has a positive significant impact on credit risk regardless of the specification and estimation model. This variable is highly significant in determining credit risk, as all the coefficients are significant at the 1% level. These results are not surprising, as more provisions for loss indicate that a bank may have a problem with financing quality. Thus, the bank will increase its exposure to credit risk. In other words, a downgrade in financing quality will potentially increase the risk of default.

In regard to capital buffer (i.e., the ratio of total equity to total assets), in previous studies, overall mixed results are reported pertaining to the relationship between CB and CR (e.g., Cebenoyan and Strahan 2004; Godlewski 2005). For example, Godlewski (2005) found a positive significant relationship between equity and risk, whereas Cebenoyan and Strahan (2004) reported a negative relationship between a capital buffer and credit risk. Table 5 shows that capital buffer has a significant positive impact on credit risk for all the estimation models in the present study. Having a positive sign means that IBs with more equity capital tend to have higher credit risk than do banks with less equity. Put differently, compared with banks with less equity capital, those with more equity capital are more likely to engage in more risky financing activities as the latter believe that they have sufficient capital to buffer potential losses.

In terms of the capital ratio (CAP) calculated as a ratio of total capital (Tier 1 and Tier 2 capital) to total assets, the coefficient is negative and statistically significant in both the FE and GLS-RE estimation models. This result indicates that the more regulatory capital held by the IBs, the less they are exposed to credit risk. Put differently, a prudent capital management policy plays a role in reducing the level of problem financing and managing risk exposure in MIBs. Bank Negara Malaysia (i.e., the country's central bank) developed a capital-adequacy framework for IBs (CAFIB) to safeguard their risk management practices. In fact, the Basel Committee on Banking Supervision (BCBS) introduced the capital-adequacy framework to promote soundness and stability in the financial system by discouraging banks from engaging in excessively risky activities (Basel 1999). Given that they are effective in managing risk exposure, this framework is in line with our results.

In regard to the relationship between size and credit risk, our results indicate that size has a positive significant effect on credit risk level for all the models used in this study. This result is in line with a result reported by Ahmad and Ariff (2007), who found a positive relationship between size and credit risk for CBs in Korea, Mexico, India, Thailand, Australia, and France.

In regard to the cost of funds (FCOST) and management efficiency (MGT EFF), we did not find any significant relationships between credit risk and either of these two variables in any of the estimations. We further

examined the impact of the FOREIGN dummy on the credit risk level of IBs in Malaysia. Our results show that FOREIGN dummy is not significant for any of the models tested.

To summarize, we found that financing expansion (TL), loan quality (LQ), capital buffer (CB), size (TA), and one-year lagged credit risk (CR) demonstrated consistent results regardless of regression specifications or estimation model. These results suggest that any deterioration in financing quality forces MIBs to allocate more extensive loss provisions, and consequently increase the implied credit risk level. The results also show that banks with more equity capital are more likely to engage in more risky financing activities as compared with banks with less equity capital. Also, we found evidence suggesting that TL and CAP each has a significantly negative impact on the credit risk level of MIBs.

CONCLUSIONS

In this paper, we discussed the structures and fundamental features of Islamic banking. We also reviewed the main characteristics of IBs in comparison with the main characteristics of CBs. Further, we discussed the types of risks faced by IBs, the characteristics of those risks, and the differential exposure to those risks as compared with CBs. We also examined the determinants of the credit risk of IBs in Malaysia (MIBs). A summary of our most important results related to the main characteristics of IBs compared to CBs is as follows:

- The operations of IBs must conform with *Shariah* principles. IBs differ from CBs in that IBs operate free from interest, uncertainty, and gambling (Khir et al. 2008).
- The five most important pillars of Islamic banking can be summarized as follows: prohibition of *Riba*, sharing of equity contributions, money as a medium of exchange (*Gharar*), and purity of contract. In IB operations, all products and services are offered based on three main types of contracts: trading contract, participation contract, and supporting contract (Khir et al. 2008).
- Although Islamic law in the Islamic banking system forbids an

interest element, capital is not “costless.” Capital is recognized as a production input in Islamic law (Ariff 1988), and profit-sharing is a viable alternative to interest (Kahf 1999).

- There is a lack of *Shariah* expertise and a weak legal framework, which results in weak support for *Shariah*-based product development.
- The financial statements of IBs differ from those generated by CBs. For example, cash in IBs refers strictly to cash items, whereas cash in CBs usually consists of cash and other interest-bearing assets (AAOIFI and CB).
- Small IBs may face less risk than similar sized CBs (Abedifar et al. 2015).
- Both IBs and CBs face risks in their daily operations. CBs face five types of risks: credit risk, interest rate risk, liquidity risk, underwriting risk, and operating risk (Saunders and Cornett 2006). IBs face financial risk, business risk, treasury risk, and governance risk (Iqbal and Mirakhor 2007).
- We propose a framework for grouping the risks faced by IBs by considering a systematic and unsystematic risk classification. In the proposed framework, only business risk is considered a systematic risk. Governance risk is classified under unsystematic risk, whereas financial risk and treasury risk are classified under SUR as having the ability to be either or un.
- IBs are unique in regard to risk-related issues. For example, IBs face two types of risks: risks similar to those faced by CBs and risks that are unique because IBs comply with *Shariah* (Ahmed and Khan 2007).
- The risk of compliance with *Shariah* entails two types of risks (Makiyan 2008): risk related to PLS contracts and risk relate to legal and corporate governance. Čihák and Hesse (2010) provide an explanation for the unique nature of risk in the Islamic banking context by asserting that IB risk derives not only from the specific nature of the PLS and NPLS contracts, but is also due to the legal, governance, and liquidity infrastructure of Islamic finance.

- The relationship between IBs and their customers is not just one between lender and borrower but also that of investor and entrepreneur. This relationship results in IBs hazarding more risk than CBs. For instance, *Mudharabah* financing as a default payment by the entrepreneur cannot be established until the contract has expired.
- Risk management became more important after the GFC. Rahman and Shahimi (2010) support the conclusion that a weak risk management system has a severe impact on profitability and will lead to bank collapse.
- Bank capital and financing expansion have a significant negative impact on the credit risk level of IBs in Malaysia. Further, financing quality (LQ), capital buffer (CB), size (TA), and lagged CR demonstrate a positive impact on credit risk regardless of regression specifications or estimation model.

Appendix A

Table A1. Variables of interest.

Credit risk (CR)	Non-performing loans to total financing outstanding
Financing expansion (TL)	Total loans to total assets
Quadratic term of financing expansion (TL ²)	Squared value of TL
Loan quality (LQ)	Loan loss provisions to total assets
Capital buffer (CB)	Total equity to total assets
Capital ratio (CAP)	Total capital (Tier 1 and Tier 2 capital) to total assets ratio
Cost of funds (FCOST)	Interest expenses to total assets
Management efficiency (MGT EFF)	Earning assets to total assets
Size (TA)	Natural logarithm of total assets
FOREIGN dummy	Value = 1 for a foreign Islamic bank Value = 0 otherwise

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CHAPTER 9

MONETARY POLICY, CASH FLOW AND CORPORATE INVESTMENT: EMPIRICAL EVIDENCE FROM VIETNAM

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ABSTRACT

This paper examines the relationships between macroscopic determinants (typically, monetary policies) and microscopic factors (mainly, cash flows and other controlling variables) on corporate investment. By employing system-GMM estimation for the 250 Vietnamese non-financial firms, the authors find that the expansionary monetary policy not only encourages the borrowing activities but also results in more corporate investment

activities over the period from 2006 to 2016. Noticeably, the internal cash flow is also significant factor, which enhances the activities of corporate investment. Finally, there are differences between internal cash flow effects on corporate investments between two groups, divided by three theoretical criteria. To recapitulate, our implications highlight the importance of monetary policy stability for sustainable growth in corporate investment in Vietnam.

Keywords: Monetary policy; cash flow; investment; GMM

INTRODUCTION

Monetary policy (MP) is one of the most significant macroeconomic policies in the market economy, which directly affects monetary circulation, contributing to promoting activities in the economy, in which investment is the most important. These policies, which are controlled by the State Bank of Vietnam (SBV), are measures to influence money supply, thereby impacting the market interest. Monetary policies are supposed to have substantial impacts on corporate lending (Kashyap et al. 1993) and corporate investment (Morck et al. 2013).

According to money supply statistics from World Bank, the money supply in Vietnam has increased continuously in recent years, which is the result of Central Bank's expansionary money policy. Our question is whether the level of investment in Vietnam is proportional to the level of the money supply of SBV—in other words—whether it increases as SBV applies expansionary monetary policy. In this research, the authors focus on measuring the impacts of monetary policy on corporate investment decisions in Vietnam, comparing the impacts of macroeconomic policies with the impacts of internal factors (amount of holdings, cash flow, business scale, financial leverage, etc.). Especially, one of main reasons to choose Vietnam as country research is that Vietnam is becoming the standing-out element among emerging markets (Bloomberg 2016). Moreover, Batten and Vo (2014, 2015) also emphasized that Vietnamese stock markets have typical characteristics such as (i) the significant participant of foreign ownership (ii) liquidity and (iii) institutional

control.

The sensitivity of the corporate investment to the change in monetary policy depends on the financial capacities of the business and its dependence on internal funds. According to Gertler and Gilchrist (1994), tightening monetary policy puts pressure on business investment decisions, now that the importance of money holdings which can timely 'rescue' companies from difficulties in external borrowing is more critical than ever. Moreover, this does not necessarily mean that, with expansionary monetary policy, the investment of the business depends only on external borrowing since the practice is bound to legal conditions. Especially, when the investment is not sufficient, the interest expense to be covered will increase the probability of bankruptcy. For this reason, the authors decided to study the sensitivity of investment to the internal cash flows of enterprises in Vietnam, comparing the differences in the sensitivity of enterprises with low and high financial constraints.

The State Bank of Vietnam is a unit of the state management apparatus. It is entitled to a monopoly in money issuing, performing the task of stabilizing the monetary value, establishing order, ensuring safe, stable, and effective operations with the aim of achieving the macroeconomic objectives of the state. To govern monetary policies, SBV must formulate and use its system of instruments, whose characteristics are to enable SBV to influence the predetermined factors for credit institutions to tailor their activities under the direction of SBV but still ensure their autonomy in business as well as the equality in the competitive environment among banks. There are four objectives of monetary policy: (i) to ensure economic growth, which is the most important and overarching purpose; (ii) to stabilize price and currency; (iii) to create employment and reduce the unemployment rate; (iv) to control the balance of payment. Therefore, the roles of the State Bank of Vietnam is significant in the transmission mechanism to corporates.

This paper will be conducted based on the following structure: Section 2 acknowledges the theoretical framework of monetary policies as well as internal cash flow on corporate investment. Then, Section 3 will briefly summarize the literature and empirical studies, which are relevant to the authors' research. In Section 4, methodology and research data will provide readers with the insights which the authors conducted.

Afterwards, the authors discussed research findings and results in Section 5. Finally, the paper ends with conclusions and implications in Section 6.

THEORETICAL FRAMEWORK

When it comes to the effect of monetary policies, we refer to Friedman (1978) theory about the crowd out theory. This theory means that the unsustainable and unclear in macroscopic policies can adversely trigger consequences such as higher inflation, or an increase of the interest rate in capital markets and vice versa. In brief, this phenomenon will be considered as a ‘crowd out effect’ of private sector borrowing as the study of Terjesen et al. (2016), Ayturk (2017). In addition, we also refer to Miller (1977) and Myers (1984) about the theoretical framework in two aspects (i) debt and taxes (ii) capital structure in corporates.

Originally initiated by Donaldson (1961), Pecking order theory was later developed by Myers and Majluf (1984), the theory starts with information asymmetry. When making investment decisions, corporations will always choose either the use of private capital or external financing. As a result, asymmetric information influences the choice between these two sources. According to the pecking order theory, private capital will be the priority in the investment decision, in which first comes the reinvested profits, then comes mobilized capitals through borrowings or debt-issuing (bonds). Issuance of new shares (stocks) is regarded as a last resort by this theory.

Before Q theory of (Grunfeld and Griliches 1960) is supposed to be the pioneer in using the market value of enterprises which represents the ability to generate expected returns and investment depends on the corporate’s market value. Brainard and Tobin (1968), and Tobin (1969) had an idea to use Q index which stands for investment. The Q index is calculated using either the ratio of market value of capital and replacement cost of capital or the ratio of market value and book value. According to Q theory, when the Q index is higher than one, corporate investment should be encouraged because if this is the case, the returns on investment are higher than the cost of buying corporate’s assets. Conversely, corporate’s investment should be discouraged if the Q index is lower than one due to the fact that the cost of buying assets is higher than the project’s expected

returns. According to Keynes (1936), investment can be determined by either aggregate demand or aggregate supply. This theory holds that the investor multiplier explains the relationship between an increase in investment and an increase in quantity, or, in other words, how an increase in investment affects quantity. From this perspective, investment appears to be a component of aggregate demand. From the perspective of aggregate supply, investment increases the quantity, which increases capital volumes, and promotes investment. This means that changes in quantity affect investment. As the demand for materials and labor increases, it is necessary to increase the number of products produced, leading to the need for more capital to invest in fixed assets in order to produce the number of products according to demand.

In brief, our study is mainly based on these essentially theoretical frameworks, which are mentioned carefully in this part. In Section 3, the authors will summarize the existing studies which are relevant to this research.

LITERATURE AND EMPIRICAL STUDIES

To begin, Tobias and Chiluwe (2012) used a number of classicist studies to explore how monetary policy impacts corporate investment. This research also refers to the enormous studies from Majumder (2007), Mishkin(2009), Kahn (2010), Bernanke and Gertler (1995). By employing macroeconomic data from 1996 to 2005, Tobias and Chiluwe (2012) concluded that the proportion of domestic debts and interest rates of the Ministry of Finance (MOF) was negatively related to the investment of private firms. Meanwhile, the money supply and savings do not show any statistical evidence on corporate investment. These studies provided fundamental concepts that microscopic factors are significant factors for corporate investment. Additionally, the expansion of monetary policies will positively influence corporate investment. To sum up, when money supply increases, interest rates fall. Finally, many companies are likely to attempt to finance their investments using external cashflows. That is the reason why Li and Liu (2017) and Morck et al. (2013) emphasized that the role of monetary policies on corporate financing sources is irreplaceable.

Recently, Yang et al. (2017) figured out that the tightened money supply from 2003 to 2013 made a corporate investment in China decrease. This policy also leads to the increase of cash holdings in Chinese firms. Interestingly, this study explicitly investigates the roles of institutional quality, ownership structure and financial development on the level of cash holding. There are many previous works done in terms of the efficiency of monetary policies such as Brandt and Li (2003), Carlino and DeFina (1998), as well as Devereux and Schiantarelli(1990). To be more precise, although the tightened monetary policy reduces investment, thanks to the use of cash holdings, corporates are still likely to be more active in their investments. Therefore, the role of cash holdings also supports the corporate activities in the context of tightened monetary policies. This motivates the authors to carry out further investigation into cash holdings as one of the controlling variables in this research.

When it comes to the internal cash flows, Fazzari et al. (1988) employed the dividend payout ratio as the identification variable for financial constraints. The study suggests that the dividend payout ratio is the measure of the availability of one of internal financing sources. Firms having the low dividend payouts are financially constrained while the ones with high dividend payouts are less financially constrained. In the research model, Fazzari et al. (1988) pointed out that firms which experience “financial constraints” are heavily dependent on internal cash flow. Therefore, it might lead to a decrease of investment in the future. In contrast, non-financially-constrained firms tend to expand their investments due to indifference between the externally and internally financing cost of capital. Therefore, these corporates are less dependent on cash flows. Once again, this empirical research encourages the authors to raise a question whether internal cash flows impact on investment decisions or corporate investments in Vietnam. Contradictorily, there are some studies which provide the opposite results with the work of Fazzari et al. (1988). For example, Kaplan and Zingales (1997) employed the sample having 49 firms over the period from 1970 to 1984 to test the investment activities in terms of cash-flow sensitivity. These authors combined relevant information and qualitative data to determine the availability of internal and external financial capital of the firms. Based on this, this research ranked the financial constraint level of each company per year. In conclusion, the results indicated that firms

having less financially constrained features have higher investment cash flows than those in the counterparty group. Moreover, Kadapakkam et al. (1998) contributed an empirical result to the existing literature that internal cash flows and liquidity will forecast the future investment. These findings also pointed out that the sensitivity of investment activities is high in large firm group rather than the small ones. The following theoretical research from Almeida et al. (2004) also confirms these findings. Meanwhile, Richardson(2006) criticized that the dependence on internal cash flows might cause over-investment. Therefore, the authors inherited the previous studies to examine the role of internal cash flows in corporate investments in Vietnam. The authors acknowledge the various theoretical and empirical studies, which were conducted before such as Lamont(1997), Chen et al. (2016), Ahiadorme et al. (2018), etc. Furthermore, Devereux and Schiantarelli (1990) introduced how to classify the group of firms for testing the internal cash flow effects on firm investments. This study applied the method of market value of equity shares. Thus, the findings suggest that cash flows plays an important role in large companies than in small companies. Explaining this result, these authors asserted that large companies tend to have a relatively low cash balance and that these companies often have a large capital structure that increases representation costs. In addition, Athey and Laumas (1994) divided the sample of Indian firms by the book value of equity. These authors examined the importance of accelerated investment, internal funds, and depreciation for investment by manufacturing companies. The results indicate that internal funds and depreciation are significant in the accelerated investment model, but the relationship between internal and investment funds is not uniform among firms. In particular, internal funds and investment have a closer relationship in large companies and high-end manufacturing companies. Lastly, Vogt (1994) classified the US firms on the 'price-to-book ratio'. This classification shows that the companies having higher ratio experience the higher level of sensitivity, and vice versa. These empirical studies prove that internal financing sources have strong impacts on investment activities, regardless of firm size. Therefore, the authors would prefer to find out if the situation is different when it comes to Vietnam by measuring the levels of impact from the firm size perspective.

In brief, previous studies have explained the relationship between internal cash flow and firm investment through evidence of the existence of financial constraints. These studies explored inconclusive insights on the sensitivity of investment cash flows between low and high financially constrained groups. Noticeably, most studies also confirmed that there is an impact of internal cash flows on corporate investments with different signs and levels. Therefore, testing this phenomenon on Vietnamese equity market, which is considered as one of emerging markets in the world, is necessary to contribute to the existing studies. Our paper attempts to answer three main research questions: (i) Does the monetary policy influence on corporate investment in Vietnam? (ii) Is internal cash flow a factor which impacts on corporate investment in Vietnam? and (iii) Are there any differences between small and large groups in three main criteria regarding the influence of internal cash flows on corporate investments? These research questions will be answered in the Section 5.1, Section 5.2 and Section 5.3, respectively.

Hence, this paper will contribute to the existing literature in three main ways as follows. Firstly, this paper will provide the insights about the macroscopic determinant such as monetary policies on corporate investments. The purpose of this research is similar to the studies of Chang et al. (2018), Chen et al. (2018) and Zhao et al. (2018), which are up-to-date. Secondly, our paper offers the further novel and additional evidence on the relationship between microscopic factors such as internal cash flows and corporate investments. Thirdly, to complement to current studies, the authors classify the effects of internal cash flows according to three different sub-samples, namely (i) price-to-book ratio, (ii) net revenue, and (iii) total assets. Proposed by Devereux and Schiantarelli (1990), Vogt (1994), Allen et al. (2005), as well as Athey and Laumas (1994), respectively.

DATA AND METHODOLOGY

This research uses a sample of 250 Vietnamese firms with ten years from 2006 to 2016. The authors eliminate the firms, which have insufficient data as well as been delisted during their operation. Therefore, our sample can generalize the Vietnamese stock market. The chosen firms are all listed in the stock market, except financial firms, primary companies

(banks and insurance companies), which had many values missing in the years to chosen to observe, individual firms, and particular transfer companies. The sample firms’ financial information is collected from their financial reports, a reliable source.

Basically, Bond and Meghir (1994), Dickinson and Jia (2007) and Yang et al. (2017) introduced their research models, which explain the impact of supply of money on the corporate investment. Their models are rewritten as follows:

$$Invest_{i,t} = \beta_0 + \beta_1 MP_{i,t} + \beta_2 CF_{i,t} + \beta_{3n} \sum_1^t \vec{Z}_{n,i,t-1} + \varepsilon_{i,t}$$

In which, *i* refers to sample firms and *t* for a year, and $\varepsilon_{i,t}$ is the error term; β stands for coefficients; $Invest_{i,t}$ is investment of *i*th firm in year *t*; $MP_{i,t}$ is referred to as money supply in year *t*; $CF_{i,t}$ is referred to as *i*th firm’s cash flow in year *t*. The authors denote the vector of *Z* as a group of controlling variables such as *S* (firm size), *Q* (price-to-book ratio), *LEV* (financial leverage), *ROA* (return on asset), *T* (tangible asset over total asset), *Growth* (growth rate of revenue from business activities), *NR* (net revenue), and *Cash* (net cash holding).

Kadapakkam et al. (1998) also represented the research model hereinafter.

$$\frac{Invest_{i,t}}{Net\ fixed\ asset_{i,t-1}} = \frac{\beta_1 CF_{i,t}}{Net\ fixed\ asset_{i,t-1}} + \frac{\beta_2 Cash_{i,t-1}}{Net\ fixed\ asset_{i,t-1}} + \beta_3 Q_{i,t-1} + \frac{\beta_4 Net\ Revenue_{i,t-1}}{Net\ fixed\ asset_{i,t-1}} + \varepsilon_{i,t}$$

In which, $\frac{Invest_{i,t}}{Net\ fixed\ asset_{i,t-1}}$ stands for corporate investment, which is the ratio of investment in fixed asset in the year to the company’s net fixed asset value, referred to as ‘investment variable’.

$\frac{CF_{i,t}}{Net\ fixed\ asset_{i,t-1}}$ means the ability of the company to generate cash flow in a year, which is the ratio of cash flow in a year to the net fixed asset value at the beginning of that year, referred as ‘cash flow variable’.

$\frac{Cash_{i,t-1}}{Net\ fixed\ asset_{i,t-1}}$ is the ratio of cash and cash equivalents at the beginning of the year to net fixed asset at the beginning of the year,

referred to as ‘cash holding variable’.

Q_{it-1} is the value of q variable of Tobin at the beginning of the year, which is referred to as Q variable.

$\frac{NetRevenue_{i,t-1}}{Net\ fixed\ asset_{i,t-1}}$ is the ratio of net revenue of the previous year to the net fixed asset at the beginning of the year, which is referred to as revenue variable.

Finally, $\varepsilon_{i,t}$ is standard error.

The Table 1 demonstrates our variables, expected sign, explanation, calculation as well as literature review for using them.

Table 1. Variables summary.

Variables	Expected Sign	Explanation	Calculation	Literature Review
Invest (Investment)	Dependent variable	The additional investment of facilities in the company's fiscal year	Invest = Net end-of-year fixed assets (-) Net worth of fixed assets at the beginning of the year.	Duchin et al. (2010) and Kadapakkam et al. (1998)
MP (Monetary Policy)	(+)	The amount of central bank supply money under the expansionary monetary policy	The value of M2 supply money	Li and Liu (2017)
LEV (Leverage)	(+)	Corporate financial leverage	Total liabilities/total assets	Kaplan and Zingales (1997), De Jong et al. (2008)
SIZE (Size)	(-)	The scale of the business since listing on the stock market	The natural logarithm of total assets	Kaplan and Zingales (1997)
ROA (Return-on-Asset)	(+/-)	Return on asset	Net profits/total assets	Yang et al. (2017)
Q (Tobin-Q)	(+)	Q represents the growth opportunities of company.	Tobin Q = market value/book value	Yang et al. (2017) and Kadapakkam et al. (1998)
T (Tangible Asset over Total Asset)	(+/-)	Asset structure	Fixed assets/total assets	Yang et al. (2017)
Growth	(+/-)	Growth rate of operating income	Sale Ggrowth in year N/ sale growth in year (N - 1)	Yang et al. (2017)
CF (Cash Flow)	(+)	Internal cash flow of company	CF is earning after tax (+) fixed asset depreciation in the year (+) corporate income tax (-) dividend payment.	Kadapakkam et al. (1998)
Cash	(+)	Cash holding	Cash, deposits at banks, and cash equivalents.	Kadapakkam et al. (1998)
NR (Net Revenue)	(+)	Revenue from the sale of goods and provision of services minus (-) sales	Revenue from sales and service provision—revenue deductions	Kadapakkam et al. (1998)

This research used three indicators (i) price-to-book ratio, (ii) net revenue, and (iii) total assets to classify companies into two group: (a)

large and (b) small by median of the total sample. Finally, the authors also construct to test our three main hypotheses as follows:

Hypothesis 1:

The investments of Vietnamese firms increase when the State Bank of Vietnam promulgates the expansionary monetary policy.

Hypothesis 2:

Internal cash flow affects the investment of Vietnamese firms.

Hypothesis 3:

The impacts of internal cash flows on investment vary according to business scale.

In order to test these hypotheses, the authors briefly introduced the following regression models:

The first model is to test the presence of monetary policy on firm investment (Hypothesis 1). This model is theoretically referred to Bond and Meghir (1994).

$$\text{Invest}_{i,t} = \hat{\beta}_0 + \hat{\beta}_1 \text{MP}_{i,t} + \hat{\beta}_2 \text{LEV}_{i,t} + \hat{\beta}_3 \text{S} + \hat{\beta}_4 \text{ROA} + \hat{\beta}_5 \text{Q} + \hat{\beta}_6 \text{T} + \hat{\beta}_7 \text{Growth} + \hat{\varepsilon}_{i,t} \text{ (Model 1)}$$

The second model is to test whether the internal cash flows influence the firm investment (Hypothesis 2). This model is theoretically referred to Kadapakkam et al. (1998).

$$\text{Invest}_{i,t} = \hat{\beta}_0 + \hat{\beta}_1 \text{CF}_{i,t} + \hat{\beta}_2 \text{Cash}_{i,t} + \hat{\beta}_3 \text{Q} + \hat{\beta}_4 \text{NR} + \hat{\varepsilon}_{i,t} \text{ (Model 2)}$$

The third model is to test the differences in the impacts of internal cash flows on firm investment between two groups with three criteria (Hypothesis 3). The authors also employed model 2 but divided our sample into three sub-samples based on (i) price-to-book ratio, (ii) net revenue, and (iii) total assets. Afterward, the authors perform the

individual regression for each group.

The authors employed the rich set of quantitative techniques namely pooled-ordinary least squares (pooled-OLS), fixed effect model, random effect model, and system-generalized method of moments (system-GMM) for this estimations. In order to enhance this paper methodological approach, the authors will briefly introduce the system-GMM procedure from Arellano and Bover (1995), and Blundell and Bond (1998, 2000). The econometric method of system-GMM introduces the pedagogic approach to linear regression for ‘small-T and large-N’ (our samples have 10 years and 250 firms). Therefore, this methodology also confirms the use of instrumental variables to correct the endogeneity, which causes the biased and inconsistent results. Especially, system-GMM requires two-step robust estimation, which generates covariance matrix derived by Windmeijer (2005). Therefore, according to Maddala and Lahiri (1992) the results of system-GMM are robust for interpretation.

FINDINGS AND RESULTS

This research is carried out by adopting the two main models:

- Model 1: A study on the impacts of expansionary monetary policy on corporate investments.
- Model 2: A study on the impacts of internal cash flows on corporate investments.

Firstly, the authors attempt to employ the statistical description for interpreting the data characteristics before performing regression.

As presented in Table 2, it is seen that the variables have the skewed and fat-tail distribution. This phenomenon might lead to the homogeneous characteristics, which probably causes endogeneity in these econometric models. Therefore, the authors bear in mind to adopt quantitative techniques, particularly system-GMM for correcting the bias and ensuring consistency.

Table 2. Statistical description of variables used for validation in the study.

Variables	Mean	Standard Deviation	Percentile q10	Percentile q90	Skewness	Kurtosis
Invest	73.275574	2828.286	0.0092945	0.406804	43.69604	2011.846
MP	112.1366	19.59663	93.65717	137.6491	0.4071207	2.540372
S	26.53337	5.002883	25.7329	29.111	-4.737473	25.37874
Q	547.7386	20115.94	0.3380425	1.849735	37.41705	1410.435
LEV	0.4728379	0.2499534	0.112023	0.784358	-0.1535366	2.201218
ROA	0.0665066	0.1375101	-0.5436	0.1609	13.53076	336.1934
T	0.2551115	0.5036074	0.0116105	0.562433	35.59383	1611.327
Growth	0.7006606	26.70394	-0.383467	0.987084	15.66164	1344.683
NR	180	0.496	105	342	8.22054	89.17907
Cash	406	0.952	254	372	51.50165	2682.775
CF	-162	0.947	-814	180	48.79517	2504.257

(Note that NR, Cash, and CF are million Vietnam dong).

First Hypothesis

Table 3 presents the results of the regression model of the impacts of expansionary monetary policy on corporate investment (Model 1) by dependent variable (Invest) through four methodological approaches: pooled-OLS, FEM, REM, and GMM. The independent variables used to explain Invest (the investment variable) are MP (monetary policy), LEV (financial leverage), S (firm size), ROA (return on asset), Q (price-to-book ratio), T (tangible asset over total asset), Growth (growth rate of revenue from business activities), where MP is the primary explanatory variable and the most crucial one for this study.

Table 3. Results of the regression model of the impact of monetary expansion policy on corporate investment (Model 1).

Invest	$Invest_{i,t} = \beta_0 + \beta_1 MP_{i,t} + \beta_2 LEV_{i,t} + \beta_3 S + \beta_4 ROA + \beta_5 Q + \beta_6 T + \beta_7 Growth + \epsilon_{i,t}$			
	Pooled OLS	FEM (Fixed Effects Model)	REM (Random Effects Model)	System GMM (Generalized Method of Moments)
MP	-0.5711737 [-0.67]	-0.6836043 [0.451]	-0.5711737 [0.504]	0.8546331 * [0.058]
Lev	-34.25557 [0.625]	-110.0149 [0.348]	-34.25557 [0.625]	49.69802 * [0.087]
S	1.699131 [0.645]	3.657795 [0.419]	1.699131 [0.645]	-13.69331 ** [0.018]
ROA	-0.7834284 [0.995]	6.300236 [0.964]	-0.7834284 [0.995]	51.8322 [0.385]
Q	0.1345481 *** [0.000]	0.1353923 *** [0.000]	0.1345481 *** [0.000]	0.1687338 *** [0.000]
T	-1.27182 [0.968]	-2.928004 [0.936]	-1.27182 [0.968]	-17.29324 [0.352]
Growth	-0.0058518 [0.992]	-0.2729514 [0.675]	-0.0058518 [0.992]	-0.3502424 [0.198]
Cons	0.748	0.791	0.748	0.044
AR(1)				0.000
AR(2)				0.231
Sargan test				0.376

Firstly, based on the pooled-OLS model, only the Q (price-to-book ratio) influences corporate investment at 1% significance level whereas there is no evidence about the relationship between monetary policies (the first hypothesis) on corporate investments. The remaining variables are insignificant. The authors suspect that there are endogeneous errors in this model. By employing the further quantitative techniques, namely fixed effect model and random effect model, the authors investigate that the results are not better. Once again, only Q (price-to-book ratio) is significant at 1% significance level while all explanatory variables fail to explain corporate investments. Hence, the authors implement the system-GMM for estimating Model 1 equation and afterwards, the results are documented in the last column in Table 2 above.

Secondly, the findings are similar to the previous studies of Tobias and Chiluwe (2012), Majumder (2007), Mishkin (2009), Kahn (2010), and Bernanke and Gertler (1995) in many different countries. The monetary policies have positive influences corporate investments. However, this is weak evidence because its coefficient is significant at 10% significance level. In other words, when SBV promulgates expansionary monetary policy, corporate investment will increase. Thus, the result fails to reject the first hypothesis.

When it comes to the other variables, Lev (financial leverage) also shows a weak evidence of its impacts on corporate investments. When Vietnamese companies choose to increase their financial leverage, they tend to obtain new investment at 10% significance level. To be more specific, the stronger the financial leverage, the higher the investment. Interestingly, the S (firm size) has a negative coefficient, which means that the larger firms might have fewer investments. In addition, the Q (price-to-book ratio) significantly affects the firm investments. This means that the market value has a strong impact on corporate investment. As companies have greater market value, they will increasingly promote their investments. The other variables, namely ROA (return on asset), T (tangible asset over total asset), Growth (growth rate of revenue from business activities) have no statistical evidence to come into conclusion.

Finally, the authors also need to confirm that the findings and results are unbiased and robust. The further tests of AR(1), AR(2), as well as Sargan test are appropriate. To be more specific, the authors fail to reject the null

of hypothesis that instrumental variables have no correlation with the residuals. Moreover, the errors in the first-differenced regression do not demonstrate the second-order serial correlation. To sum up, the results and findings are worth to interpret. These results are appropriately used to answer the first research question that monetary policy influences corporate investment.

However, to be sure whether the multicollinearity errors among the variables exists, the authors perform the Variance Inflation Factor (VIF) test for the model, see Table 4.

Table 4. Multicollinearity verification in model 2.

Variable	VIF	1/VIF
Net	1.01	0.986199
CF	1.01	0.988369
Cash	1.00	0.997063
Q	1.00	0.999537

The result of the VIF test shows that all the VIF coefficients are less than 10. This explains that the multi-collinear phenomenon did not occur in the research set (Kennedy 1992).

Second Hypothesis

When it comes to Model 2, the results of regression on the impacts of cash flow on investment with the dependent variable investment (Invest) through four models: pooled-OLS, FEM, REM, and system-GMM. The independent variables that are used to explain the investing variable are CF (cash flow), Cash (cash holding), Q (price-to-book ratio), and NR (net revenue). There is no evidence of model errors such as multicollinearity, autocorrelation as well as heteroscedasticity. Therefore, the model with pooled-OLS, FEM, REM, and GMM are statistically employed to test the second hypothesis. Firstly, based on the pooled-OLS model, the Q (price-to-book ratio) is only determinant of corporate investments at 1% significance level. However, the remaining variables show no statistical evidence at any significance level. The findings are the same for fixed effect model and random effect model. To be more specific, once again, only Q (price-to-book ratio) is significant at 1% significance level while

all explanatory variables fail to explain the corporate investments at the two econometrical approaches. Hence, using system-GMM to correct the endogenous errors (Model 2). Finally, the coefficients and t-statistics are noted in the Table 5 below.

Table 5. Regression results on the impact of internal cash flow on investment (Model 2).

Invest	$Invest_{i,t} = \hat{\beta}_0 + \hat{\beta}_1 CF_{i,t} + \hat{\beta}_2 Cash_{i,t} + \hat{\beta}_3 Q + \hat{\beta}_4 NR + \hat{\varepsilon}_{i,t}$			
	Pooled OLS	FEM	REM	System GMM
CF	5.47 (a) [0.7495]	6.28 (a) [0.743]	5.47 (a) [0.749]	939 (a) *** [0.006]
Cash	-0.03.14 (a) [0.999]	0.747 (a) [0.969]	-0.0314 (a) [0.999]	99.5 (a) [0.668]
Q	0.1345012 *** [0.000]	0.1353395 *** [0.000]	0.1345012 *** [0.000]	0.1354203 *** [0.000]
NR	5.33 (a) [0.874]	8.60 (a) [0.856]	5.33 (a) [0.874]	0.0517 (a) ** [0.023]
Cons	0.748	0.903	0.942	0.072
AR(1)				0.000
AR(2)				0.998
Sargan test				0.865

As regards the system-GMM, internal cash flow has positively influenced corporate investments. Especially, this demonstrates a strong evidence because its coefficient is significant at 1% significance level. The greater the internal cash flow, the larger the corporate investment values. Hence, the result, once again, fails to reject the second hypothesis. In the context of other variables, the results share same patterns with the previous study of Kadapakkam et al. (1998). To be more specific, the Q (price-to-book ratio) influences corporate investment at 1% significance level. Furthermore, the NR (net revenue) significantly affects the corporate investments at 5% significance level. Unexpectedly, cash is insignificant in this regression estimations. This shows that corporate investment is not sensitive to internal cash flow in Vietnam. Meanwhile, the firms having greater net revenue are likely to invest more. The first-order and second-order correlation in the estimations showed that the results are robust. Furthermore, the Sargan–Hansen test also indicates that the instrumental variables are not correlated with the residuals. Once again,

the results are unbiased and consistent. Therefore, the second research question is answered, which means that the internal cash flow also affect the corporate investment in Vietnam.

Third Hypothesis

By dividing the samples into two groups (i) small and (ii) large based on three criteria: (i) price-to-book ratio, (ii) net revenue, and (iii) total assets, the authors examine the scale effect of internal cash flow on corporate investment. The Table 5 demonstrates the results of pooled-OLS regression of model 2 by two sub-samples dividing by price-to-book ratio. The main reason for choosing pooled-OLS is to reexamine the sub-sample effects between the two groups. The previous results and findings are robust because of system-GMM techniques; therefore, the authors only employ the simple rule in statistics (known as parsimony) for testing the third hypothesis.

As can be seen from Table 6, the Q (price-to-book ratio) in the large group is significant at 1% significance level for the three criteria. In addition, there is a weak evidence that internal cash flow influences corporate investments in the large group at the sub-sample of Q (price-to-book ratio). Therefore, the authors fail to reject the third hypothesis. This proves that there are differences in the impacts of internal cash flow on corporate investment. Internal cash flows in large-scale firms have a weak impact on corporate investment, suggesting that financial constraint issues and asymmetric information do not affect the investment decisions of small-scale firms. Large-scale firms are more cautious in investing, not only in external capital but also in internal cash flow and the amount of money they hold to decide whether to increase the investment or not. The findings and results are similar to the study of Kaplan and Zingales (1997). Thus, there are differences between two sub-samples concerning the impacts of internal cash flow on corporate investment, which is the third research answer.

Table 6. Summary regression results by sub-samples based on three criteria by pooled-OLS.

Variable	Price-to-Book Ratio	
	Small	Large
CF	0.000322 ^(a) [0.02]	371 ^(a) [1.87]
Cash	-0.00398 ^(a) [-0.22]	487 ^(a) [1.27]
Q	-0.0865233 [-1.21]	0.1348381 *** [119.71]
NR	-0.0587 ^(a) [-0.75]	226 ^(a) [0.35]
Cons	0.3279273 [5.11]	-2.675934 [-0.08]

Variable	Net revenue	
	Small	Large
CF	0.04 ^(a) [0.11]	5.44 ^(a) [0.22]
Cash	-4690 ^(a) [-0.20]	-9.07 ^(a) [-0.03]
Q	-0.0169778 [-0.58]	0.1345023 *** [118.90]
NR	-10.4 ^(a) [-0.90]	7.59 ^(a) [0.12]
Cons	0.3017064 [6.64]	-2.256631 [-0.06]

CONCLUSIONS AND IMPLICATIONS

Conclusions

By employing the rich set of quantitative techniques, the authors confirm that when the State Bank of Vietnam promulgates expansionary monetary policies, corporate investments increase. This explains why corporate investment is heavily dependent on external sources of capital. With the expansionary monetary policy, which means lower interest rates,

businesses will tend to borrow and invest more and more. Obviously, borrowing for investment when commercial banks apply an expansionary monetary policy is ideal because interest expense is no longer too heavy. It also creates opportunity cost for shareholders to invest in many other fields instead of retaining profits to continue investing in fixed assets. On top of that, interest rates is a great tax shield for businesses. However, it is very interesting to witness that the monetary policy effect is quite weak. Therefore, apart from macroeconomic elements, corporate investment is also affected by the internal elements. To prove that, the authors have implemented further research on the impacts of internal cash flow on corporate investment. At the same time, cash holdings, market value, and net revenue are also considered in this study to explain corporate investments.

As the expectation of the theoretical research of Kaplan and Zingales (1997), internal capital flows have a significant impact on corporate investment. It can be interpreted that the more effective the business is, the more investment in fixed assets it can attract to expand the scale of business. Investigating an impact of internal cash flow on investment helps practitioners recognize that market value plays an important role in corporate investment decisions. In addition, the classification of the scale of business has shown that large-scale groups are more sensitive to internal cash flows than small-scale ones. Moreover, research results from both groups of companies show that cash holdings does not affect the investment decisions of enterprises. However, with different scale groups, research results found that cash holdings play an extremely important role in large-scale enterprise groups. Thereby, it shows that large enterprises are very careful in making investment decisions and allocating capital.

Implications

By the two main research models, the authors also conclude that both macroeconomic and internal factors always influence corporate investment. In particular, the macroeconomic factors are the most important and decisive factors. Monetary policy plays a vital role in the economy. The study demonstrates that expansionary monetary policy makes investment increases. However, it is not always true in the case

that monetary policy is ideal as the more the inflation increases, the more the real value of the currency decreases. Also, the dependence on external financing of businesses is growing, and interest rates increase the risk of bankruptcy and lousy debts more and more. The study does not aim to promote expansionary monetary policy but to measure the degree and direction of impacts on investment. Based on that, SBV can consider in combination with the socio-economic situations to best-tailor the monetary policy.

Dependence on external financing of small business is understandable. However, small-business groups need to focus on the role of cash holdings in an investment in order to minimize the risks of interest and react timely to the economy as soon as the market fluctuates. The evolution of the economy is like a parabolic graph: growth and recession will take place from time to time, and this is indispensable. Therefore, the preparation to respond to the fluctuations is very important to help businesses survive and develop.

As regards the macroscopic aspects, the study must carry out in-depth research on each group of companies in order to have the most general overview of the problem. Especially, with an emerging economy like Vietnam, in which most of the businesses are small and medium, the research groups are the businesses that are listed on the stock exchange and all of which are well positioned in the Vietnamese economy. Therefore, the study cannot cover all enterprises with financial constraints, especially those in rural areas and underprivileged economic areas.

From the limitations of the research, the authors propose separate research on how monetary policy affects investment. The sample should be expanded to more enterprises and consider the impacts on each group of enterprises: large-scale, medium scale enterprises, small-scale enterprises, and enterprises with financial constraints (small enterprises, rural enterprises, etc.). Because this is a macro issue, further research should be more intensive and in-depth.

As regards the recommendations for monetary authority, the authors suggest that State Bank of Vietnam should remain the sustainable monetary policy. Any change in monetary policy should be carefully considered in the economic and political aspects. Furthermore, holding the expansionary monetary policies will encourage corporate investments; however, it also has to pay the prices for ‘inflation’. This research suggests the further quantitative techniques to estimate the threshold of the M2 money supply to be optimal for Vietnamese economy.

The authors suggest researching the importance of cash holdings in businesses. Because the authors focus on the impacts of internal cash flow on investment, so cash is only a second variable and fail to be able to go into the problem. Investigating the role of cash holdings in investment is extremely necessary. However, in Vietnam, such studies do not receive as much proper attention as in European countries as well as in the US. In China, there has recently been many topics related to the topic of cash holdings in the business. The authors strongly believe that more studies as well as discussions will be held on this topic in Vietnam in the future.

Author Contributions

These authors contributed equally to this work.

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CHAPTER 10

FINANCE AND JOBS: HOW FINANCIAL MARKETS AND PRUDENTIAL REGULATION SHAPE UNEMPLOYMENT DYNAMICS

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ABSTRACT

This article explores the impact of financial market regulation on jobs. It argues that understanding the impact of finance on labor markets is key to an understanding of the trade-off between economic stability and financial sector growth. The article combines information on labor market flows with indicators of financial market development and reforms to assess the implications of financial markets on employment dynamics directly, using information from the International Labour Organization (ILO) database on unemployment flows. On the basis of a matching model of the labor market, it analyses the economic, institutional, and policy determinants of unemployment in- and out-flows. Against a set of basic controls, we present evidence regarding the relationship between financial sector development and reforms and their impact on unemployment dynamics.

Using scenario analysis, the article demonstrates the importance of broad financial sector re-regulation to stabilize unemployment inflows and to promote faster employment growth. In particular, we find that encompassing financial sector regulation, had it been in place prior to the global financial crisis in 2008, would have helped a faster recovery in jobs.

Keywords: Unemployment in- and out-flows; financial market development; financial market reforms; reform scenarios

INTRODUCTION

The global financial and economic crisis (GFC) that erupted in 2008 profoundly changed our view of how financial markets affect economic performance and stability. The bankruptcy of Lehman Brothers—one of the oldest investment banks in the United States—demonstrated the immense risks that the global financial system had accumulated over the previous decade and the disastrous consequences that a sudden shift in risk perception was able to produce for growth and jobs. In a matter of a few months, the global economic system moved from a state of a symbiotic relationship between finance and growth to one where financial market risks were seen as inimical to stable and sustained economic performance. Most observers at the time had simply overlooked the enormous risks that a fast-growing financial sector had built up, which gradually undermined the stability of the entire system. This article argues that a focus on the financial market impact on employment dynamics would have helped a better understanding of the link between financial sector development and economic stability. Looking carefully at how financial market development and regulation affect job creation and destruction, we demonstrate how such insights allow us to inform on-going discussions on financial sector reforms. Specifically, the article shows how financial sector regulation could have helped overcome the GFC-induced jobs crisis more rapidly had some of the currently-implemented regulations been in place already earlier.

Regulatory activity on financial markets has been intensive since 2009. Indeed, soon after the outbreak of the crisis, a debate arose regarding

the most appropriate changes to the regulatory framework of financial markets. After an intense period of policy and regulatory action (see International Institute for Labour Studies (2010, Chp. 5) for a summary of regulatory measures) a new debate arose which questioned the implemented regulation. Regulatory reforms ratified by the U.S. administration in the Dodd–Frank act in 2010 were among the most encompassing that the financial industry had seen in recent history. In Europe, where policy makers also faced a sovereign debt crisis three years later, similarly bold changes are still in the process of being fully implemented. At the international level, new regulatory agencies, such as the European Stability Mechanism, have been entering the scene and are beginning to influence global capital markets. Some reforms such as the Basel III agreement on stricter capital requirements are expected to be fully implemented only by 2022 (see the discussion in Basel Committee on Banking Supervision, 2017, Basel III: Finalising post-crisis reforms, Basel, available at: <https://www.bis.org/bcbs/publ/d424.pdf>, for more information on the implementation process). Nevertheless, disagreement continues as to whether the scope of regulatory reforms has been sufficient or if—on the contrary—policy makers have gone too far and are preventing economic activity from expanding more forcefully.

This disagreement is a reflection of the dramatic shift in perceptions that followed after several decades of academic research, highlighting the benefits of well-developed financial markets for economic growth (see, for instance, Levine 1997, 2005; Rajan and Zingales 1998). The earlier literature not only stressed the importance of well-developed financial markets for the real economy, it also provided empirical evidence of the different transmission channels, favoring market-based finance over bank credit, supposedly less favorable for innovation and entrepreneurship (Acemoglu et al. 2006; Levine and Zervos 1998). Accordingly, policy makers implemented significant reforms with the view toward developing sophisticated financial markets. The outbreak of the financial crisis, however, made it obvious that the previous growth spurts that followed financial market reforms were often accompanied by increases in inequality, making the acceleration in growth imbalanced and eventually unsustainable. In particular, the period of increasing financial market deregulation saw a significant fall in the labor income share across OECD countries (see Figure 1). Observers began to realize

that an important transmission mechanism linking financial markets to the real economy ought to be taken into account in order to foster a full understanding of the links between financial sector development and risk (Rajan 2010).

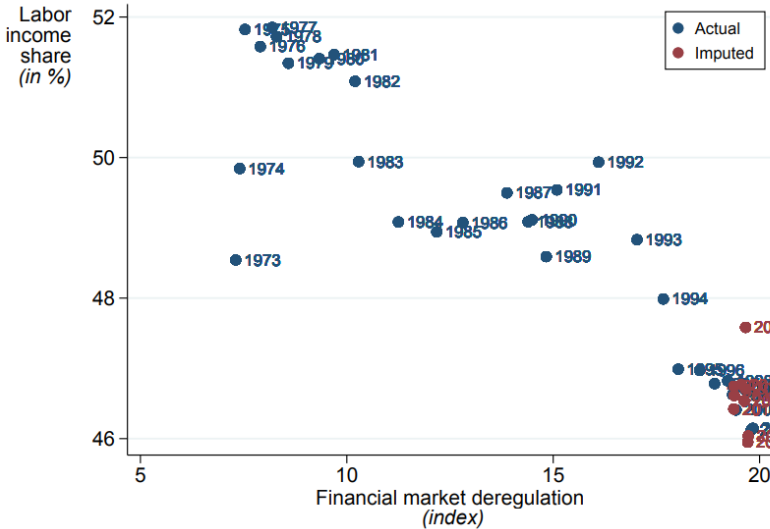


Figure 1. Labor income share and financial market reforms in the OECD (1973–2014). Note: The chart displays the average (employment weighted) labor income share in a sample of 20 OECD countries against the IMF financial market reform index between 1973 and 2014. The labor income share measures the some of wages as a share of nominal GDP (in percent). Values of the financial market reform index for years after 2005 have been imputed, using the method described in Section 5. Source: OECD Economic Outlook database, Abiad et al. (2008).

The latter points to a more fundamental short-coming in the discussion on the benefits of financial market development and the necessity of financial sector reforms: none of the existing research has looked specifically at the impact of financial markets on employment growth and job creation, or the particular impact financial market development might have on employment and earnings volatility. Implicitly, it is assumed that an understanding of the growth channel of financial market reforms is sufficient to grasp the full impact of the latter on labor markets and jobs. Partly, this has to do with the fact that to date, little is understood about the interactions between financial market development and job creation, with

only a few theoretical papers addressing the issue (see, for instance, Ernst and Semmler 2010; Pagano and Pica 2012; Wasmer and Weil 2004, which look at the interaction of financial development and unemployment from different angles). Drawing on existing theoretical insights, this article addresses the issue empirically, looking into the effects of both financial development and financial market regulation on labor market dynamics. Specifically, using both empirical estimates and scenario techniques, we ask whether and how the implementation of certain post-2010 reforms prior to the crisis would have affected recovery in employment.

To address this question, the article analyses the impact of different aspects of financial market development and financial sector reforms by examining the gross margins of labor market adjustment prior to the global financial crisis. This allows us to understand the impact of financial markets on the dynamics of job creation and job destruction separately, using panel estimates for unemployment in- and out-flows based on a methodology originally developed by Shimer (2012) and later refined by Elsby et al. (2013) (see the discussion in ILO (2013b)). The article first presents evidence on the different margins of adjustment and their interaction with financial market characteristics. Combining different information sources regarding the evolution of financial sector regulation, this article also confirms the disruptive nature of financial market deregulation for the post-2009 period. Finally, carrying out a scenario analysis, the article then examines how different forms of financial sector reforms would have impacted employment dynamics, had they already been in place by 2010. The main results of the analysis can be summarized as follows:

- Financial market developments have a significant albeit ambiguous influence on unemployment dynamics. In particular, market-based financial development (both stock and bond markets) appears conducive to more labor market turbulence with higher unemployment in- and out-flows. On the other hand, greater international financial openness has the opposite effect, again with an ambiguous effect on overall unemployment rates.
- Regarding financial market reforms, securities market liberalization also leads to higher labor market turbulence, confirming the effect of the de facto development of stock

and bond markets. Similarly, banking sector reforms such as loosening credit controls and banking sector privatization strengthen job creation without affecting unemployment inflows. At the same time, improved prudential regulation of banks leads unambiguously to lower unemployment as both unemployment outflows increase and unemployment inflows decline. In contrast to *de facto* international openness, *de jure* capital account openness has an unambiguous positive effect on employment by increasing unemployment outflows and lowering unemployment inflows.

- Looking at the post-crisis period, financial market re-regulation appears modest when assessed in a historical context. Only a few additional constraints have been introduced that make financial regulation appear less market-friendly. When assessing the evolution of financial sector deregulation beyond 2009, financial market reform continues to display a distinctive pattern of increased labor market turbulence. Only the removal of entry barriers to the entry of new banks seem to reduce labor market turnover, albeit at the cost of an overall reduction in employment dynamics. Taken as a whole, financial market re-regulation had only a very limited positive effect on labor market developments.
- A scenario analysis suggests that much higher benefits for jobs could have been obtained had financial market reforms been bundled into a substantive regulation package. Adopting a political economy perspective, we present reasons why such an encompassing reform package has not been adopted despite its obvious labor market benefits. We demonstrate the potential positive impact on employment that a fully-fledged financial market reform could have had in comparison to a no-reform benchmark, but also with respect to partial reforms such as those effectively observed.

This article is structured as follows: The next section provides an overview of the existing literature on the effect of financial market development on labor markets. Section 3 introduces a simple model of labor market flows on the basis of a standard search and matching framework, extended by a more general description of shocks and taking

into account capital accumulation at the firm level. Section 4 discusses the data and methodology employed in this paper. Section 5 presents the main results and examines the relative contribution of individual factors to the overall variation in our sample; it also presents evidence of the impact of financial market deregulation on labor markets after 2009 against an extended set of financial reform indicators using imputation techniques. Section 6 discusses some scenarios for financial market reform and their likely (combined) effect on labor market outcomes. A final section concludes.

FINANCE AND REGULATION: AN OVERVIEW OF THE LITERATURE

Prior to the global financial crisis, the rich literature on financial market development and growth focused mainly on the impact of the different characteristics of financial markets, sectoral specialization, and the institutional environment. The focus shifted significantly with the crisis, with an emerging literature paying increasing attention to the impact of financial markets on economic stability and the regulatory challenges financial market development pose. This section reviews some of the earlier literature on finance and growth, discusses its more critical reception since the crisis, and discusses some considerations that focused specifically on labor market issues. It also presents a selection of the vast and rapidly-growing literature on financial market regulation.

Finance and Growth

A substantial body of research has pointed to the benefits of financial development for growth, arguing that the financial sector plays an important role in mobilizing savings (Levine 1997; Levine and Zervos 1998), as well as in providing essential risk-sharing services (e.g., Allen and Gale 1999). Identification is not straightforward, however, as standard financial market variables such as credit growth or stock market valuations co-move with economic growth, which prevents the use of standard OLS-type estimations. To address this issue, different

identification methods have been developed and applied (Beck 2009). The most common approach has been to use panel instrumental variables, often making use of sectoral data to identify sectors with a particular dependence on external finance. Some authors have also applied country-specific time-series approaches, exploring the forecast capacity of financial development for future growth rates (e.g., Rousseau and Wachtel 1998). Finally, some authors have made use of firm-level data to gain a better understanding of the particular transmission mechanisms through which financial development can affect economic performance (e.g., Love 2003). Levine (2005) and Demirgüç-Kunt and Levine (2001) provide good overviews of both the theoretical and empirical literature that developed in this area prior to the GFC.

Looking at (instrumented) cross-sectional data, Beck et al. (2000) identified particular channels through which financial development affects growth. In particular, they found that financial intermediaries raise growth by lifting total factor productivity growth, whereas these institutions only weakly impact either physical capital growth or private savings rates. In this regard, Aghion et al. (2005) argued that financial development does not only help accelerate growth, it is also particularly beneficial for developing countries to catch up with more advanced economies; the further away a country is from the production frontier, the more financial development will help in closing the gap. Financial institutions seem to play different roles, however, in the catch-up process, as argued by Acemoglu et al. (2006). Whereas financial intermediaries are particularly important in providing capital to companies that are in the process of adopting technologies from the world frontier, market-based finance becomes important in selecting innovative firms to help push out the technological frontier. Therefore, different financial market institutions are supporting countries as they progress from emerging to developed economic status. In contrast, Compton and Giedeman (2011) took the view that financial intermediaries, such as banks, are complementary to growth in countries with weak governance structures (such as high levels of corruption and an absence of the rule of law), but do support growth in countries with higher institutional quality. In their view, only stock markets have a significant and independent impact on growth regardless of the quality of institutional development.

Alternative approaches have aimed at identifying the transmission channels of financial development on the real economy through sectoral analysis. An approach put forward by Rajan and Zingales (1998), and later extended by Carlin and Mayer (2003), commenced from the premise that sectors rely differently on external financing. The specific sectoral panel data setup allowed the authors to identify a growth effect from more developed financial markets for those sectors that rely more heavily on external financing. Specifically, Carlin and Mayer (2003) confirmed the results from aggregate estimates, showing that the growth effect of financial development comes from higher expenditures in R&D rather than from fixed capital formation. In contrast, Rousseau and Vuthipadadorn (2005) argued that for Asian economies, the investment channel has been the more relevant transmission mechanism in their catching up phase over the 1950–2000 period.

Since the GFC, research has focused on the possibility that there might be an upper limit to financial sector growth, above which negative effects of finance on economic stability prevail. Whereas earlier research suggested that the growth-enhancing effect of financial liberalization outweighs its costs in the form of a higher risk of crises (Rancière et al. 2006), Arcand et al. (2015) argued that there is a threshold above which financial depth no longer has a positive effect on economic growth. In particular, the authors estimated that financial depth depresses output growth when the credit ratio exceeds one year of GDP. This threshold not only operates for advanced economies, but can be detected even for emerging economies in Asia and Latin America: Aizenman et al. (2015) presented evidence suggesting that there might be a tipping point above which further increases in financial development lead to reductions in growth, in particular in specific sectors. Loayza et al. (2018) provided an overview of the literature looking specifically at the trade-off between faster growth and higher crisis risk. Even though the growth effects outweigh the crisis risk for middle-income countries, the challenges of “too much finance” are present for a large group of countries, in which overly-large financial sectors crowd out productive activities and lead to misallocation of resources. Echoing this pessimistic view, Intartaglia et al. (2018) presented evidence that all different forms of debt—private household and non-financial corporation debt—appear to be harmful to economic growth, albeit to different degrees and depending on whether

the country is advanced or developing. In particular, the total amount of debt seems to have a negative impact on growth only in developed economies, but not in developing countries, according to their estimates.

So far, no agreement seems to have been reached as to the particular reasons for the existence of such a threshold. Blanchard et al. (2016) focused on the role that international financial integration plays in destabilizing economies. In particular in emerging economies, large capital inflows seem to be concomitant with financial sector development that leads to pro-cyclical effects of credit growth, thereby both supporting economic growth and raising the risk for sudden stops and crisis. Such effects had already been detected in earlier periods during the integration of less well-developed European countries into the single market (Brezigar-Masten et al. 2008). Others have focused on the impact that financial market liberalization can have on inequality (Ernst and Escudero 2008; Kumhof et al. 2015; Rajan 2010): As gains from financial market development are distributed unequally, misallocation of credit can endogenously produce higher instability and increase the risk of sudden stops. It is, in particular, this latter mechanism that points to a particular role for labor market dynamics in understanding the trade-off between economic growth and crisis that financial sector development is likely to influence.

Financial Market Development and Employment Dynamics

In line with the literature on the impact of finance and growth, several studies have looked more directly at the impact financial sector turbulences have had on employment creation. In particular, in the aftermath of the GFC, researchers aimed at a better understanding of the role banking sector problems play in explaining the fall in employment. Using firm-level employment data for Spain, Bentolila et al. (2017) analyzed the credit supply shock as banks were forced to restructure, indicating that around 24% of job losses were due to firms being attached to weak banks. Berton et al. (2018) showed similar evidence for Italy, highlighting the heterogeneous employment effect of financial shocks, with effects of financial shocks depending on the education, age, gender, nationality, and type of contract of job holders. This is in line with earlier evidence presented by Caggese and Cunat (2008), demonstrating that in Italy,

financially-constrained firms make more use of temporary employment than unconstrained ones, amplifying the employment volatility of shocks. The volatility-enhancing impact of banking crises was also confirmed in a panel of OECD countries prior to the crisis (Pagano and Pica 2012). In particular, during banking-related crises, job creation is more tightly linked to falls in output, thereby amplifying the employment impact of the recession (see Figure 2).

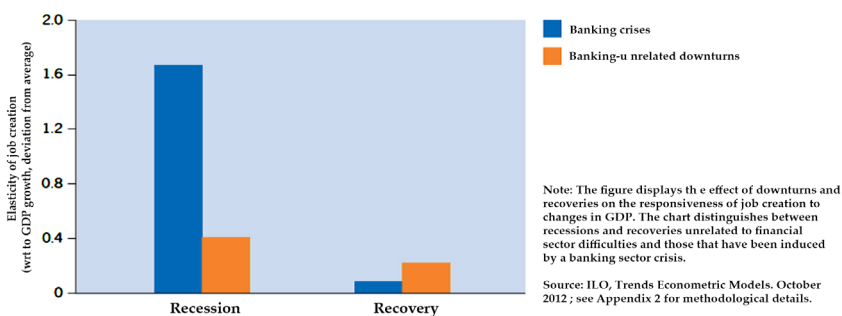


Figure 2. Banking crises and job creation. Source: ILO (2013a), p. 52.

Another strand of the literature has stressed the role of the financial premium and the financial accelerator in explaining labor market outcomes. Following considerations by Phelps (1998), for instance, Zoega (2012) stressed the role of asset prices in understanding employment dynamics. Looking specifically at the cyclical nature of the external finance premium, Chugh (2013) demonstrated that credit-market frictions amplify aggregate total factor productivity shocks, leading to large employment fluctuations that might help macro-economic models to generate realistic volatility in vacancies and job creation.¹ Part of the observed amplification of shocks has to do with the fact that larger banking sectors lead to more pronounced swings in the external finance premium (Epstein and Shapiro 2019). In addition, Gatti et al. (2012) showed that the impact of financial variables also depends on the specific rigidities present in the labor market: increased stock market capitalization enhances employment volatility in particular when labor markets are flexible. Finally, asset price effects might also operate in housing markets, amplifying shocks through a misallocation of resources between the housing market and the

rest of the economy, thereby making adverse shocks to unemployment more persistent (Ernst and Saliba 2018).

In this regard, Wasmer and Weil (2004) have developed a general framework for better understanding the particular transmission mechanism that links financial shocks to labor markets. Introducing matching frictions also on financial markets, in their model, entrepreneurs need to search for both financial funds and workers. The complementary nature between capital and labor in this model causes financial frictions to magnify those on the labor market, thereby exercising additional upward pressure on equilibrium unemployment rates. Moreover, changes in capital costs, the availability of funds, or the nature of the (financial) matching process will have immediate repercussions on labor market outcomes, both in terms of employment and wages. On the basis of this theoretical framework, a small macro-economic literature has developed that tries to understand the role of the financial sector on the transmission of growth on employment. For instance, Ernst and Semmler (2010) showed that when the cost of issuing bonds changes endogenously due to wealth effects, shocks on output and employment are magnified, possibly leading to multiple equilibria and catastrophic job losses. In an empirical application of this approach that makes use of multi-regime vector auto-regressions, Ernst et al. (2016) demonstrated that shocks to credit conditions during a high-growth period have markedly different effects than during recessionary periods, amplifying the initial shock on output and employment.

Financial Market Regulation: Between Economic Development and Instability

Banking sector stability, therefore, appears to be key to ensuring that financial market development will play a positive role in the real economy. As highlighted by Monnin and Jokipii (2013) in a panel VAR for a sample of 18 OECD countries, a positive link exists between the stability of the banking sector and real output growth. When the banking sector is unstable, uncertainty about future output growth increases, depressing investment and employment. In addition, wealth effects resulting from the financial accelerator need to be specifically targeted

through macro-prudential regulation. Following the debate on financial sector regulation after 2009, Claessens and Kodres (2014) summarized a few key lessons to restoring financial sector stability, including the adoption of a systemic approach, the introduction of crisis management as an integral part of macro-economic policy making and taking into account regulatory arbitrage.

The latter points to political economy considerations that will also play a role in our scenario analysis. Indeed, as Pagano and Volpin (2005a) and Pagano and Volpin (2005b) have pointed out, in economies with well-developed financial markets, managers and financial investors have an incentive to lobby for lax financial market regulation together with flexible labor markets that allow keeping wages low. In particular, such a mechanism would explain the negative correlation observed in Figure 1. It is, therefore, no surprise that representatives from financial institutions have argued against overly-strict sector regulation, highlighting potential negative implications for activity levels (Institute of International Finance 2010). In contrast, academics and representatives from civil society have pointed out that previous increases in capital requirements have had little impact on credit growth, but helped make the economy more stable (Admati et al. 2013; Deli and Hasan 2018; Kashyap et al. 2010). Most of this work has concentrated on the impact of financial reforms on GDP growth and output levels, but so far, the labor market implications have rarely been part of a more detailed analysis, implicitly assuming a more or less fixed relationship between output and employment.

Recently, some research has emerged that tries to analyze the impact of macro-prudential regulation on labor markets more directly, demonstrating the role of self-employment as a particular transmission mechanism of volatility that prudential regulators need to target (Shapiro and Gómez 2015, 2017). So far, however, labor market specificities have played only a small role in understanding the effectiveness of financial market regulation on promoting growth and stabilizing the economy. This seems to be a major short-coming of the existing literature, given the prominent role that labor markets can play in amplifying shocks. To address this gap in the literature, this article offers a more direct analysis of the effects of financial sector regulation on unemployment dynamics. Starting from the seminal contribution by Wasmer and Weil (2004), we develop an empirical application of their framework in order

to understand three essential dimensions of financial sector regulation as discussed in the literature reviewed thus far:

Regulation of international capital flows and the international financial architecture will affect the availability of foreign capital in the domestic economy, lifting competition on the domestic banking sector and providing additional liquidity. This will help reduce domestic financial market frictions and should in principle lower the real long-term interest rate. At the same time, at the macroeconomic level, it can also increase economic volatility, in particular when financial deregulation is met with poor macroeconomic management and exchange rate misalignment. Over the long-run, this needs to be matched against the potentially positive effects of better integrated financial markets that can help especially low-income countries to overcome capital shortages and thereby promote job creation and limit job destruction.

- Banking sector regulation is expected to lead to lower credit growth and potentially to higher real interest rates. The former will reduce the growth rate of aggregate demand, dampening gross fixed capital formation and growth in disposable household income. In addition, the interest rate effect will not only slow down aggregate demand growth, but will directly affect the value of a new job, thereby lowering the rate at which new vacancies are being created and increasing the job destruction rate. At the same time, prudential banking sector reforms are expected to stabilize the financial sector, thereby raising the prospects for job stability and employment growth.
- The regulation of financial products, in particular regarding the derivatives market, can be expected to have ambiguous effects on labor markets. On the one hand, stricter regulation of certain products—regarding, for instance, the disclosure of information, the standardization and trading of these products on centralized platforms, or the outright prohibition of certain products such as uncovered short-selling—is likely to reduce market liquidity, with the risk of higher risk premia and more market volatility, translating into greater macroeconomic uncertainty and lower employment creation. On the other hand, to the extent that these products are themselves at the origin of macroeconomic volatility, regulating such activities

can help stabilize the banking sector and thereby lower the macroeconomic risk premia.

UNEMPLOYMENT FLOWS AND FINANCIAL MARKET INTERACTIONS

Based on the original contribution by Wasmer and Weil (2004), in this section, we proceed with the development of our main hypotheses that we want to test in the remainder of this article. In particular, we derive empirically-testable equations for unemployment in- and out-flows that allow a precise quantitative assessment of the interactions of labor market dynamics with the characteristics of financial markets. The section starts by summarizing the main theoretical insights on the interaction between financial markets and labor market outcomes as analyzed by Wasmer and Weil. It then presents an empirical decomposition of unemployment dynamics that can be used to test the theoretical predicaments using a new database on unemployment flows.

The Impact of Financial Market Frictions on Labor Market Outcomes

Starting from the original contribution to labor market matching of Pissarides (2000), Wasmer and Weil (2004) added financial frictions to the process of job vacancy openings. In their setup, entrepreneurs—prior to opening a job vacancy—need to find an appropriate financier that allows them to finance their capital layouts and the recruitment stage. This happens in a separate step through a frictional matching process on financial markets. Similar to labor markets, the matching process on financial markets can be represented through a (constant-returns-to-scale) matching function with credit liquidity ϕ and a repayment rate that is subject to a bilateral Nash bargaining process. Once an entrepreneur has successfully matched a financier, a vacancy can be opened that will be filled at a rate depending on labor market tightness, measured by the ratio of unfilled vacancies, V , over current job seekers, U , in short $\theta \equiv V/U$.

The value of such a job vacancy arises from the expected net profit $E(\pi) = \frac{y-w}{r+\sigma}$, with y : output, w : worker's salary, r : gross interest rate, σ : match separation rate, minus the recruitment costs, $\gamma(\theta)$, which are proportional to labor market tightness, θ , or the difficulty to match with a job seeker. In Wasmer and Weil's setup, the value of a vacancy is calculated at the stage when an entrepreneur meets with a prospective bank and will, therefore, depend on the chances of a successful match. In short notation, this yields (see Wasmer and Weil 2004, p. 950):

$$V_t = V(\theta_t, r_t, w_t, y, \sigma, \gamma) = \frac{q(\theta_t)}{r_t + q(\theta_t)} \left[\frac{y - w_t}{r_t + \sigma} - \gamma(\theta_t) \right] \text{ with } V_\theta, V_r, V_w, V_\sigma, V_\gamma < 0, V_y > 0 \tag{1}$$

where $q(\theta)$ describes the matching function with $q_\theta < 0$.

Job creation takes place if the value from a vacant job, V_t , exceeds the entry costs for firms and the funding costs for banks. In Wasmer and Weil's model, the joint surplus that arises from a vacancy will be split according to a bargaining rule with the bank's bargaining power measured by β . Hence, equilibrium arises at the intersection of the schedule of financial and labor market equilibrium:

$$\beta V_t = K(\phi_t) \text{ and } (1 - \beta) V_t = C(\phi_t)$$

where ϕ_t : available financial funds, $K(\phi_t)$: fundraising costs, and $C(\phi_t)$: a firm's entry costs with $K_\phi < 0, C_\phi > 0$. In equilibrium, the availability of financial funds will adjust so that:

$$\frac{1 - \beta}{\beta} = \frac{C(\bar{\phi})}{K(\bar{\phi})} \tag{2}$$

Besides on financial market tightness, ϕ , firm entry costs, $C(\phi)$, are only assumed to depend (negatively) on exogenous barriers to entry as they arise, for instance, from product market regulation. In turn, fundraising costs, $K(\phi)$, depend (negatively) on banking sector regulation, such as minimum capital requirements, regulatory openness to international

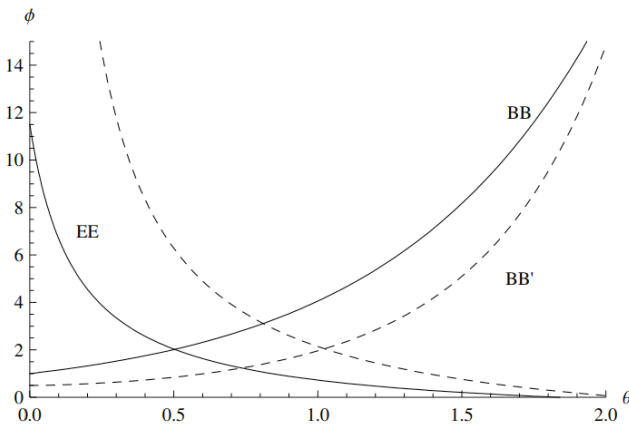
capital (in-)flows and the regulation of securities markets. Both fundraising and entry costs of firms will depend on the depth of financial markets that influence the matching process, in particular the speed with which available funds can be matched with entrepreneurial projects. Finally, the equilibrium on financial markets described by Equation (2) depends on the bargaining power of banks, β , which depend on the structure of the banking sector (number of banks, share of publicly-owned banks), as well as on any interest rate controls.

Similar to Pissarides (2000), Wasmer and Weil's base model kept job destruction exogenous. Our data on labor flows (see Section 4 below) allow, however, distinguishing both margins separately and testing factors that influence job creation and job destruction rates. To derive empirically-testable hypotheses relevant for unemployment inflows, we, therefore, consider that (endogenous) job destruction takes place whenever the joint surplus of a job, S_t , falls below a viability threshold due to the realization of a negative productivity shock. This viability threshold is negotiated prior to the creation of a vacancy and depends on the commitment of banks to provide additional funds in the case of adverse shocks, as well as the quality of the firm's balance sheets (Phelps 1998). As Wasmer and Weil indicated, such commitment might be tested if productivity falls substantially below the zero-profit condition and might depend again on the size and quality of the financial system. Furthermore, and thereby following the earlier literature on endogenous job destruction (see Pissarides 2000; Caballero 2007), we will consider labor market conditions to be relevant for the determination of the optimal threshold at which jobs are being destroyed. In our setup, we assume that the viability condition is defined by the rate of underlying technological progress, given by total factor productivity (TFP), whereas realized output per match is given by y . In short notation, we, therefore, express the endogenous job destruction as:

$$\sigma_t = \sigma (E (y < TFP))$$

Figure 3 describes how exogenous factors related to financial market development and financial regulation are influencing the position of the two equilibrium schedules and their expected effect on labor market and financial tightness. As shown in Panel A, matching function parameters will not influence the equilibrium position of ϕ described in Equation (2), and hence, financial development will lead to a proportional shift of both the financial market and labor market equilibrium, leading to less unemployment overall. Stricter banking regulation (Panel B) will only affect financial markets and lead to an upward shift of the BB-schedule, thereby increasing both financial market tightness and unemployment. In contrast, lowering interest rates, for instance through relaxed securities regulation or stiffer banking sector competition, will have ambiguous effects on employment even though it also raises financial market tightness (Panel C). For reasonable parameter values and high unemployment rates, it will actually help expand employment. Finally, lowering entry barriers for firms, for instance the through ease of business regulation, will increase both financial market tightness and employment as only the EE-schedule moves to the right (Panel D).

Panel A: More developed financial markets



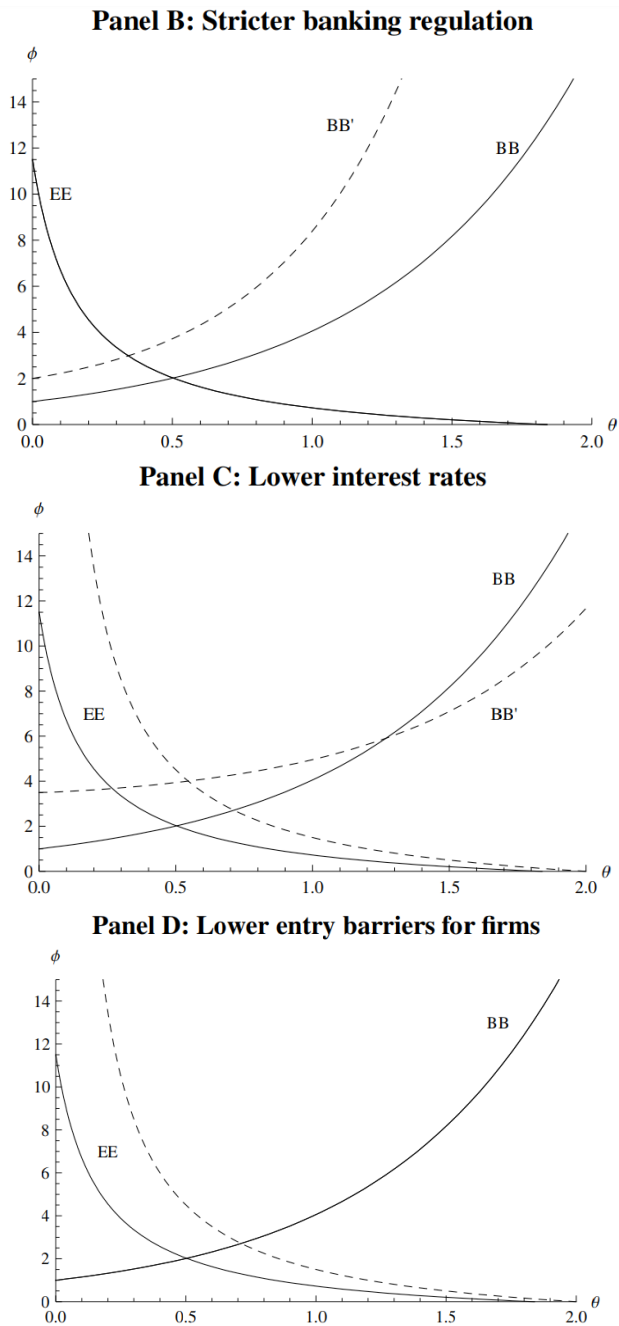


Figure 3. Finance and jobs. Note: The EE- and BB-schedules refer to equilibrium on labor and financial markets. (**B**) refers to an increase in k .

From Theory to Empirical Analysis: Unemployment Flows Accounting

Testable relations between financial market characteristics and unemployment flows can be set up starting from a labor flow accounting framework. In the following, we concentrate on labor market flows related to flows from employment to unemployment (IN_t) and from unemployment into employment (OUT_t). These flows can be linked to (absolute) changes in the number of unemployed as follows:

$$\Delta U_t = \Delta L_t - \Delta ET_t = IN_t - OUT_t \quad (3)$$

i.e., the level of unemployment increases with the increase in the labor force, L_t , and decreases with the rise in (total) employment, ET_t . Alternatively, unemployment increases when inflows into the unemployment pool, IN_t , exceed outflows, OUT_t . In order to be operational for our purposes, this flow equation needs to be further refined, taking into account the job creation and destruction process that affects the total amount of jobs available:

$$\Delta ET_t = JobCreation_t - JobDestruction_t \quad (4)$$

i.e., changes in the employment level result from the difference between created vs. destroyed jobs.

Adding our theoretical considerations regarding the impact of financial markets on job dynamics to an earlier empirical formulation of labor market matching models derived by Carlsson et al. (2006), the extensive margin of labor demand can be derived from the surplus value of a vacancy, V_t , and is, therefore, determined by a mix of the following factors (see Equation (1) above):

$$JobCreation_t = \alpha_1 + \beta_{11} AD_t + \beta_{12} w_t + \beta_{13} FinDev_t + \beta_{14} r_t + \beta_{15} Share_t \quad (5)$$

where $AD_t = y$: aggregate demand, w_t : real wages, $FinDev_t$: financial development/regulation, r_t : the real long-term interest rate, $Share_t$: real share price growth. Following considerations by Phelps (1998), we also include balance-sheet effects that arise from variations in (real) share prices and that affect both the rate at which jobs are being created, but more importantly the financial fragility of existing jobs, and hence the rate of job destruction.

Similarly, job destruction will be affected by the rate of technological progress, the real interest rate (through the discounted future benefits of an ongoing relationship), import competition, wages, and aggregate demand:

$$\text{JobDestruction}_t = \alpha_2 + \beta_{21} \text{TFP}_t + \beta_{22} r_t + \beta_{23} \text{FinDev}_t + \beta_{24} w_t + \beta_{25} \text{AD}_t + \beta_{26} \text{Share}_t \tag{6}$$

where TFP_t : an indicator for total factor productivity, r_t : the real (long-term) interest rate, FinDev_t : financial development/regulation.

Finally, unemployment dynamics as described above are also affected by changes in the labor force. We build upon standard theories about the determinants of labor supply by considering the following equation for changes in labor force growth (see, for instance, Burniaux et al. 2003):

$$\Delta L_t = \alpha_3 + \beta_{31} \Delta L_{t-1} + \beta_{32} \Delta u_{t-1} + \beta_{33} \text{Tax}_t \tag{7}$$

where β_{32} represents the discouraged worker effect, which depresses the labor force (with an expected negative sign).

The five Equations (3)–(7) form the basis of our labor market flow model. Due to the lack of internationally-comparable data on job creation and destruction rates, however, the model needs to be rewritten to match with our database. This can be done by bringing in accordance job creation rates with unemployment outflows, on the one hand, and job destruction with unemployment inflows, on the other. This requires that the determinants of labor supply as specified in Equation (7) are plugged into the appropriate unemployment flow equation. Indeed, unemployment inflows and outflows do not match exactly job destruction and job creation. Some unemployment inflow happens from inactivity, while some of those loosing their job might drop out immediately to inactivity if they do not qualify for any benefits. Similarly, job creation can happen out of inactivity (for instance, through self-employment), while some people might “flow out of” unemployment at the end of their benefit period and into inactivity. As a consequence, using unemployment flows instead of job creation and destruction rates might overestimate employment dynamics due to the failure to take out flows back and forth from and to inactivity. It might also overestimate the variation of employment growth when the inactivity rate fluctuates with the business cycle (as is suggested by the discouraged worker effect).

In our specification, we consider that the discouraged worker effect will create additional unemployment outflows. On the other hand, increasing supply in the available workforce will show up as additional unemployment inflows. Tax-related changes in labor supply are considered to affect both unemployment inflows and outflows. Besides these adjustments to our specification, we consider both unemployment inflows and outflows to follow dynamic adjustment processes, instead of estimating them at levels. This way, we cope with systematic under- or over-estimation of flows over the cycle that are due to linkages between unemployment and inactivity. In addition, by considering contemporaneous interactions between the two flow directions, we also take care of the possibility that we are overestimating the impact of unemployment flows on employment variation: higher contemporaneous inflows will also increase outflows as part of it goes into inactivity. Similarly, higher outflows might partly imply an increase in inactivity that will show up in increased inflow rates. We will therefore estimate the following two equations related to unemployment dynamics:

$$OUT_t = \alpha_{OUT} + \tilde{\beta}_{11}OUT_{t-1} + \tilde{\beta}_{12}X_t^{JobCreation} + \tilde{\beta}_{13}\Delta u_{t-1} \quad (8a)$$

$$IN_t = \alpha_{IN} + \tilde{\beta}_{21}IN_{t-1} + \tilde{\beta}_{22}X_t^{JobDestruction} + \tilde{\beta}_{23}\Delta L_{t-1} \quad (8b)$$

where $X_{JobCreation}$ and $X_{JobDestruction}$ correspond to the different explanatory variables in Equations (5) and (6), respectively. Equations (8a) and (8b) will form the base model for the following extensions of our labor flow model.

DATA, METHODOLOGY, AND HYPOTHESES

Data: Unemployment Flows, Labor Market Institutions, and Financial Structure

The paper brings together three databases: unemployment in- and outflows, general macroeconomic data, and financial market dynamics. The resulting database covers 20 OECD countries over most of the period

between 1970 and 2009 on an annual basis (time coverage changes depending on the particular specification used). Even though information on both unemployment flows and financial market development is available for more recent periods, we restrict the sample on purpose to allow comparability with the IMF's financial market reform index, which is only available until 2005. This way, we interpret our scenario results as the impact of financial market regulation on job dynamics had the regulation been in place prior to the global financial crisis.

Unemployment flows are taken from the International Labour Organization (ILO) database on unemployment flows. This database follows the methodology developed by Shimer (2005, 2012) and Elsby et al. (2013). The data are constructed on the basis of OECD information regarding unemployment stocks and unemployment duration of different duration lengths. In contrast to similar information provided by Shimer (2012) or Petrongolo and Pissarides(2008), our data on unemployment flows follow the methodology suggested by Elsby et al. (2013) that allows for a systematic cross-country analysis. In our case, we take advantage of the larger country coverage to use the increased number of degrees of freedom (within a panel-data context) in order to test for a larger number of determinants of unemployment flows.

Information on different aspects of financial market development is based on the updated version of the database originally provided by Beck et al. (2000). The database contains information on the asset and liability side of the financial sector (banking, bond, and stock markets), as well as diverse indicators regarding the performance of the banking market (return-on-assets, return-on-equity, net interest margin, concentration rate). In the estimations below, we have been concentrating on liquidity measures to reflect the quantitative impact that government net lending might have on available loan-able funds.

Indicators on financial sector reforms in OECD countries since the 1970s have been developed by Abiad et al.(2008). The database establishes an overall indicator on the (time-varying) state of financial market regulation. In addition, the database allows distinguishing between different areas of regulation, including interest rate ceilings, credit growth restrictions, entry barriers for banks, the extent of (financial sector) privatizations, and security market reforms. In our regressions, we make use of the most

detailed level of information, although we only report coefficients when they satisfy a minimum degree of statistical significance.

As the financial market regulation index produced by Abiad et al. (2008) is only available until 2005, we make use of additional information on the evolution of financial market regulation provided by the Heritage Foundation. The Heritage Index of Economic Freedom assesses cross-country differences of market regulation and state interventions in different areas since 1995 and up to 2018 (see <https://www.heritage.org/index/>). For our purposes, six sub-indicators of the overall index have been used: financial freedom, investment freedom, trade freedom, monetary freedom, level of government spending, and business freedom. We used simple panel data regressions to make out-of-sample imputations, which allowed an expansion of the original financial reform database to up to 32 OECD countries covering all years from 1995–2018 (detailed regression output of the imputation equations is available from the author upon request).

Information on international capital flows has been used from Lane and Milesi-Ferretti (2007). The database contains information regarding internationally-traded assets and liabilities, such as foreign direct investment, portfolio equity and debt flows, and financial derivatives. Both share indicators and (real) growth rates (deflated using the GDP deflator) have been used in this paper.

The database has been complemented with macro-economic and labor market information taken from the OECD Economic Outlook database and the OECD Main Economic Indicators. In particular, data regarding total employment and labor force developments, capital stock estimates, and interest rates are taken from there. In addition, an indicator of real share price increases has been developed on the basis of OECD information, using the GDP deflator to deflate nominal share prices.

Methodology and Hypotheses

To exploit the cross-country nature of our data, we apply standard panel data techniques. The theoretical equations developed in Section 3 are both formulated in level terms, which would suggest the use of simple

OLS to test the different determinants of unemployment flows. Three issues arise, however, in this respect:

- Country-specific information is not always available for all variables over the entire time period. Moreover, some of the financial reform indicators suffer from very limited time variability within country panels.
- Both unemployment in- and out-flows are highly persistent within countries, introducing problems of auto-correlation.
- Some of the right-hand side variables are endogenous to the dependent variable (in- and out-flows).

To address these problems, we follow Beck et al. (2000) and use the Arellano–Bond (AB) system General Method of Moments (GMM) estimator, taking into account the low-order moving-average correlation of the error terms as we have relatively long time series. As the AB-GMM estimator is known to be inconsistent for panels with a large time dimension due to the proliferation of instruments, we limit the number of instruments to satisfy the Sargan over-identification test in line with standard practice in the finance-and-growth literature (see Beck et al. 2000).

In our base specification, we rely on the setup identified by Ernst (2011) and Ernst and Rani (2011). In order to identify the interactions with financial markets as discussed above, we separately introduce variables related to financial development and financial market regulation to avoid problems of multi-collinearity (see Section 5.1 and Section 5.2). In Section 5.3, we use our imputed financial reform index as a robustness check to our baseline regressions. In a separate step, we simulate a joint model of financial determinants of unemployment outflows and inflows in order to present the labor market outcomes of reform proposals that are currently being discussed or in the process of being implemented (Section 6).

Based on our theoretical considerations in Section 3, we want to contribute to a better understanding of labor market dynamics as financial markets develop:

- Financial market development might simultaneously increase job creation and lower job destruction due to stronger investment that is being directed towards its most productive use;
- financial market development might also lead to higher labor market turnover as both unemployment out- and in-flows increase due to faster restructuring, which is implied by deeper financial markets;
- in contrast, financial market development might depress both job creation and increase job destruction if it brings about an increase in unproductive, speculative activities that do not generate jobs.

As regards financial market regulation and based on the macro-finance literature discussed above, two main hypotheses may be put forward:

- Stricter regulation of banking sector activities will lead to an increase in the user cost of capital, thereby reducing unemployment outflows and increasing unemployment inflows.
- Better prudential regulation reduces financial market stress and stabilizes the banking sector, thereby relieving credit constraints; this should support job creation and limit job destruction.

In the next section, we will present the empirical results to see whether they confirm our hypotheses.

FINANCIAL MARKET DETERMINANTS OF UNEMPLOYMENT FLOWS

This section presents evidence regarding the different hypotheses on the relationship between financial markets and unemployment flows. First, we will look into the influence of the size of the financial sector and the importance of international financial flows on labor market dynamics. In Section 5.2, our interest then turns to analyzing the effects of financial market regulation on unemployment flows.

Financial Market Development and Unemployment Flows

Table 1 and Table 2 summarize the results regarding the impact of various facets of financial market development on unemployment flows. Different aspects are covered, ranging from financial market development as measured by the share of private credit in GDP (equations (1.1) and (2.1)) over international financial integration (equations (1.2) and (2.2)), to the importance of stock and private bond markets (equations (1.3), (1.4), (2.3), and (2.4)). A fifth equation is added, estimating the joint effect of these four aspects to assess the extent to which these four indicators cover different aspects of financial market development.

Table 1. Financial market determinants of unemployment inflows.

	Dependent Variable: Unemployment Inflows				
	(1.1)	(1.2)	(1.3)	(1.4)	(1.5)
Unemployment inflows	0.881 ***	0.912 ***	0.836 ***	0.831 ***	0.808 ***
(lagged)	(1.9×10^{-2})	(1.9×10^{-2})	(2.2×10^{-2})	(2.4×10^{-2})	(3.1×10^{-2})
Output gap	-3.3×10^{-2} ***	-2.6×10^{-2} **	-3.8×10^{-2} ***	-4.2×10^{-2} ***	-5.1×10^{-2} ***
	(9.0×10^{-3})	(1.1×10^{-2})	(1.0×10^{-2})	(1.0×10^{-2})	(1.5×10^{-2})
TFP growth	2.4×10^{-1} **	2.8×10^{-1} ***	2.6×10^{-1} **	2.5×10^{-1} **	3.4×10^{-1} **
(lagged)	(1.0×10^{-1})	(1.2×10^{-1})	(1.1×10^{-1})	(1.2×10^{-1})	(1.6×10^{-1})
Labor force growth	1.247 ***	-1.4×10^{-2}	1.228 ***	1.291 ***	8.7×10^{-1} ***
(lagged)	(3.2×10^{-1})	(1.5×10^{-2})	(3.0×10^{-1})	(3.2×10^{-1})	(2.8×10^{-1})
Real share price growth	-1.3×10^{-1} ***	-1.5×10^{-1} ***	-9.8×10^{-2} ***	-1.2×10^{-1} ***	-1.9×10^{-1} ***
(lagged)	(3.7×10^{-2})	(3.9×10^{-2})	(3.8×10^{-2})	(3.9×10^{-2})	(4.9×10^{-2})
Financial market development	-4.5×10^{-2} **				-1.2×10^{-1} ***
	(2.1×10^{-2})				(3.2×10^{-2})
International		-1.1×10^{-2} **			-1.8×10^{-2} ***

Dependent Variable: Unemployment Inflows					
financial openness		(4.0 × 10 ⁻³)			(5.6 × 10 ⁻³)
Stock market			1.9 × 10 ⁻² **		8.2 × 10 ⁻² ***
development			(1.0 × 10 ⁻²)		(2.9 × 10 ⁻²)
Private bond market				1.5 × 10 ⁻¹ ***	2.0 × 10 ⁻¹ ***
capitalization				(3.1 × 10 ⁻²)	(4.8 × 10 ⁻²)
Observations	399	315	342	307	206
Number of countries	19	19	19	18	18

Note: TFP: total factor productivity. All estimates performed using the Arellano–Bond system GMM estimator. Standard errors in parentheses. All regressions pass the Sargan over-identification test to validate the number of instruments. The number of asterisks indicates the statistical significance level: *** p < 0.01, ** p < 0.05, * p < 0.1.

Table 2. Financial market determinants of unemployment outflows.

Dependent Variable: Unemployment Outflows					
	(2.1)	(2.2)	(2.3)	(2.4)	(2.5)
Unemployment outflows	0.770 ***	0.726 ***	0.770 ***	0.712 ***	0.700 ***
(lagged)	(2.9 × 10 ⁻²)	(3.5 × 10 ⁻²)	(3.2 × 10 ⁻²)	(3.8 × 10 ⁻²)	(4.4 × 10 ⁻²)
Output gap	1.9 × 10 ⁻² ***	2.4 × 10 ⁻² ***	1.1 × 10 ⁻²	1.6 × 10 ⁻² *	3.5 × 10 ⁻² **
	(7.0 × 10 ⁻³)	(9.0 × 10 ⁻³)	(7.0 × 10 ⁻³)	(9.0 × 10 ⁻³)	(1.1 × 10 ⁻²)
Real long term	-4.0 × 10 ⁻³	-1.6 × 10 ⁻² **	1.0 × 10 ⁻³	-3.0 × 10 ⁻³ ***	
interest rate	(6.0 × 10 ⁻³)	(7.0 × 10 ⁻³)	(6.0 × 10 ⁻³)	(8.0 × 10 ⁻³)	
Wage-interest rate	-4.2 × 10 ⁻² **	-8.8 × 10 ⁻² ***	-5.9 × 10 ⁻² ***	-5.4 × 10 ⁻² **	-1.0 × 10 ⁻¹ *
ratio	(2.0 × 10 ⁻²)	(4.5 × 10 ⁻²)	(2.1 × 10 ⁻²)	(2.1 × 10 ⁻²)	(5.2 × 10 ⁻²)
Real share price growth					1.7 × 10 ⁻¹ **
					(7.0 × 10 ⁻²)
Gross fixed capital	1.232 ***	1.188 ***	1.164 ***	1.288 ***	
investment	(2.0 × 10 ⁻¹)	(2.4 × 10 ⁻¹)	(2.1 × 10 ⁻¹)	(2.4 × 10 ⁻¹)	
Financial market	0.149 ***				8.1 × 10 ⁻² **
development	(3.1 × 10 ⁻²)				(4.1 × 10 ⁻²)
International financial		-0.044 ***			-4.5 × 10 ⁻² ***

	Dependent Variable: Unemployment Outflows				
openness		(8.0×10^{-3})			(8.4×10^{-3})
Stock market			0.182 ***		0.171 ***
development			(3.7×10^{-2})		(4.8×10^{-2})
Private bond market				0.378 ***	0.358 ***
capitalization				(6.2×10^{-2})	(7.2×10^{-2})
Observations	390	302	332	303	214
Number of countries	20	20	20	18	18

Note: All estimates performed using the Arellano–Bond system GMM estimator. Standard errors in parentheses. All regressions pass the Sargan over-identification test to validate the number of instruments. The number of asterisks indicates the statistical significance level: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Our results confirm the original insight of Wasmer and Weil: increased financial market development as measured by a higher credit-to-GDP ratio lowers unemployment by lowering unemployment inflows (equation (1.1)) and increasing unemployment outflows (equation (2.1)). This is true even when controls for other forms of financial market development are being introduced (see equations (1.5) and (2.5)).

However, such unambiguous results do not apply to other financial market indicators. When considering international financial openness as measured by international capital flows as a share of GDP, unemployment inflows are being reduced, but so are unemployment outflows. This suggests that rather than stimulate an economy's restructuring, such capital inflows tend to make unemployment dynamics less volatile, but also less conducive to economic restructuring.

In contrast, both more developed stock and bond markets yield higher labor market turbulence. Both indicators are associated with higher unemployment inflows and higher unemployment outflows. This suggests that market-based financial development—rather than credit/bank-based finance—is likely to be more conducive to labor market restructuring and eventually to a more rapid adaptation of labor markets to external shocks. Whether the overall contribution of either stock market or bond market development leads to higher or lower employment levels seems to be a question of the particular specification used. In particular for the

indicator of stock market development, estimated coefficients seem to depend largely on the specification used (compare equations (1.3) and (1.5) in Table 1), as well as on the number of countries retained in each sample.

Financial Market Reforms and Labor Market Flows

The theoretical model discussed in Section 3 also offers the possibility to analyze directly the effect of financial sector reforms on job dynamics. Since the financial market crisis most of the discussion in this area has focused on the impact of reforms on financial sector stability and diversification rather than on real economic growth, with some notable exceptions (see, for instance, Admati et al. 2013, Deli and Hasan 2018, Kashyap et al. 2010, Basel Committee on Banking Supervision 2010, Financial Stability Board 2010). Rare have been the papers that have specifically looked into the effects such reforms might have on labor markets (see, for instance, Shapiro and Gómez 2015).

Using the same methodology as the one outlined in Section 3, we use information recently made available on financial reforms (see Section 4, which discusses the data). The available information stops in 2005 and covers less countries than the one on financial market development, but does still allow panel data analysis with a medium-sized panel. The results of these estimates are presented in Table 3 for unemployment outflows and in Table 4 for unemployment inflows.

Table 3. Financial sector reforms and unemployment outflows.

	Dependent Variable: Unemployment Outflows										
	(3.1)	(3.2)	(3.3)	(3.4)	(3.5)	(3.6)	(3.7)	(3.8)	(3.9)	(3.10)	(3.11)
Unemployment outflows	0.734 ***	0.799 ***	0.800 ***	0.745 ***	0.788 ***	0.836 ***	0.836 ***	0.815 ***	0.816 ***	0.838 ***	0.857 ***
(lagged)	(0.0345)	(0.0283)	(0.0283)	(0.0342)	(0.0320)	(0.0273)	(0.0307)	(0.0275)	(0.0301)	(0.0271)	(0.0273)
Output gap	0.0133 **	0.00451	0.00498	0.0134**	0.0103*	0.0139**	0.00938	0.00637	0.00354	0.00912	0.00283
(0.00593)	(0.00626)	(0.00626)	(0.00626)	(0.00628)	(0.00624)	(0.00662)	(0.00639)	(0.00621)	(0.00651)	(0.00621)	(0.00670)
Real short-term interest rate	-0.0196 ***	-0.0133 ***	-0.0136 ***	-0.0189 ***	-0.0143 ***	-0.0126 **	-0.0200 ***	-0.00946 *	-0.0154 ***	-0.0119 **	-0.0124 **
(0.00478)	(0.00505)	(0.00506)	(0.00483)	(0.00522)	(0.00551)	(0.00527)	(0.00536)	(0.00510)	(0.00510)	(0.00522)	(0.00542)
Change in wage-capital ratio	-0.105 ***	-0.132 ***	-0.132 ***	-0.108 ***	-0.116 ***	-0.107 ***	-0.121 ***	-0.129 ***	-0.131 ***	-0.121 ***	-0.135 ***
(0.0316)	(0.0332)	(0.0333)	(0.0321)	(0.0330)	(0.0330)	(0.0345)	(0.0362)	(0.0333)	(0.0336)	(0.0332)	(0.0364)
Real share price inflation	0.102 **	0.0816 *	0.0846 *	0.104 **	0.109 **	0.118 **	0.111 **	0.104 **	0.145 ***	0.103 **	0.136 ***
(0.0466)	(0.0496)	(0.0497)	(0.0473)	(0.0482)	(0.0505)	(0.0510)	(0.0492)	(0.0492)	(0.0503)	(0.0492)	(0.0525)
Gross fixed capital formation	4.383 ***	5.038 ***	5.009 ***	4.145 ***	4.302 ***	2.803 ***	3.752 ***	4.582 ***	4.762 ***	3.912 ***	4.575 ***
(0.874)	(0.954)	(0.956)	(0.939)	(0.913)	(0.949)	(0.979)	(0.933)	(0.933)	(0.963)	(0.907)	(1.015)
Growth in real household disposable income	1.361 **	1.698 ***	1.702 ***	1.375 **	1.481 **	1.400 **	1.348 **	1.592 **	1.859 ***	1.523 **	1.851 ***
(0.604)	(0.639)	(0.640)	(0.613)	(0.626)	(0.656)	(0.670)	(0.638)	(0.654)	(0.637)	(0.685)	(0.685)
Financial derivatives liabilities	-2.760 ***	-2.883 ***	-2.891 ***	-2.665 ***	-2.174 ***	-3.205 ***	-2.538 ***	-3.351 ***	-2.237 ***	-2.729 ***	-2.851 ***
(0.00478)	(0.00505)	(0.00506)	(0.00483)	(0.00522)	(0.00551)	(0.00527)	(0.00536)	(0.00510)	(0.00510)	(0.00522)	(0.00542)

Dependent Variable: Unemployment Outflows											
	(0.552)	(0.585)	(0.588)	(0.557)	(0.525)	(0.702)	(0.695)	(0.620)	(0.567)	(0.587)	(0.711)
(in % of GDP, lagged)											
Removing directed credit provisions (lagged)		0.130 *** (0.0175)									
Loosening of credit controls (lagged)			0.130 *** (0.0177)								
Loosening of interest rate controls (lagged)				0.0168 (0.0214)							
Lifting of entry barriers (lagged)					0.00438 (0.0106)						
Bank privatization (lagged)						0.0810 *** (0.0189)					
Capital account openness (lagged)							0.0514 *** (0.0168)				0.0350 ** (0.0156)
Financial reforms (lagged)								0.0251 *** (0.00373)			
Securities markets' deregulation (lagged)									0.203 *** (0.0327)		0.123 *** (0.0345)

	Dependent Variable: Unemployment Inflows									
Prudential regulation of banks										-0.0123 **
(lagged)										(0.00547)
Constant	-0.767 ***	-0.566 ***	-0.884 ***	-0.752 ***	-0.848 ***	-0.888 ***	-0.797 ***	-0.933 ***	-1.064 ***	
	(0.178)	(0.201)	(0.213)	(0.176)	(0.178)	(0.184)	(0.177)	(0.181)	(0.175)	
Observations	221	75	75	221	221	221	221	221	211	
Number of countries	12	5	5	12	12	12	12	12	12	

performed using the Arellano–Bond system GMM estimator. Standard errors in parentheses. All regressions pass the Sargan over-identification test to validate the number of instruments. The number of asterisks indicates the statistical significance level: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

The results on unemployment outflows are broadly in line with those uncovered regarding the effects of financial market development on job creation. Removing credit provisions or loosening credit controls impact unemployment outflows positively, reflecting the fact that stronger credit growth pushes up employment creation. Similarly, reforming securities markets will also help increase job creation rates. On the other hand, loosening interest rate controls does not seem to have a significant effect, reflecting the ambiguity of lower interest rates on labor market liquidity as discussed in the theoretical section.

Table 3 also offers two noticeable differences with respect to results presented in earlier sections. First, increasing capital account openness seems to contribute positively to job creation rates, whereas de facto financial openness had depressed it (see Table 2, equations (3.2) and (3.5)). This might have to do with the fact that other reforms are typically being undertaken simultaneously, which helps overall job creation to be stimulated even though the direct effect from higher financial integration is negative. Second, stricter prudential regulation leads to stronger unemployment outflows, in contrast to what the theoretical results presented in Section 3 would have suggested. This might have to do with the fact that such reforms lead to lower volatility of the real economy with less frequent cycles that have a lower amplitude, which both should be expected to influence job creation positively. This effect, however, has not properly been taken care of in the theoretical model underlying Section 3, which abstracts from any effects from financial instability.

Similar to unemployment outflows, the results on the impact of financial regulation on unemployment inflows presented in Table 4 are also in line with the earlier results of Table 1, at least as regards reforms to securities market regulation. Most of the indicators on reforming credit provisions and interest rate controls are insignificant, suggesting that they have little impact on the separation rate. The measured impact of credit growth on unemployment inflows might, therefore, stem from an overall aggregate demand effect rather than from a specifically finance-related impact of credit on job separation. As before, capital account openness has a significant effect that is different from the observed effect of de facto international financial integration; taken together, these results suggest that de jure financial openness is unambiguously positively related to employment growth. Furthermore, prudential regulation of banks supports lower job separation rates, yielding an overall positive contribution of prudential regulation on employment growth, again a result that is somewhat at odds with the theoretical predictions of Section 3.

With these results of the impact of individual financial market reforms on labor market outcomes, we are now ready to turn to analyze broader implications of across-the-board financial sector reform as it is currently being debated. This will be done in the following section.

Robustness Check

As the financial reform index developed by Abiad et al. (2008) is only available until 2005, we extend our reform database using the methodology described in Section 4. In particular, we use six sub-indicators of the Heritage Foundation Index of Economic Freedom in order to expand the reform index beyond 2005. As Figure 4 displays, the extended reform indicator suggests some reversal of financial market deregulation in the aftermath of the global financial crisis. Nevertheless, financial re-regulation never returned to the level of strictness and intervention as observed in the 1980s. Even the most strictly regulated financial market in the 2010s was only marginally more so than in the second half of the 1990s. What is more, by 2018, many countries had already reverted back to a more relaxed stance on financial market regulation. The imputed indicator gives, indeed, a good reflection of the debate in the literature as

reviewed in Section 2, which highlighted the on-going need for financial market regulation and the worry that ten years after the crisis, many lessons might have been lost already (Tooze 2018).

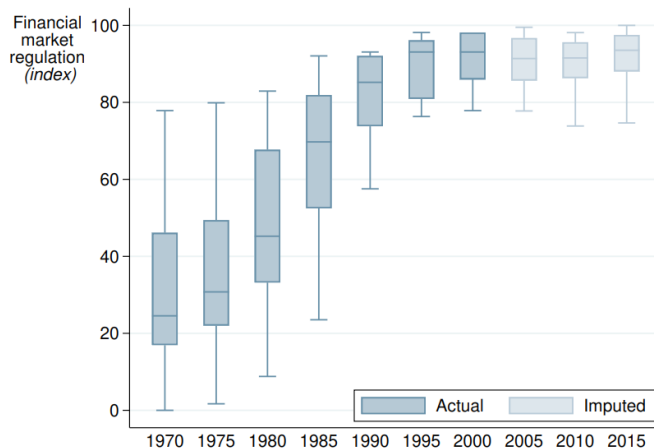


Figure 4. Financial reforms: extended indicator for OECD countries. Note: The chart displays cross-country variation of the IMF financial reform index for OECD countries between 1973 and 2018 in five-year averages. Values for years after 2005 are imputed, using the method described in the text. The IMF financial reform index has been rescaled to range from zero (no reforms) to 100 (full liberalization).

Applying this extended financial reform index to the specifications for unemployment inflows and outflows as described in Section 4, Table 5 and Table 6 summarize the main results of the estimations. As before, the Sargan over-identification test is passed in all specifications, indicating that the number of instruments used does not lead to overconfidence of the estimated parameters. However, given that the extension of the financial reform index is based on imputation techniques rather than by assessing actual regulatory changes, the following estimations should be considered as robustness checks only.

Table 5. Robustness check: financial market reforms and unemployment inflows.

Dependent Variable: Unemployment Inflows	(5.1)	(5.2)	(5.3)	(5.4)	(5.5)	(5.6)	(5.7)
Inflows (lagged)	0.762 *** (0.0275)	0.767 *** (0.0279)	0.770 *** (0.0287)	0.795 *** (0.0268)	0.790 *** (0.0266)	0.735 *** (0.0290)	0.757 *** (0.0322)
Output gap	-0.0194 *** (0.00336)	-0.0187 *** (0.00331)	-0.0177 *** (0.00345)	-0.0197 *** (0.00311)	-0.0206 *** (0.00314)	-0.0170 *** (0.00334)	-0.0160 *** (0.00376)
Total factor productivity growth	9.85×10^{-5} *** (2.20×10^{-5})	8.64×10^{-5} *** (2.11×10^{-5})	7.99×10^{-5} *** (2.16×10^{-5})	8.12×10^{-5} *** (2.15×10^{-5})	8.31×10^{-5} *** (2.16×10^{-5})	9.77×10^{-5} *** (2.18×10^{-5})	8.04×10^{-5} *** (2.27×10^{-5})
Real long term interest rate	0.0143 *** (0.00509)	0.0102 ** (0.00466)	0.0134 ** (0.00526)			0.0136 *** (0.00522)	0.0128 ** (0.00607)
Real long term interest rate (change)				0.0131 *** (0.00463)	0.0137 *** (0.00464)		
Real wage growth (lagged)	0.00902 ** (0.00403)	0.00644 * (0.00389)	0.00694 * (0.00404)	0.00538 * (0.00296)	0.00739 ** (0.00297)	0.00680 * (0.00401)	0.00785 * (0.00451)
Financial reforms (lagged)	0.0214 *** (0.00739)						
Capital account opening		0.178 *** (0.0446)				0.133 *** (0.0462)	0.176 *** (0.0489)
Prudential regulation of banks			0.0462 ** (0.0193)			0.0620 *** (0.0200)	0.0509 ** (0.0210)
Removal of banks entry barriers				-0.0695 *** (0.0186)		-0.0918 *** (0.0250)	-0.0828 *** (0.0278)
Loosening of credit					0.0352 **	0.0451	

Dependent Variable: Unemployment Inflows		(0.0152)		(0.0336)	
controls (lagged)					
Removal of credit ceilings					1.034 *
					(0.617)
Constant	-1.648 ***	-1.720 ***	-1.304 ***	-0.815 ***	-1.760 ***
	(0.216)	(0.201)	(0.159)	(0.113)	(0.210)
Observations	331	331	331	323	331
Number of countries	18	18	18	18	15

Standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; reform indicators are extended up to 2018 using the methodology described in the text.

Table 6. Robustness check: financial sector reforms and unemployment outflows

Dependent Variable: Unemployment Outflows									
	(6.1)	(6.2)	(6.3)	(6.4)	(6.5)	(6.6)	(6.7)	(6.8)	(6.9)
Outflows (lagged)	0.446 ***	0.437 ***	0.426 ***	0.442 ***	0.419 ***	0.426 ***	0.410 ***	0.676 ***	0.668 ***
	(0.0871)	(0.0887)	(0.0899)	(0.0865)	(0.0851)	(0.0863)	(0.0741)	(0.0350)	(0.0367)
Output gap	0.0270 ***	0.0268 ***	0.0241 ***	0.0277 ***	0.0288 ***	0.0279 ***	0.0301 ***	0.0411 ***	0.0397 ***
	(0.00714)	(0.00714)	(0.00723)	(0.00704)	(0.00696)	(0.00701)	(0.00657)	(0.00522)	(0.00522)
Real long term interest rates	-0.0575 ***	-0.0592 ***	-0.0612 ***	-0.0565 ***	-0.0548 ***	-0.0562 ***	-0.0530 ***	-0.0258 ***	-0.0278 ***
	(0.0100)	(0.0103)	(0.0104)	(0.00969)	(0.00926)	(0.00951)	(0.00778)	(0.00597)	(0.00609)
Real wage growth (lagged)	-0.0177 ***	-0.0183 ***	-0.0164 ***	-0.0180 ***	-0.0173 ***	-0.0166 ***	-0.0143 ***	-0.0177 ***	-0.0167 ***
	(0.00357)	(0.00355)	(0.00356)	(0.00358)	(0.00352)	(0.00360)	(0.00354)	(0.00360)	(0.00360)
Real share price	0.0872 ***	0.0858 ***	0.0886 **	0.0847 **	0.0732 **	0.0774 **	0.0468	0.114 ***	0.115 ***

Confirming a result from the previous section, using the extended financial reform indicator displays an increase in labor market turbulence with a rise in both unemployment inflows and outflows (Specifications (5.1) and (6.1)). A major component in this seems to be the opening of the capital account (Specifications (5.2), (6.2), (5.6) and (6.6)), which raises both in- and out-flows. In this regard, the extended indicator seems to suggest a change in the impact of capital account opening, as in the specification looking only at the impact up to 2005, capital account opening was associated with a reduction in unemployment inflows (see Table 4, equation (4.9)). Again, this ties in well with the shift in perception in the literature that has moved to a more cautious approach as regards international capital market deregulation. Securities market deregulation, on the other hand, is associated with ambiguous effects on unemployment outflows (depending on the specification used) and no longer showed any significant correlation with unemployment inflows.

(Re-)regulation of the banking sector is partly confirmed by the extended reform indicator. Notably, lifting of entry barriers for banks does not seem to bring benefits to the labor markets, as both unemployment inflows and outflows decline, suggesting an overall ambiguous impact on employment growth. This is in line with findings reported above for the shorter sample prior to 2005. Deregulation of credit controls and credit ceilings also confirm the findings from the shorter sample, albeit at relatively low statistical significance levels. Looking at the extended indicator, prudential regulation of banks seems to bring less benefits than in the shorter sample. While still yielding improvements in unemployment outflows, it also leads to increases in unemployment inflows, indicating an overall increase in labor market turbulence, in contrast to findings in the previous section. We will see, however, in the scenario analysis that once a larger specification is considered that includes also indication of the prevalence of financial crisis, such a result can also be found when restricting the sample to pre-crisis observations.

Overall, the robustness check using the extended financial reform indicator suggests the substantial impact of financial market deregulation on labor market turbulence, with ambiguous effects on the overall level of employment growth. The careful combination of reforms and re-regulation of certain areas of financial markets, notably as regards capital accounts, promise to yield positive impacts on labor markets by both

strengthening competitive forces in the banking sector and reducing the incidence of financial crisis and turbulence. The following section will explore such reform packages in more detail, using the shorter sample to provide an assessment as to what would have happened had these reform packages been in place prior to the GFC.

REFORM SCENARIOS AND UNEMPLOYMENT DYNAMICS

Most advanced economies have embarked on reforms to tighten the regulation of financial markets in the aftermath of the GFC. The estimates presented in the previous section suggest that such changes to the regulatory environment in which banks and financial investors operate is likely to have statistically-significant effects on unemployment dynamics. However, not all reforms will also have an economically-relevant impact, nor will the impact of different reforms necessarily affect job dynamics in a similar fashion. For instance, the estimations show that both capital account opening and improved banking supervision have unambiguously positive effects on employment, lowering job destruction and increasing job creation. On the other hand, deregulation of the securities markets does mainly seem to increase labor market turbulence, increasing both unemployment in- and out-flows. Finally, deepening derivatives markets will hamper outflows, but leave inflows (statistically) unaffected, thereby increasing unemployment stocks and duration. Taken together, the impact of financial sector reforms will, therefore, depend on the concrete packages that countries are adopting and the relative weight they put on individual reforms in these three areas.

Whatever the benefits of proper financial sector regulation, policy makers are not free in choosing the optimal level of regulation that would correspond to theory. Besides the fact that a single, optimal reform package may actually not exist given the different layers of financial regulation, at least three considerations will limit the capacity of policy makers to reform financial markets:

- The financial and economic recovery actually complicates the task of substantial regulatory reform of financial markets. Political pressure for reforms wears off as business activities

resume. The immediate sense of urgency recedes, making policy makers more lenient when putting forward an encompassing reform agenda. In addition, even though the crisis had somewhat reduced the political influence of financial firms in the immediate aftermath, as soon as the outlook improved, financial sector lobby groups started to gain a stronger political voice again. Finally, financial sector (re-)regulation will take place in a substantially different macroeconomic environment. Even 10 years after the crisis, the risk appetite of investors has resumed only partially. Over the longer term, however, investors are likely to re-evaluate their environment and consider investing in higher yielding and more risky assets.

- At the same time, countries and policy makers are limited in their action by the high level of public debt that has accumulated during the crisis and has not been brought down since. This will reduce their scope for action and hence the extent to which they can effectively introduce any kind of regulation without regard to the interests of capital owners and their own financiers. In the past, periods of rapid increase in public sector debt have often preceded periods of financial deregulation. In other words, even if it were possible to identify *ex ante* the optimal package of financial sector regulation, such a reform bundle is unlikely to be implemented *ex post* as policy makers rely heavily on financial markets to (re)finance their high and still increasing debt levels.
- Finally, regulatory competition between jurisdictions prevents countries from implementing all measures deemed necessary for fear of losing (financial sector) market share to competitors. As countries compete to attract financial firms through favorable regulatory conditions, overly stiff prudential regulation may hamper further growth of the financial sector. Highly-qualified staff may consider moving to different locations with a more attractive tax and regulatory environment (for instance regarding bonus regulation). Similarly, financial firms may consider moving their activities to jurisdictions where limitations on leverage and credit growth are less stringent,

offering their services to clients abroad or arbitraging across different regulatory conditions through branching.

Considering different areas of financial regulation and the existence of political barriers to financial reform, four different reform scenarios are being considered in the following in order to evaluate their impact on employment dynamics. Such reform packages—in contrast to individual reforms—are likely to have larger, macroeconomic effects: First, changes to prudential regulation will have implications on financial market stress and volatility. Related, financial market regulation influences the cost of capital through the risk-free rate, as well as the development of stock market valuations. As regards reforms to international capital flows, changes in the international financial architecture may impact both international capital and trade flows. By constructing alternative reform scenarios, this last section offers a contribution to a global assessment of real economy effects of different reform packages. The following table summarizes the different assumptions that are underlying the impact analysis of the reform scenarios on labor markets.

In order to illustrate the implications of different reform scenarios for labor market outcomes, we compare three different reform scenarios with the baseline scenario of unreformed financial markets (see Table 7). The reform options chiefly focus on enhanced prudential regulation of the domestic banking sector and the regulation of international capital flows. As argued elsewhere (see International Institute for Labour Studies 2010, Chp. 5), these two areas are likely to be reformed independently of each other, with no guarantee that policy reforms will be coordinated between national and international regulators. The impact of the reforms will be felt along different dimensions (see Table 3, equation (3.11), and Table 4, equation (4.9)): All reform scenarios come with reduced financial stress in comparison to the baseline scenario of an unreformed financial sector. When reforms are concentrated on the domestic market, the impact will be predominantly felt in a less vibrant stock market with lower share price growth and higher capital costs. When reforms are concentrated on the international market, both international capital flows and world trade will grow less rapidly.

Table 7. Exit scenarios from the crisis: assumptions about macroeconomic implications.

	International Capital Flows		
Domestic Financial Markets		Unreformed	Tightened Regulation
Unreformed		<i>Scenario I:</i> Permanent increase in financial stress Return to highly-valued shares Continued export and import growth High international capital flows	<i>Scenario III:</i> Moderate reduction in financial stress Moderate reduction or stable share prices Further export and import growth Moderate increase in international capital flows
Tightened regulation		<i>Scenario II:</i> Moderate increase in financial stress Stable share prices Slower trade growth Reduced international capital flows	<i>Scenario IV:</i> Permanent reduction in financial stress Lower real share prices Slower growth of world trade Reduction in international capital flows

On the basis of these assumptions regarding the implications of the four scenarios for financial sector development, an estimation has been carried out as to the likely impact on employment dynamics in a typical advanced G20 country (see Table 8). Both equations replicate the results of the previous sections in addition to a fuller specification including the IMF Financial Stress Index to indicate exogenously-driven shocks to the financial system.

Table 8. Scenario estimations.

	Outflows	Output	Real long term	Wage-interest rate	Real share price	Investment growth	Capital	Securities	Prudential	Financial stress
	(lagged)	gap	interest rate	(yearly change)	(yearly change)	(per cent)	openness	markets	regulation	index (change)
Outflows	0.556 *** (0.115)	0.019 * (0.010)	-0.030 ** (0.015)	-0.105 * (0.055)	0.031 (0.060)	12.934 *** (3.60)	0.205 *** (0.059)	-0.116 * (0.064)	0.053 *** (0.017)	-0.026 *** (0.008)
	Inflows	Output	Labor force	Total factor productivity	Banking sector	Capital	Securities	Prudential	Financial stress	
	(lagged)	gap	growth (p.a.)	growth (lagged)	entry barriers	openness	markets	regulation	index (lagged)	
Inflows	0.867 *** (0.023)	-0.051 *** (0.010)	1.600 ** (0.672)	0.175 * (0.103)	-0.059 ** (0.025)	-2.3×10-4*** (6.2×10-5)	0.048 ** (0.023)	0.028 *** (0.010)	0.010 *** (0.004)	

Note: The table displays the estimations for the unemployment outflow and inflow equation underlying the scenario analysis. Estimations are based on GMM estimations. Both equations contain constants (not displayed) and pass the Sargan test for over-identification of the instruments.

Together, Table 7 and Table 8 allow quantifying the likely impact of the reform options on the main determinants that influence unemployment in- and out-flows as described in the previous section. Figure 5 assumes that—starting in 2010—the real value of outstanding shares would increase permanently by 10%, that annual trade growth would continue at 10%, and that capital flows would increase by 10% per year. No further securities or prudential regulation in the banking sector would be introduced. At the same time, this scenario assumes a unit increase in global financial stress as measured by the indicator produced by Balakrishnan et al. (2009).

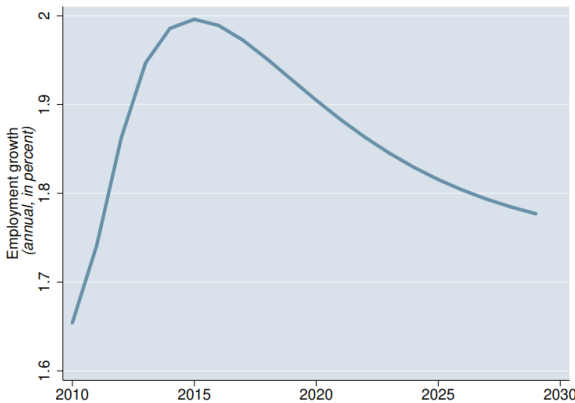


Figure 5. Employment dynamics with unreformed financial markets. Note: The chart presents the evolution of employment growth in the baseline scenario of unreformed financial markets.

The quantitative scenario assumes not only an impact of financial market stress on employment creation, but also on labor supply (through a discouraged worker effect). In particular, according to the underlying estimates, labor force growth is permanently depressed by one percentage point if the financial market stress indicator raises by a unit increase. As the following figure shows, despite this additional financial market stress, employment growth continues to recover, thanks to strong trade and share prices growth. After a peak in 2015, it will gradually return to

its long-run trend rate at around 1.7%, in line with labor force growth in this region (no change in demographics have been assumed in these simulations).

In comparison, the three other scenarios assume—each to a different degree—a further tightening of either securities or banking sector regulation, whereby Scenario IV makes the strictest assumptions about the evolution of these indicators (see Figure 6). Trade is expected to decline in Scenarios II and IV, whereas financial market stress (and the real value of outstanding shares) declines only in Scenario III and IV, thanks to the introduction of tighter domestic regulation. As the following chart demonstrates in the long-run, the effects on employment are negative in the short-run, as expected, although certainly much less than what has been predicted by others elsewhere (Institute of International Finance 2010).

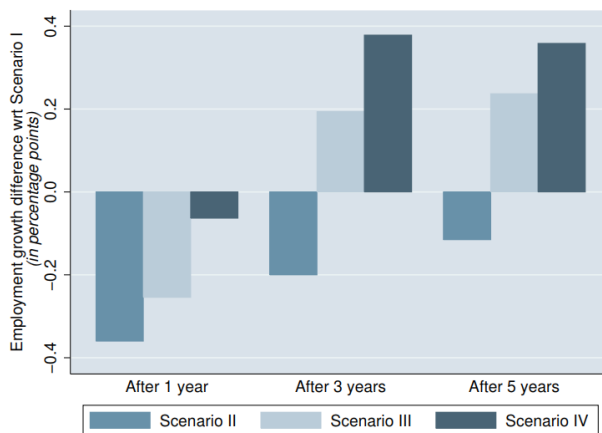


Figure 6. Comparisons of employment dynamics: Scenarios II–IV vs. Scenario I. Note: The chart compares employment growth rates of different reform scenarios with the baseline. The bars represent differences in annual employment growth rates in percentage points.

Already after three years, some improvements can be felt, in particular due to the decrease in financial sector volatility. Under Scenario II, where this effect is weakest, the adverse effects from reduced dynamics in world trade and financial market activity will keep the employment growth rate permanently below the baseline rate of unreformed financial markets. However, when policy makers show more ambition, in particular as

regards domestic re-regulation and the supervisory framework of the banking sector, stronger positive effects for employment creation can be expected. In other words, the increase in costs resulting from stricter banking sector regulation can be considered moderate in comparison to the benefits from lower financial market volatility, a point also made by Admati et al. (2013) or Kashyap et al. (2010). Taken together, these results suggest that financial sector regulation, had it been in place already at the time of the crisis, would not only have helped stabilize the economy, but would have also supported a faster recover of employment growth.

CONCLUSIONS

This article is the first to present a detailed analysis of the effects of financial market development and reforms on labor market dynamics. Against the backdrop of renewed discussions on the benefits of (strict) financial market regulation, it discusses the likely impact on labor market dynamics of reforms in credit provision, interest rate controls, capital account openness, and prudential regulation. As the article demonstrates, such financial market reforms could have brought about substantial benefits for job creation had these measures been implemented in a coherent manner prior to the crisis.

The article starts by presenting a theoretical framework through which to analyze the empirical implications of financial market development and regulation. On the basis of the ILO's database on unemployment flows, we then present the impact of financial market variables on unemployment outflows and inflows, demonstrating the significant effects that well-developed, well-regulated financial markets have on both margins of labor market adjustment.

When analyzing more encompassing financial sector reforms, the article shows that some negative effects might have been expected from tighter regulation in the short-run. However, over the medium-run, employment creation would have strongly benefited from the reduced volatility that a more elaborate framework for securities, banking supervision, and capital controls would have brought. In this regard, policy-makers should not lose the momentum for pushing through with the implementation of already agreed-upon reforms such as those to strengthen capital adequacy

rules by the Basel III framework, in order to reduce disproportionate leverage and excessive incentives for risk-taking within the banking sector. As indicated by our extended financial reform index, there is some worry that the reform effort displayed in the aftermath of the global financial crisis is already losing momentum. In this regard, continuing the implementation of these regulatory reforms would greatly reduce the still very high levels of uncertainty among market participants, and also reduce volatility and risk premia, thereby supporting output and employment growth. The benefits of financial sector reform for the real economy will be greatest when they are implemented in a coordinated fashion, reforming both domestic financial markets and the international financial system. This article shows that such reforms are feasible and likely to yield the expected positive results for employment creation.

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CHAPTER 5

Hammad Riaz, Abubakr Saeed, Muhammad Saad Baloch , Nasrullah and Zeeshan Ahmad Khan, Valuation of Environmental Management Standard ISO 14001: Evidence from an Emerging Market, doi.org/10.3390/jrfm12010021

CHAPTER 6

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CHAPTER 8

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CHAPTER 9

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CHAPTER 10

Ekkehard Ernst, Finance and Jobs: How Financial Markets and Prudential Regulation Shape Unemployment Dynamics, doi.org/10.3390/jrfm12010020

INDEX

A

- Abnormal performances 104, 105, 106
- Academic research 120, 121
- Accounting Data 11, 14, 16
- Accounting system 53, 61
- Aggregate Bond Index (AGG) 28
- Alternative Test 105
- Analytical judgment process 3
- Arellano–Bond (AB) 275
- Artificial intelligence method 46
- Artificial neural network method 40
- Asset allocation strategy 39, 40, 41
- Autoregressive Integrated Moving Average (ARIMA) 46

B

- Banking market 273
- Banking sector 262, 264

- Bank Negara Malaysia (BNM) 195, 199
- Bank-specific variables (BSV) 213
- Basel Committee on Banking Supervision (BCBS) 207, 214
- Basic communication device 57
- Big Data 11, 12, 13, 15, 16, 17, 19, 20, 21, 22
- Budget analysis 17, 18
- Budget enforcement control 18
- Budgeting 17, 18
- Business environment 119, 120
- Business management 1
- Business manager 5, 9
- Business to Business (B2B) 132
- Buyer–supplier 145, 155

C

- Capital account 256, 285, 286, 291, 292, 298
- Capital buffer (CB) 212, 215, 217
- Capital ratio (CAP) 212, 214

Cash-to-Cash cycle (C2C) 144
 Central Bank's 226
 Control methodology 101
 Conventional banks (CBs) 189, 190, 200
 Corporate financial 1, 2, 6, 7, 8, 9
 Corporate investment 226, 230, 231, 232, 236, 238, 239, 240, 241, 242, 243, 245
 Credit risk 190, 192, 201, 202, 203, 204, 208, 209, 211, 212, 213, 214, 215, 216, 217, 218, 220, 222

D

Days Inventory Outstanding (DIO) 144
 Days Payables Outstanding (DPO) 144
 Days Sales Outstanding (DSO) 144
 Decision-support systems (DSS) 56
 Descriptive Statistics 67, 70, 73, 76
 Dodd–Frank act 253
 Domestic firm 94, 97, 100, 107, 108, 109, 114
 Domestic Research Status 3
 Dramatic shift 253
 Dynamic market 161, 171, 177, 178, 180

E

Economic benefit evaluation system 3
 Economic development 160, 180

Economic value added (EVA) 3
 Electronic Computer Process 15, 16
 Electronic Document and Record Management Systems (EDRMS) 67
 Electronic Document Management System 58
 Electronic Records Management System 58
 Electronic system 58
 E-mail 12
 EMAS system 99
 Enterprise 11, 12, 13, 15, 17, 18, 19, 20, 21
 Enterprise forecasting 9
 Enterprise production and management 5
 Enterprise product quality 8
 Entire system 252
 Entrepreneurial human capital 166, 184
 Entrepreneurial strategy 159, 160, 161, 162, 163, 164, 165, 169, 172, 173, 174, 176, 178, 179, 180
 Environmental management systems (EMSs) 92
 Equity-based financing (EBF) 206
 Executive support systems (ESS) 56
 Expansionary monetary policy 225, 226, 227, 235, 236, 237, 238, 242, 243, 244

F

Finance ministry 53

- Financial analysis 1, 2, 3, 5, 6, 7, 8, 9
 Financial analysis index system 4
 Financial capital 159, 160, 161, 162, 163, 167, 169, 170, 172, 173, 174, 175, 176, 177, 178, 179, 180, 185
 Financial depth 259
 Financial development 255, 257, 258, 259, 268, 270, 271, 275, 279, 300, 301
 Financial institution 160, 165
 Financial management 2, 5, 8, 9
 Financial market 24, 26, 35, 45, 46
 Financial market development 251, 252, 254, 255, 256, 257, 260, 262, 268, 273, 276, 277, 279, 280, 285, 298
 Financial market reform 254, 256, 257, 273
 Financial market regulation 251, 255, 257, 263, 273, 274, 275, 276, 286, 287, 294, 298
 Financial market tightness 266, 268
 Financial premium 261
 Financial reform index 275, 286, 287, 299
 Financial risk 202, 203, 207, 216
 Financial sector regulation 252, 255, 263, 264, 292, 293, 298
 Financial service provider (FSP) 145
 Financial service providers (FSPs) 134
 Financial situation 2, 5, 9
 Financial statement 53
 Fixed-effect (FE) 212
 Foreign exchange currency 26, 28, 30, 36, 37, 38
 Foreign exchange market 24, 25, 26, 28, 36, 37, 46
 Foreign exchange market data 28
- G**
- Generalized behavior learning method (GBLM) 39
 Genetic algorithm 39, 40
 Global financial and economic crisis (GFC) 252
 Global financial crisis (GFC) 202
 Globalization and competitive edge 159
 Goodwill 91
- H**
- Human and financial capital 160, 161, 162, 173, 183
 Human capital 161, 166, 177, 184, 186, 187
 Human capital dimension 166, 177
 Human contemporary 23, 24
 Human financial capital 162, 163
 Hypothesis 54
- I**
- Implementation 97
 Innovation diffusion theory (IDT) 145

- Integrated Financial Management Information System (IFMIS) 51
 Internal cash flow influences 241
 Internal control system 61, 62
 International capital flow 264, 274, 279, 294
 International Labour Organization (ILO) 251, 273, 302, 303
 Investment cash flows 231, 232
 Investment model 231
 Investor 91, 93, 94, 96, 97, 98, 100, 105, 108, 109, 113
 Islamabad Chamber of Commerce and Industry (ICCI) 168
 Islamic Banks and Finance (IBF) 191
 Islamic banks (IBs) 189, 190, 200, 209
 Islamic banks in Malaysia (MIBs) 190
 Islamic Cooperation (OIC) 205
 Islamic Financial Institutions (IFIs) 192
 Islamic investment banks 194
- L**
- Labor market information 274
 Loan quality (LQ) 212, 215
- M**
- Macro- and micro-level 110
 Macro-economic 261, 262, 263, 274
 Macroscopic determinants 225
 Malaysian Islamic banks (MIBs) 211
 Management information systems (MIS) 56
- Market economy 5, 8, 9
 Market performance 91, 94, 98, 99, 100, 104, 105, 106, 107, 108, 109, 110
 Market risk 192, 202, 203
 Mechanical Process 15, 16
 Media 58
 Microsoft Excel 125
 Modern conventional banking 194
 Monetary policy (MP) 226
 Multicollinearity issue 173
- N**
- Nairobi City County Government (NCCG) 54
 National Aeronautics and Space Administration (NASA) 13
 National Oceanic and Atmospheric Administration (NOAA) 13
 National Science Foundation (NSF) 12
 Network click stream data sources 12
 Networked Process 15, 16
 Networking 165, 181, 182
 New venture performance 159, 160, 162, 164, 165, 166, 167, 170, 173, 176, 177, 178, 179, 180, 181, 183
 Non-financial indicator 7
 Non-profit and loss-sharing (NPLS) 197
- O**
- Optimisation 119, 120, 121, 122,

136, 144
 Organization of Islamic Cooperation (OIC) 195
 Original contribution 265

P

Penn Exchange Simulator (PXS) 31
 Policy trading strategy 41
 Poor judicial system 93, 108
 Processing accounting data 14
 Prophet Muhammad (PBUH) 193
 Purchase 2 Pay (P2P) 64

R

Rawalpindi Chamber of Commerce and Industry (RCCI) 168
 Real economic growth 280
 Regression Analysis 173
 Reinforcement learning 23, 24, 26, 27, 39, 46, 50
 Reinforcement learning approach 30, 49
 Reinforcement learning framework 40
 Reinforcement learning method 30
 Reliability 172
 Resource-based view (RBV) 162
 Risk mitigation expertise 190
 Robustness Check 286

S

Secondary data 130, 146
 Shariah Supervisory Board (SSB) 200
 Small and medium enterprises

(SMEs) 120
 Small and medium-sized enterprises (SMEs) 161
 SME closed-loop supply chains (SMECLSCs) 141
 Social capital 161, 163, 165, 169, 170, 173, 177, 184, 185, 186
 Stakeholder 92, 93, 94, 95, 96, 97, 98, 99, 109, 112
 State Bank of Vietnam (SBV) 226
 Structural equation modelling (SEM) 145
 Supply Chain Effectiveness 51, 52, 54, 55, 60, 62, 67, 69, 73
 Supply chain finance 119, 120, 121, 122, 124, 126, 127, 130, 131, 134, 136, 140, 142, 145, 146, 151, 152, 153, 155, 156, 157
 Supply Chain Management (SCM) 52
 Supply Chain (SC) 52
 Sustainable development 1
 Systematic method 123
 Systematic/unsystematic risks (SUR) 203

T

Testable relations 270
 Total asset 232, 234, 235, 241
 Total factor productivity (TFP) 267
 Total interpretive structural modelling (TISM) 145
 Track record 131, 132, 144
 Trading-based financing (TBF) 206

Trading system	34, 45, 48	130	
Transaction processing systems (TPS)	56	V	
Transactions matter	134	Variance Inflation Factor (VIF)	
Trevor Hastie	20	239	
Triple win situation' (TWS)	145	Video software	12
Turbulent markets	160	W	
U		Weighed average cost of capital (WACC)	144
United Kingdom (UK)	146	Working capital position	136
United States of America (USA)		World Bank	226
		WSR test	103

Financial Management: Clear Concepts, Contemporary Theory, and Practical Applications

Now a day it has been enlarged with innovative and multi-dimensional functions in the field of business with the effect of industrialization, Financial Management has become a vital part of the business concern and they are concentrating more in the field of Financial Management. The rapidly changing nature of today's external environment continuously creates a need for business strategy, process improvements and organizational transformation to ensure survival in today's highly competitive market. Today, businesses are under constant pressure to develop, implement and rapidly revise their financial management strategies. To do this, businesses need to develop and implement financial strategies to manage risk and improve financial performance and capabilities. The success behind any organization depends on the efficient management of finance. Financial practices go together with scanning the economic environment of a certain market. While financial management is a critical element of the management of a business as a whole, within this function the management of its assets is perhaps the most important. The main task of all managers at all levels and all social institutions is Environmental design, implementation and maintenance that members are able to work and achieve their collaboration on specific targets for achieving these goals are essential managers a system of management accounting system. Every day there is a new form of economic relations and of individuals and companies and institutions is associated with each other and influences each other changes in their financial and day-to-day activities become more complex. These factors will lead to a role as providers of accounting and financial information determined using accounting standards for most users.

This book provides detailed information about the finance and finance related area to investigate various factors that impact the selection of financial management practices. It also attempts to explore the impact of financial management practices and earnings management on firm performance. Managing the movement of funds in relation to the budget is essential for a public academic institutions performance. But experience reveals that the financial management processes of public academic institutions are generally weak and dominated by conditions of resource scarcity vis-à-vis the ever increasing agenda of development activities on which such funds could be spent. It is believed that greater the confidence in selecting the best course of action can only be achieved by carefully analyzing finance functions and the unique contexts within which they operate. Business partnering to business intelligence, outsourcing, benchmarking, and talent management, just some of the solutions put forward to develop effective finance functions. In this book we propose a framework which helps managers carry out this analysis. Thus the study of financial management helps and guides the finance managers to make right decision in generating fund, making right investment, earning good return and sharing the profit to the shareholders. The key aim of this book is to review recent studies to concentrate on the main critical issues of financial management. The book enriches the quality of information in financial management and enables the reader to clearly understand the major concepts and techniques in the subject.

Ketty Samual is Master's in Business Administration. He holds Ph.D. in Financial Management. With over eight years of teaching in finance department, he has written several research reports, and research articles on matching principle, ethics in accounting, insurance contracts, green accounting, and financial instruments.



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