Walden University

ScholarWorks

Walden Dissertations and Doctoral Studies

Walden Dissertations and Doctoral Studies Collection

2022

Impact of Islamic Financial Principles on Mitigating the COVID-19 Financial Crisis in Pakistan

Mohammed Monzur Murshid
Walden University

Walden University

College of Management and Human Potential

This is to certify that the doctoral dissertation by

Mohammed Monzur Murshid

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Mohammad Sharifzadeh, Committee Chairperson, Management Faculty
Dr. Javier Fadul, Committee Member, Management Faculty
Dr. David Bouvin, University Reviewer, Management Faculty

Chief Academic Officer and Provost
Sue Subocz, Ph.D.

Walden University
2022

Abstract

Impact of Islamic Financial Principles on Mitigating the COVID-19 Financial Crisis in

Pakistan

by

Mohammed Monzur Murshid

MBA, University of Texas at Dallas, 2005

ME, University of Florida at Gainesville, 2000

ME, Fukui University Japan, 1997

BS, BUET Bangladesh, 1989

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Management

Walden University

May 2022

Abstract

The COVID-19 pandemic caused a global financial crisis. Governments and central banks around the world took unprecedented measures to mitigate the effect of the pandemic-triggered financial crisis and maintain the stability of the financial system. The purpose of this cross-sectional quantitative study was to examine the capability of the Islamic financial system to mitigate the effect of the pandemic-induced financial crisis on the economy of Pakistan in 2020. The International Monetary Fund enhanced dynamic stochastic general equilibrium (IMF-DSGE) model provided the framework for this study. Data collection included conventional financial sector parameters, Islamic financial sector parameters, and country-level macroeconomic data from Pakistan in 2020. These parameters and data were inserted into the IMF-DSGE model for simulation. The results showed the Islamic financial system was more effective than the conventional financial system in mitigating the effect of the pandemic-induced financial crisis on the economy of Pakistan in 2020. Furthermore, the nonlinearized IMF-DSGE model was better than the linearized IMF-DSGE model in capturing the pandemic-generated financial crisis dynamics of the Pakistani economy in 2020. Regulators might use the results to mitigate the intensity of the financial crisis and maximize the gross domestic product of a country. Central banks might apply the results to formulate procedures to oversee financial institutions and maintain their financial stability. Results might also be used to increase people's quality of life through stable jobs and reduced unemployment.

Impact of Islamic Financial Principles on Mitigating the COVID-19 Financial Crisis in

Pakistan

by

Mohammed Monzur Murshid

MBA, University of Texas at Dallas, 2005

ME, University of Florida at Gainesville, 2000

ME, Fukui University Japan, 1997

BS, BUET Bangladesh, 1989

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Management

Walden University

May 2022

Dedication

This study is sincerely dedicated to Dr. Jamaal Zarabozo, who introduced me to Islamic finance and economics. I believe this economic system would help to attain social justice.

I also dedicate this work to my late mother. She guided me through life with wisdom and spirituality. She taught me the importance of hard work. Her inspiration helped me toward becoming the best version of myself.

Acknowledgments

I am grateful to Almighty Allah for the gift of life and strength to pursue and complete this academic work. I would like to thank Dr. Mohammad Sharifzadeh for the support and guidance throughout the entire process. I would also like to thank Dr. Javier Fadul for insight as my professor and committee member. Appreciation to Dr. David Bouvin, my university research reviewer, for the thorough feedback. I would also like to thank the staff at Walden for the continuous support through the entire process.

I would like to give a special thank you to my wife, Zeenat Sonia, for all of the love and support that she provided throughout this journey. I would like to give thanks to my daughters, Zunairah Murshid and Zahrah Murshid. I appreciate the many sacrifices that were made so I could pursue this lifelong dream. I certainly would not have been able to do this without them.

Table of Contents

iv

List of Tables

List of Figures

Chapter 1: Introduction to the Study

The COVID-19 pandemic had a massive impact on the global economy. The World Economic Outlook Report of International Monetary Fund mentioned that the COVID-19 pandemic caused financial crisis on the world economy in 2020 (International Monetary Fund, 2021). The world gross domestic product (GDP) contracted by 3.5% in 2020 due to pandemic-triggered financial crisis, the GDP growth of advanced economics was reduced by 4.7%, the GDP of emerging markets and developing economies declined by 1.7%, and the U.S. GDP growth shrank by 3.5% (World Bank, 2021a). The world GDP of 2020 was reduced by 2.875 trillion dollars in comparison with the GDP of 2019 (World Bank, 2021b). The pandemic-induced financial crisis was different from the global financial crisis of 2007–2009. The public health measures implemented to reduce the spread of the virus led to immediate financial distress and an unprecedented downturn in the world economy (Moon & Sohn, 2021). Although the pandemic disrupted many economic activities, the service sector was affected the most (Lee, 2021). According to the U.S. Bureau of Labor Statistics (2020), the unemployment rate in April 2020 increased by 10.3% points to 14.7% points. This was the highest rate and the largest over-the-month increase in the history of the data. The number of unemployed people rose by 15.9 million to 23.1 million in April 2020 (Bureau of Labor Statistics, 2020). In addition, the U.S. consumer price index (CPI) rose 6.8% from November 2020 to November 2021, the largest 12-month increase since the period ending June 1982 (Bureau of Labor Statistics, 2021).

The governments and central banks around the world took unprecedented measures to mitigate the effects of the pandemic-triggered financial crisis and maintain the stability of the financial system. The U.S. Federal Reserve lowered policy rates to 0%–0.25%, bought large assets through quantitative easing, and responded proactively by introducing new credit facilities (Clarida et al., 2021). Compared to the U.S. policy response during the global financial crisis of 2007–2009, the monetary and fiscal measures were larger in scope and size. The fiscal stimulus during the COVID-19 crisis in the United States was approximately 14% of GDP compared to 7% of GDP during the global financial crisis of 2007–2009 (Lee, 2021). However, the United States was not the only country impacted; many countries were impacted financially, economically, and in terms of global trade. The pandemic-induced financial crisis made the desire for financial stability a pressing and fundamental issue at the international level.

Financial instability has been a recurring phenomenon in contemporary economic history (Mackintosh, 2014). The most enduring crisis was the Great Depression of 1929–1933. To help ensure such a crisis would not repeat itself, eminent economists of that era produced a proposal to establish a banking system capable of preserving long-term financial stability. Their proposal became known as the Chicago Plan (Hart, 1935). Their proposals were a natural testament to the basic pillars of Islamic financial principles (Askari et al., 2010). The plan included the conventional version of the Islamic precepts of risk sharing, deposits for safekeeping, and prohibition of debt financing (Tarık & Dolgun, 2016). The Chicago Plan divided the banking system into two components: (a) a warehousing component with a 100% reserve requirement and (b) an investment

component in which deposits were considered as equity shares and were remunerated with dividends, and maturities were fully observed (Angell, 1935). In the traditional Islamic financial system, there is no debt financing, only equity financing; additionally, there is no risk shifting, only risk sharing (Askari et al., 2012). In this financial system, the stability of the financial system is ensured by eliminating the type of asset-liability risk that threatens the solvency of financial institutions (Askari et al., 2014). The basic ethical tenet of the Islamic financial system was suitable to fight the pandemic-induced financial crisis and maintain financial stability (Pareed, 2021; Rabbani et al., 2021).

This claim of the Islamic financial economists needed to be verified using a good economic model. The dynamic stochastic general equilibrium (DSGE) model is one of the good models used in macroeconomics. The economists and central bankers are using this model for forecasting (Alessi et al., 2014). The DSGE model was suitable for my research. I used the International Monetary Fund enhanced DSGE (IMF-DSGE) model to examine the effectiveness of the Islamic financial principles in mitigating the impact of the pandemic-induced financial crisis.

Background of the Study

The Islamic financial principles moderated the severity of the financial crisis, and distributed the effects of the financial shocks equitably (Ejaz & Khan, 2014). The profit-sharing Islamic financial principle increased the effectiveness of the Islamic financial sector in dealing with economic crisis caused by the COVID-19 pandemic (Hasan, 2020). The pandemic-induced global financial crisis had no major impact on the technical efficiencies of the Islamic financial sector in Pakistan (Samad, 2021). The Islamic

financial principles reassured the investors, stabilized financial systems, and provided them with a means of escaping from the effects of financial downturns (Arouri et al., 2013). The Islamic financial institutions maintained their stability during the global financial crisis of 2007–2009 (Hussain, 2014). During the 2007–2009 global financial crisis when many conventional banks announced bankruptcy, no Islamic bank failures were reported (Ghassan & Fachin, 2016). However, Salim and Mahmoud (2016) stated that the Islamic banks were not more profitable and more efficient than conventional banks during the crisis times. Both the Islamic and conventional banking systems were vulnerable to financial shocks during 1997 and 2007 financial crises in Malaysia (Kassim & Majid, 2010). The Islamic banking sector might be more vulnerable than the conventional banking sector in facing pandemic-generated financial crises (Fakri & Darmawan, 2021).

Researchers have provided conflicting evidence about the effectiveness of the Islamic financial principles on mitigating the severity of a financial crisis. However, researchers did not use Islamic financial parameters and country-level macroeconomic data to verify the effectiveness of these principles to alleviate the severity of a financial crisis. The current study addressed this gap in the literature by applying the Islamic financial principles using financial parameters and country-level macroeconomic data of Pakistan to verify Islamic financial principles' effectiveness in lessening the severity of the pandemic-generated financial crisis in Pakistan in 2020. The nonlinear DSGE models were the most suitable tools for this purpose (see Rasoulinezhad, 2012). The nonlinear DSGE framework estimated the peak response of the cyclical component of output to an

uncertainty shock 50% larger than the one predicted by the same linear model (Caggiano et al., 2021).

The linear DSGE models were designed before the 2007–2009 global financial crisis for conventional monetary analysis. These models did not consider the role played by the bank balance sheet and discounted the role of the bank balance sheet by assuming that all lending risk was diversible (Borio, 2014). Therefore, these models failed to predict the 2007–2009 global financial crisis. Benes et al. (2014a) enhanced the DSGE model by incorporating the role played by the bank balance sheet. Their updated model simulated the 2007–2009 global financial crisis prediction. This model was suitable for my study. I discuss this model in detail in Chapter 2.

Problem Statement

The cost of the COVID-19 pandemic was extremely high. Cutler and Summers (2020) estimated that the financial cost of COVID-19 pandemic was $16 trillion dollars. In comparison, the magnitude of the 2007–2009 global financial crisis was $5 trillion to $15 trillion (Adelson, 2013). The general problem was that the policy recommendations provided by the conventional financial economists were not successful in mitigating the effect of financial crises. The Islamic financial economists claimed that Islamic financial principles mitigate the severity of the financial crises (Shah & Bhutta, 2016). The Islamic financial system might be helpful to recover from the financial crisis by reducing the effects of COVID-19 pandemic (Pareed, 2021). The specific problem was that the claim of the Islamic financial economists had not been verified using a conventional financial model on a specific country. The current study addressed this gap by examining the

impact of Islamic financial principles on mitigating the pandemic-generated financial crisis in Pakistan in 2020.

Purpose Statement

The purpose of this cross-sectional quantitative study was to examine the impact of the Islamic financial practices in mitigating the pandemic-triggered financial crisis in Pakistan in 2020. The global financial crisis of 2007–2009 had established the credentials of the Islamic financial system as a sustainable financial system to save interests of the average citizens around the world while adding value to the real economy (Diaw, 2015). The basic ethical tenets of the Islamic financial system might be suitable to fight the economic aftershocks of a pandemic like COVID-19 (Rabbani et al., 2021). The important Islamic financial principles are zero interest, shared risk, profit loss sharing policies, and no uncertainty in transaction (Daly & Frikha, 2016). The independent variables of the current study were conventional financial sector parameters, Islamic financial sector parameters, and country-level macroeconomic parameters of Pakistan. The dependent variables were aggregate demand, price variable, bank specific financial variable, and nonbank financial variable. These variables were the best indicators for assessing a financial crisis (Claessens & Kose, 2013). The financial system of Pakistan consists of the conventional financial sector and the Islamic financial sector. I inserted the conventional financial sector parameters, Islamic financial sector parameters, and country-level macroeconomic data of Pakistan of 2020 in the IMF-DSGE model for both sectors separately. Then I examined the impact of the Islamic financial principles on

mitigating the pandemic-triggered financial crisis of Pakistan of 2020 by comparing the output of the model of both sectors.

Theoretical Framework

The DSGE models include modern macroeconomic theory to explain and predict comovements of aggregate time series over the business cycle (Taylor & Uhlig, 2017). The DSGE model includes both the standard neoclassical growth model (King et al., 1988) and the New Keynesian monetary models (Smets & Wouters, 2003). A common feature of these models is that decision rules of economic agents are derived from the assumptions about preferences, technologies, information, and the prevailing fiscal and monetary policy regime by solving intertemporal optimization problems. The DSGE model paradigm provided an empirical model with a strong degree of theoretical coherence that was attractive as a laboratory for policy experiments. Modern DSGE models are flexible enough to accurately track and forecast macroeconomic time series well. They have become one of the workhorses of monetary policy analysis in central banks (Dostey, 2013).

The conventional DSGE models were linear. Blanchard (2014) stated that macroeconomists relied heavily on linear models for their analysis, and these linear models produced stable equilibria. Blanchard pointed out the importance of developing nonlinear macroeconomics models. Because the economic mechanisms become nonlinear during a financial crisis, there are vicious interactions between asset prices, bank lending conditions, and real economy (Borio, 2014). The conventional linearized DSGE models did not capture the effects of nonlinearities and ignored the role played by banks in

contributing to vulnerabilities and nonlinearities due to the financial crisis. The unregulated banks changed the economic propagation mechanism during a financial crisis (Benes et al., 2014a) . Benes et al. modified the linear DSGE model to include the role played by the banks during financial crises. The enhanced DSGE model is suitable to study the vulnerabilities associated with excessive credit expansions and asset price bubbles and to recommend economic policies that might guard against such vulnerabilities (Benes et al., 2014a). I used this IMF-DSGE model in my study.

Research Question

To what extent did an Islamic financial system mitigate the COVID-19 pandemic-caused financial crisis on the economy of Pakistan in 2020?

Hypotheses

The financial system of Pakistan consists of both conventional and Islamic financial sectors. I collected conventional financial sector parameters, Islamic financial sectors parameters, and country-level macroeconomic data Pakistan from 2020. Then I inserted the data into the enhanced IMF-DSGE model (see Benes et al., 2014a) and tested following hypotheses:

Hypothesis 1

I developed the first hypothesis to test the effect of Islamic financial system on aggregate demand of Pakistani economy during the COVID-19 pandemic in 2020. The aggregate demand of Pakistani economy depends on consumption, government spending, investment, and trade balance.

H_o1 : The Islamic financial system did not have an effect on consumption, government spending, investment, and trade balance of the Pakistani economy during the COVID-19 pandemic period in 2020.

H_a1 : The Islamic financial system had an effect on consumption, government spending, investment, and trade balance of the Pakistani economy during the COVID-19 pandemic period in 2020.

Hypothesis 2

I developed the second hypothesis to test the effect of the Islamic financial system on the price variable of the Pakistani economy during the COVID-19 pandemic in 2020. The price variable of the Pakistani economy depends on wage, consumer price index, policy interest rate, and real exchange rate.

H_o2 : The Islamic financial system did not have an effect on wage, consumer price index, policy interest rate, and real exchange rate of the Pakistani economy during the COVID-19 pandemic period in 2020.

H_a2 : The Islamic financial system had an effect on wage, consumer price index, policy interest rate, and real exchange rate of the Pakistani economy during the COVID-19 pandemic period in 2020.

Hypothesis 3

I developed the third hypothesis to test the effect of the Islamic financial system on the bank-specific financial variable of the Pakistani economy during the COVID-19 pandemic in 2020. The bank-specific financial variable of the Pakistani economy depends

on the real value of capital stock, real bank credit, lending spread, portfolio default ratio, and post default capital adequacy ratio.

H_o3 : The Islamic financial system did not have an effect on the real value of capital stock, real bank credit, lending spread, portfolio default ratio, and post default capital adequacy ratio of the Pakistani economy during the COVID-19 pandemic period in 2020.

H_a3 : The Islamic financial system had an effect on the real value of capital stock, real bank credit, lending spread, portfolio default ratio, and post default capital adequacy ratio of the Pakistani economy during the COVID-19 pandemic period in 2020.

Hypothesis 4

I developed the fourth hypothesis to test the effect of the Islamic financial system on the non-bank-specific financial variable of the Pakistani economy during the COVID-19 pandemic in 2020. The non-bank-specific financial variable of the Pakistani economy depends on net foreign asset to GDP ratio, physical capital stock, and real asset price.

H_o4 : The Islamic financial system did not have an effect on the net foreign asset to GDP ratio, physical capital stock, and real asset price of the Pakistani economy during the COVID-19 pandemic period in 2020.

H_a4 : The Islamic financial system had an effect on the net foreign asset to GDP ratio, physical capital stock, and real asset price of the Pakistani economy during the COVID-19 pandemic period in 2020.

Hypothesis 5

The fifth hypothesis tested the ability of the linearized and nonlinearized IMF DSGE model to capture the financial crisis dynamics of the Pakistani economy during the COVID-19 pandemic in 2020 for the conventional banking sector.

H_o5 : The nonlinearized IMF-DSGE model was not better than the linearized IMF-DSGE model in capturing the financial crisis dynamics of the Pakistani economy during the COVID-19 pandemic period in 2020 for the conventional banking sector.

H_a5 : The nonlinearized IMF-DSGE model was better than the linearized IMF-DSGE model in capturing the financial crisis dynamics of the Pakistani economy during the COVID-19 pandemic period in 2020 for the conventional banking sector.

Hypothesis 6

The sixth hypothesis tested the ability of the linearized and nonlinearized IMF-DSGE model to capture the financial crisis dynamics of the Pakistani economy during the COVID-19 pandemic in 2020 for the Islamic banking sector.

H_o6 : The nonlinearized IMF-DSGE model was not better than the linearized IMF-DSGE model in capturing the financial crisis dynamics of the Pakistani economy during the COVID-19 pandemic period in 2020 for the conventional banking sector.

H_a6 : The nonlinearized IMF-DSGE model was better than the linearized IMF-DSGE model in capturing the financial crisis dynamics of the Pakistani economy during the COVID-19 pandemic period in 2020 for the conventional banking sector.

The dependent variables were aggregate demand, price variable, bank-specific financial variable, and nonbank financial variable. The independent variables related to

aggregate demand were consumption, government spending, investment, and trade balance. The independent variables related to price variable were wage, CPI, policy interest rate, and real exchange rate. The independent variables related to the bank-specific financial variable were real value of capital stock, real bank credit, lending spread, portfolio default ratio, and post default capital adequacy ratio. The independent variables related to the non-bank-specific financial variable were net foreign asset to GDP, physical capital stock, and real asset price.

I collected the conventional financial sector parameters, Islamic financial sector parameters, and country-level macroeconomic data of Pakistan from the websites of the Central Bank of Pakistan, the International Monetary Fund, and the World Bank. After that, I inserted the data into the enhanced IMF-DSGE model for both Islamic and conventional economic sectors separately. Then I compared the output of the enhanced IMF-DSGE model for both conventional and Islamic economic sectors of Pakistan. The results of the analysis helped me answer the research question.

Nature of the Study

All of the variables were well defined for this study, so I used the quantitative research method. The quantitative research method helped me collect numerical data regarding aggregate demand, price variable, bank-specific financial variable, and nonbank financial variable of 2020. Then I examined the effectiveness of Islamic financial principles in mitigating the pandemic-induced financial crisis in Pakistan during 2020. Because the qualitative research method is exploratory by nature, it was not suitable for my study (see Atkinson & Delamont, 2010). The qualitative method is

suitable for a study when little is known about a problem or there is no established theory (Eriksson & Kovalainen, 2008). Because the widely accepted DSGE model was present, the qualitative research method was not suitable for this study.

I used a cross-sectional design in my research. This design required nonrandomized country-level aggregate economic data of Pakistan for one period only (see Baldwin & Berkeljon, 2010). This design was appropriate for the measurement and modeling in particular time. This design also allowed the direct estimation of parameters at one period (see Salkind, 2010).

The experimental research design was not suitable for this study. It required forming a control group and a treatment group (Cynthia et al., 2004). The data regarding the conventional financial sector, Islamic financial sector, and country-level macroeconomic data of Pakistan could not be manipulated to form a treatment group. A longitudinal study was also not suitable for this study. It required collecting data for multiple periods (Salkind, 2010). In my study, data from one period were needed.

Definitions

The following terms were used as defined:

Asset price bubble: It is an extreme form of upward asset price movement that is not explainable based on fundamentals. Patterns of extreme increase in asset prices are often followed by crashes. This is known as asset price booms and busts (Harrison, 2010).

Banking crises: Banks are fragile, and the problems of individual banks often spread to the whole banking system. Banking crises are often related to problems in asset

markets. Crises may happen due to poor market discipline, limited disclosure, weak corporate governance framework, and poor supervision (Curry, 2012).

COVID-19 pandemic: The novel coronavirus caused a pandemic throughout the world. Hundreds of millions of people were infected with this virus, and millions of people died globally. Governments around the world adopted the pandemic public health policy measures. Governments also took drastic monetary and fiscal policy responses to mitigate the financial crisis caused by the COVID-19 pandemic.

Credit booms and busts: A period of significant growth of credit along with asset prices often happens before the crisis. Booms are often followed by busts in credit markets along with sharp corrections in asset prices (Di Maggio & Kermani, 2017).

Credit crunch: This is an economic condition in which individuals and businesses do not get enough credit. The lenders are worried about the ability of borrowers to repay loans. The consequence of a credit crunch is a prolonged recession or slower recovery (Bordo, 2017).

Financial crisis: A financial crisis is associated with a substantial change in credit volume, asset prices, larger scale balance sheet problems, severe disruptions in financial intermediation, and the supply of external financing (Altavilla, 2019).

Gharar (excessive risk): Gharar is the uncertainty over the existence of the subject matter of sale. Gharar happens when the subject matter of the sale is unknown or the consequences are concealed. The Islamic financial system forbids gharar (Daly & Frikha, 2016).

Global financial crisis: The severe financial crisis of 2007–2009 is known as a global financial crisis. It originated in the U.S. housing market and spread across the world (Acharya, 2009).

Macroprudential policy: It deals with the systematic risks in the financial sector. It dampens the build-up of financial imbalances. It uses several tools for this purpose. The objective of this policy is to make the financial crisis less severe. It uses several tools for this purpose. The important macroprudential tools are loan-to-value ratio, debt-to-income ratio, liquidity coverage ratio, and time-varying reserve requirement (Jeon, 2021).

Money creation: Banks create new money in the process of making a loan. In this loan-making process, banks simultaneously create a matching deposit in the borrower's bank account. Bank money creation is limited by the bank's assessment of profit. Money is destroyed when the borrower repays the loan (Karmelavičius, 2019).

Profit loss sharing principle: This is one of the core principles of the Islamic financial system. This financial system does not allow usury or interest. However, it allows a predetermined profit sharing between lender and borrower (Tarık & Dolgun, 2016).

Shock: It is an unpredictable event that affects an economy. The most important shocks are technology shock, supply shock, demand shock, inflationary shock, and monetary policy shock. The technology shock happens due to technology development that touches productivity. Supply shock may happen due to disasters. A sudden change in consumption or investment may cause demand shock. Abrupt price changes cause

inflationary shock. The central banks may cause monetary policy shock by changing policy rates abruptly without advance warning (Kumar et al. , 2021).

Assumptions

The purpose of this study was examining the impact of the Islamic financial principles in mitigating the pandemic-caused financial crisis in Pakistan. I used an IMF-DSGE model for this purpose. The assumptions used by Benes et al. (2014a, 2014b) to develop the IMF-DSGE model were the following:

- The number of individuals taking bank loans is large.

- The loan portfolio is not dominated by any of them.

- The aggregate risk and the idiosyncratic risk are distributed normally.

- Bank capital is subject to regulation in the form of capital requirements.

- Imperfections in equity markets and other possible costs associated with external capital flows prevent banks from acquiring fresh capital instantaneously and costless.

- Banks are only owned by domestic households.

- There are no financial positions between the country and the rest of the world other than nonresident bank deposits.

- Households and banks expect, ex ante, the asset prices to follow their fundamental path in the basic specification.

- The portfolio default rate is annualized to facilitate comparisons with lending spreads.

Scope and Delimitations

The focus of this study was on testing the capability of Islamic financial principles to mitigate the severity of the pandemic-triggered financial crisis in Pakistan in 2020. I used the enhanced IMF-DSGE model for this purpose (see Benes et al., 2014a). Benes et al. (2014a) included three key design features in this model: bank credit creation, aggregate risk, and global nonlinearities. The model was designed to study vulnerabilities associated with excessive credit expansions and asset price bubbles, and the consequences of different macroprudential policies. The model has the capability to differentiate between good and bad credit expansions (Benes et al., 2014b). Bad credit expansions cause asset price bubbles. The model allows researchers to analyze alternate macroprudential policies in dealing with the immediate aftermath of a financial crisis. The model has the capability to recommend policies to prevent the occurring of financial crisis. Benes et al. (2014b) tested the capabilities of the model. I collected conventional financial sector parameters, Islamic financial sector parameters, and country-level macroeconomic data of Pakistan from 2020 and inserted into them into the IMF-DSGE model separately. Then I compared the results.

Limitations

Economic events influence macroeconomic research through complex processes and might affect the result of the study. The results of my study might have been affected by the following limitations:

- The IMF-DSGE model does not deal with issues related to excessive risk-taking behavior of banks.

- The banks are always fully hedged in the IMF-DSGE model.

- The quantitative properties of the IMF-DSGE model when subjected to large shocks would contain enormous uncertainty around them.

- The implications of nonlinearities under conditions of excessive leverage in the banking and nonfinancial sectors might limit the effects of such nonlinearities. The countercyclical macroprudential policies also limit the effects of such nonlinearities.

- The result of the study might be generalizable to other countries with a conventional financial sector and an Islamic financial sector. However, the results of the study would not be generalizable to countries with only a conventional financial system.

Significance of Study

The conventional financial system might cause a financial crisis by not connecting nominal and real transactions in an economy (Ejaz & Khan, 2014). The Islamic financial principles might close this gap between the financial sector and real sector. The current study might advance the knowledge in financial economics by providing a solution to financial crises. The study might be a fundamental contribution in the field of the financial economics.

Potential Contributions to Advance Practice and Policy

My study might contribute to advance practices and policies. The legislative branch might use the findings of my research to devise regulations to reduce the impact of the financial crisis. The regulators might also use it to devise the financial policy to

reduce the intensity of the financial crisis. Central banks might apply it to formulate procedures to oversee financial institutions. The study might help policymakers identify key elements that might affect the economy (see Dostey, 2013). The study might also provide a coherent and internally consistent way of viewing the economy.

Potential Implications for Positive Social Change

Many stakeholders might benefit from the results of this research. Economists might use the findings of my research to develop techniques to maximize the GDP of a country. The study might help banks maintain stability and avoid bankruptcy. A stable banking system is good for business. The study might also help to stabilize the economy and minimize unemployment. The study might increase people's quality of life by offering stable jobs through financial stability. Ultimately, the study might help to promote economic and social justice.

<div align="center">

Summary

</div>

The purpose of this study was testing the impact of the Islamic financial principles in mitigating the pandemic-induced financial crisis of Pakistan in 2020. I used the IMF-DSGE model for this purpose (see Benes et al., 2014a). The model has the capability to examine the vulnerabilities associated with excessive credit expansions and asset price bubbles. The model also supports macroprudential policy analysis for reducing the impact of financial crises.

I conducted a cross-sectional quantitative study. This design was appropriate for this study due to the nature of the variables and the hypothesized relationship between them. The dependent variables of this study were aggregate demand, price variable, bank

specific financial variable, and nonbank financial variable. The independent variables were consumption, government spending, investment, trade balance, wage, CPI, policy interest rate, real exchange rate, real value of capital stock, real bank credit, lending spread, portfolio default ratio, post default capital adequacy ratio, net foreign asset to GDP, physical capital stock, and real asset price. I present a literature review in Chapter 2.

Chapter 2: Literature Review

The COVID-19 pandemic caused both a public health crisis and a financial crisis globally. The governments imposed broad-based lockdowns and stay-at-home restrictions that caused COVID-19 pandemic-triggered recession. The deterioration in economic activity due to COVID-19 pandemic affected financial sectors and caused millions of lost jobs and trillions of lost dollars in GDP (Lee, 2021). Similar situations arose during the global financial crisis of 2007–2009. Policymakers introduced fiscal and monetary policies to mitigate the effect of the pandemic-induced financial crisis. However, the policies had adverse effects on the economy. Adrian and Gopinath (2021) stated that inflation rose globally due to these policies. The economists had difficulties inventing balanced policies to prevent the repeated occurrence of financial crises. The traditional financial economists failed to formulate a solution to stop the financial crises. The Islamic financial economists proposed that the Islamic financial principles provide a solution to financial crises. The solution needed to be verified using a respected traditional financial model. I addressed this literature gap in my research.

I present important classical theories of financial crisis in Chapter 2. These include Keynesian business cycle theory, Austrian business cycle theory, real business cycle theory, and monetarist business cycle theory. I also introduce a framework of the nonlinear DSGE model generated by IMF. Then I introduce Islamic economics theories about financial crisis. Two important principles of Islamic financial system are zero interest and risk sharing. The Islamic financial system does not allow a predetermined rate of interest. It allows only a predetermined rate of profit-loss sharing between the

borrowers and lenders. The borrowers do not bear 100% risk. Both the borrowers and lenders share risk (Daly & Frikha, 2016). A few countries were experimenting with the Islamic financial principles and implemented it in limited scale. So far, no country has implemented the Islamic financial principles completely. Pakistan implemented the Islamic financial principles on a limited scale. I collected conventional financial sector parameters, Islamic financial sector parameters, and country-level macroeconomic data of Pakistan of 2020. Then I inserted them into the IMF-DSGE model and examined the effectiveness of Islamic financial principles to mitigate the impact of the pandemic-induced financial crisis of Pakistan in 2020.

Literature Search Strategy

I started my research using Walden University's research databases and the Google Scholar search engine to find relevant sources. I searched ABI-Inform, Academic Search Premier, EBSCO, Proquest Central, Tylor and Francis, Emerald Insight, OECD Library, and National Bureau of Economic Research. My keywords for searches were *financial crisis*, *Islamic finance*, *Islamic economics*, *Islamic financial principle*, *DSGE model*, *business cycle*, *profit loss sharing system*, and *prohibition of riba*. The initial research gave me many resources. I narrowed the result using the AND operator and used more than one keyword. I also searched the websites of World Bank, International Monetary Fund, and Central Bank of Pakistan.

I searched for both traditional and Islamic theories related to financial crisis. I searched the journals starting from 1920. I cited seminal theories of financial crisis from

the original authors. I also cited from contemporary researchers. Most of my citations are from current scholars and researchers.

Financial Crisis

Financial crises were an integral part of the economic landscape (Reinhart & Rogoff, 2009). Each financial crisis was not distinctive from the preceding ones. The characteristics that appeared to be common across crises included states of an economy. These characteristics included excessive debt accumulation, speculative manias, the bursting of asset bubbles, bank runs, currency crises, and international contagion (Malliaris et al., 2016). However, the pandemic-induced financial crisis happened due to imposed public health measures by the governments across the world (Moon & Sohn, 2021).

Bernanke (2013) proposed that the 2007–2009 financial crisis was best understood as a classic financial panic transposed into the novel institutional context of the 21-century financial system. Financial panics induced liquidity crises because the increased economic uncertainty during the panic increased the demand for liquid assets. Investors who had liquid assets were reluctant to change for an uncertain valuation of long-term illiquid assets, bringing the financial intermediation process to a complete freeze. Financial panic transmuted into liquidity crises and stopped transactions. Financial panic also caused a temporary failure of financial markets (di Patti & Sette, 2016). Tirole (2011) analyzed the interrelated concepts of financial panics, liquidity crises, freezes of financial markets, fire sales, collateral valuations, maturity mismatching, securitizations breakdowns, the economics of contagions, and the role of

regulations. Famous financial economists discussed these issues of capitalist financial system in detail (Bordo & Olivier, 2002). The COVID-19 pandemic caused by combined supply and demand shock. The actions taken during the 2007–2009 financial crisis might not be fully effective as long as the pandemic persists and restricted public health measures are in place (Moon & Sohn, 2021).

The Minsky-Kindleberger-Keynes paradigm postulates the fundamental axiom that the capitalist system is inherently unstable (Malliaris et al., 2016). Keynes (1936) connected this instability to investment that was driven by "animal spirits" (p. 81). Akerlof and Shiller (2009) generalized the idea of animal spirits and gave numerous novel illustrations. Minsky (1986) attributed the instability of the capital system to the financial sector by formulating his famous financial instability hypothesis, and Keen (1995) adopted the Minskyan hypothesis as a theoretical framework to analyze historical economic crises. Islamic financial economists also studied these issues and compared them with the Islamic financial system (Trabelsi, 2011). Islamic banks increased the stability of the banking system and the efficiency of the whole banking sector. The inclusion of Islamic banking products in the financial systems stimulated financial deepening and improved the financial stability in the Southeast Asian economy (Lebdaoui & Wild, 2016).

An Islamic financial system prohibits interest and interest-based assets, and thereby restricts speculation (Ökte, 2010). Many causes of financial instability such as money creation, speculation, and interest-based financial assets are absent in Islamic finance. Banks have direct ownership of real assets and operate like an equity holding

system. Savings are redeployed into a productive investment (Askari et al., 2010). The Islamic financial principles and innovations provided a promising solution for the global financial crisis (Arouri et al., 2013). Aisyah and Reza (2020) discussed the profit-loss sharing contract of Islamic finance as a financing tool in helping the economy and businesses to recover from COVID-19 economic crisis. Islamic finance was an alternative financial system in providing the relief to the COVID-19-affected people and entrepreneurs (Hassan et al., 2021).

Theoretical Foundation of Islamic Financial Principles

The Islamic financial system encompassed directives on business ethics, wealth distribution, social and economic justice, and role of the state (Daly & Frikha, 2016). Further, it focused on the ethical, moral, social, and religious dimensions to improve equality and fairness, which are the values of Islamic commandments (Zaman & Qadir, 2017). Economic justice is an important part of the Islamic financial system. The rules related to permissible and forbidden economic behavior, property rights, production, and distribution of wealth are based on the Islamic concept of justice (Askari et al., 2016). Several of the most fundamental Islamic financial principles are applied in the Islamic financial system.

Prohibition of Riba

Riba (interest) is any unjustifiable increase of capital in loans or sales (Alrifai, 2015). Riba is prohibited because it is exploitive and produces profit at someone else's expense. In a riba-based transaction, the lender and the borrower are on unequal terms. The lender is guaranteed a profit with a collateral while the borrower gains or loses

money depending on the outcome of the transaction. Rather than being on equal terms whereby both parties share the risk, this practice creates injustice. The Islamic financial principle prohibits riba (Erdem, 2017) and also prohibits usury (Ahmad & Milhem, 2016).

Risk Sharing

A risk-sharing system serves the true function of finance as facilitator of real sector activities and avoids the emergence of a paper economy in which there is gradual decoupling of finance from the real sector. Islamic finance was initially proposed as a profit loss sharing system, but its core principle is risk sharing (Askari et al., 2014). The Islamic financial principles prohibit interest-based debt contracts and provide an alternative solution. The alternative to debt-based contracts is "al-bay," a mutual exchange in which one bundle of property rights is exchanged for another (Askari et al., 2012). Al-bay allows both parties to share production, transportation, and marketing risks. It also allows both parties to reduce the risk of income volatility and allows consumption smoothing.

Other Islamic Financial Principles

The Islamic financial principles recognize the time value of money. According to this principle, money acts as capital when it is joined with other resources in undertaking a productive activity. The time value of money prohibits speculative behaviors such as gambling and excessive risk taking (Waemustafa & Sukri, 2016). The time value of money also respects the sanctity of contracts. Contractual obligations and the disclosure

of information are part of the time value of money, which helps to reduce the risk of asymmetric information and moral hazard.

Theoretical Foundation of Conventional Financial Crisis Theories

The United States went through 33 business cycles from 1854 to 2009 (The National Bureau of Economic Research, 2010). Each business cycle varied in length and severity. The Great Depression was the longest, deepest, and most widespread downturn of the 20th century (Bernanke, 1995). It lasted from 1929 to 1939 in the United States. The business cycle known as the Great Recession lasted from 2007 to 2009 (Christiano et al., 2015). The major schools of economics explained these crises using business cycle approaches. I discuss the Keynesian business cycle theory, the monetarist business cycle theory, the Austrian business cycle theory, and the real business cycle theory.

Keynesian Business Cycle Theory

Keynes (1936) stated that business cycles happen due to fluctuations in aggregate demands. The key variables of aggregate demands are consumption, investment, and government expenditure. If aggregate demand falls due to exogeneous or endogenous shock, the resulting impact will cause a recession. During this time, the demand determines the level of investment and income. Keynes proposed that a small increase in government expenditure would lead to a larger increase in GDP. This GDP increase would happen due to preference for liquidity during an economic recession. Keynes further proposed that fiscal authorities should intervene at times of a recession to eliminate market failure. For example, the government could increase national income and employment through expansionary fiscal policy. The economic stimuli would work

as a fiscal stabilizer and would reduce the severity of a recession via multiplier effect (Roullear-Pasdeloup, 2018). The economic stimuli would also accelerate the rate at which an economy would reach full employment. The government spending could restore confidence and ameliorate demand.

In response to Keynes's proposition, the classical economist suggested that a liberal approach would allow the market to adjust itself. However, Keynes was highly skeptical about the classical approach of allowing the market to equilibrate over a lengthy period. Furthermore, Keynesianism faced challenges from the school of monetarism (Friedman & Schwartz, 1963). Friedman and Schwartz (1963) linked business cycle to volatility in money growth. The fiscal multipliers were made redundant by controlling the money growth. Later, Lucas and Sargent (1979) challenged Keynesian theory by developing the rational expectation model. The model showed how fiscal stimuli were greatly undermined by myopic households through their intertemporal consumptions and savings decisions. The model reduced the fiscal multiplier to zero.

Austrian Business Cycle Theory

Mises (1953) and Hayek (1935) developed the Austrian business cycle theory. They posited that the expansionary monetary policy would push investors to commit to malinvestments. These malinvestments would be bound to fail. They further mentioned that economies tend to prefer an accelerated growth rate over a natural one because the accelerated growth rate would bring the future opulence into the present. The central banks would inject more credit into the economy to achieve this insatiable desire for growth, and the higher supply of credit would lower the interest rate (Garrison, 1989).

This lower interest rate would stimulate aggregate demand through investment. This would accelerate the expansionary phase. The economies would reduce the interest further to maintain this booming phase. This would not delay the contractionary phase but would also exacerbate its impact. Ultimately, expansionary monetary policy would raise the risk of harsher crisis (Foldvary, 2015).

The Austrian economist explained the 2007–2009 financial crisis using this business cycle theory (Salerno, 2015). Before this crisis, the Federal Reserve implemented loose monetary policy. The interest rate was at an all-time low due to the dot-com bust. U.S. households borrowed more than they could afford to pay back. They believed that the low interest rate and easy credit would persist in the future. Here the prices became distorted and did not reflect reality. This kindled an unsustainable level of economic activity and led to the death of many long-term projects. The Austrian model affirmed it.

Monetarist Business Cycle Theory

Friedman was the founder of the monetary school of thought. Friedman and Schwartz (1963) proposed that the changes in money supply were the core basis for the fluctuations in the business cycle. A rapidly expanding monetary base would cause an inflation volatility, and a rapidly contracting money supply would cause an economic downturn (Friedman, 1972). Monetarists proposed that economies must maintain a stable level of money growth to prevent such phenomena.

Monetarism is a short-term remedy for a business cycle. The monetarists proposed to regulate and stabilize money supply. However, there are many classifications

of money, and monetarists failed to define types. Moreover, regulating money supply is an extremely tedious job for the central bank (Krugman, 2008).

Real Business Cycle Theory

The neoclassical economists developed the real business cycle theory. According to these economists, changes in aggregate supply cause business cycle (Plosser, 1989). The supply shocks are generated by the economic fluctuations, and it uses in a neoclassical growth model as a reference for the economy's long-term behavior (Long & Plosser, 1983; Prescott & Kydland, 1982). The real business cycle (RBC) theory is characterized by the economic agents' rationality, reflected by an optimum, well-grounded reaction to the real shocks on preferences, productivity, or public acquisitions (Hudea et al., 2014). The RBC model consisted of five agents: households, firms, fiscal and monetary authorities, the foreign sector, and financial institutions. The RBC model shows how the households deal with two problems of choice: intra-temporal consumption-leisure and intertemporal consumption-savings. The Households decide how much to consume, how much to invest and how much labor to supply, with the aim of maximizing utility, taking prices as given. The RBC model also shows how the firms choose inputs used in the production process. The firms decide how much to produce using available technology and choosing the factors of production, taking these prices as given. In all cases, the marginal rate of substitution is compared to relative price. The RBC theory assumes perfect competition in goods and inputs markets.

Any good theory is both internally and externally consistent (Mankiw, 1989). The RBC model is internally consistent. The model is based on microeconomic principles,

such as utility maximization, profit maximization, and market equilibrium. However, the RBC theory is not externally consistent. It fails to match the empirical facts. Mankiw (1989) stated that the prediction of RBC model does not fit the facts of business cycle.

Dynamic Stochastic General Equilibrium Model

The dynamic stochastic general equilibrium (DSGE) model includes a broad class of macroeconomic models (Taylor & Uhlig, 2017). The DSGE model encompasses a standard neoclassical growth model (King et al., 1988) and new keynesian monetary model with real and nominal frictions. The DSGE model incorporates the nominal rigidities and the dynamic effects of a shock to monetary policy (Christiano et al., 2005) and incorporates habit formation, costs of adjustment in capital accumulation, and variable capacity utilization (Smets & Wouters, 2003). The decision rules of economic agents are derived from assumptions about preferences, technologies, information, and the prevailing fiscal and monetary policy regime. The DSGE model delivers empirical model with a strong degree of theoretical coherence and accurately tracks and forecasts macroeconomic time series. The DSGE model is attractive to central banks for monetary policy analysis. Major central banks of the world developed their own DSGE models that are suitable for business cycle analysis, policy analysis, and forecasting. The DSGE model estimation and solution techniques are the two pillars that form the basis for understanding the behavior of aggregate variables such as GDP, employment, inflation, and interest rates.

The DSGE model is accepted due to its coherent analysis capability. This coherence is a result of the acceptable behavior that agents would maximize utilities in

decision making decisions. The DSGE model's dynamic mechanism is another attraction and represents the intertemporal movement of economic variables. The DSGE model is not subject to Lucas critique (Lucas, 1976). The central banks are striving to make DSGE more useful in the analysis economic policy. The central banks are considering to account an increasingly sophisticated financial sector with financial vulnerability, collateral restrictions, and are progressively perfecting the understanding of forecasting.

International Monetary Fund DSGE Model

The conventional linearized DSGE model is not useful for evaluating the macroeconomic phenomena during the financial crisis due to deviation of behavior of the agents. The macroeconomic variables change, and the economic process becomes non-linear during financial crisis (Milne, 2009). The interactions between bank lending conditions, asset prices, and real economy magnify the non-linear process (Borio, 2014). Unregulated banks change the economic propagation mechanisms through their response to standard demand and supply shocks generated from outside the banking system. The conventional linearized DSGE models ignore the special role played by the banks in contributing to vulnerabilities and nonlinearities.

Benes et al. (2014) modified the conventional DSGE model by incorporating the bank balance sheets and borrower balance sheets. The Banks play important roles in creating new purchasing power to finance consumption and investment through loans. The interactions among bank balance sheets, borrower balance sheets and the real economy become highly nonlinear during financial crises. The interactions among asset prices, bank lending conditions and the real economy magnify the effects (Borio, 2014).

Banks become source of shocks by setting excessive optimistic expectations concerning growth prospectus, borrower riskiness or asset prices. The three important features of IMF generated DSGE model are bank credit creation, aggregate risk, and global nonlinearities (Benes, Kumhof, & Laxton, 2014a).

Bank Credit Creation

The financial economists generate few models for bank credit creation (McLeay, Radia, & Thomas, 2014). The traditional model is a loanable fund model. According to this loanable fund model, the depositors deposit funds in the banks. Then, banks use that deposit funds to make loans to borrowers. Banks are used as intermediaries. Disyatat and Borio (2011) posited that the loanable fund model failed to capture the mechanism through which banks expand or contract credit to the economy. Disyatat and Borio proposed that banks are in the business of financing, and issue economy's medium of exchange through lending. Banks do not need fund from the depositors before making loan, and can expand both side of the balance sheet out of thin air. The banks face two constraints to expand the size of bank balance sheets. The first constraint is demand by non-banks for the economy's medium of exchange. If banks approve loan, the quantity of the economy's medium of exchange increases. On the other hand, if the loan is repaid, the quantity of the economy's medium of exchange decreases. The second constraint is related to banks' expectation about profitability, solvency, and capitalization. Banks may make profit or loss from giving loan. The loan giving process may put their solvency at risk, and expose to not diversifiable risk. So, the size and riskiness of bank balance sheet

create macrofinancial vulnerabilities. The IMF generated DSGE model incorporated these factors (Benes et al., 2014a).

Aggregate Risk

The banks' balance sheet faces diversible and non-diversifiable aggregate risks. Many macroeconomic models with macrofinancial extensions considered the diversifiable aggregate risk only. The classical financial accelerator model incorporated the diversifiable aggregate risk by means of optimal state-contingent contracts (Bernanke et al., 1999). The Lorenzoni inefficient credit boom model did the same (Lorenzoni, 2008). The IMF DSGE model incorporated both the diversifiable and non-diversifiable aggregate risks (Benes et al., 2014a). The non-diversifiable aggregate risk is determined endogenously by the real economy, the optimal leverage ratio, individual lending and borrowing behavior, optimal spreads, and the probability of default. The banks' equity absorbs the non-diversifiable aggregate risk. Banks may face capital shortfall due to large portfolio losses and maintain regulatory capital buffers to reduce cost due to capital shortfall.

Global Nonlinearities

The economic processes become nonlinear during financial crises due to deviations of the behavior of agents and of macroeconomic variables from what prevails during normal times (Milne, 2009). These nonlinearities are also magnified by macrofinancial feedback. The IMF DSGE model incorporates these nonlinearities. The IMF DSGE model has the capability to depict real-world distress nonlinearities, and useful in correctly evaluating the underlying macroprudential policy trade-offs. The

objective of macroprudential policy is to minimize the impact of financial crisis at reasonable cost paid during normal times (Macroeconomic Assessment Group, 2010).

Aggregate Credit Risk and Capital Regulation

The aggregate credit risk (ACR) is a part of risk that cannot be diversified away and is a potential source of financial instability. The macroeconomic variables are the drivers of ACR (Kerbl & Sigmund, 2011). Benes et al., (2014a) proposed to include four building blocks to introduce aggregate credit risk and capital regulation in the DSGE model. The proposed four building blocks are as follows (Benes et al., 2014a):

- the asymptotic single risk factor framework
- loan portfolio value theory
- bank balance sheet and capital regulation,
- imperfections in external capital flows

The four building blocks incorporate the endogenous lending spread due to individual credit risk and the risk of a regulatory capital shortfall. The lending spread generates feedback mechanisms between banks and the real economy that causes nonlinearities in the model. I discuss the four building blocks in the following sections.

Asymptotic Single Risk Factor Framework

The theoretical foundations of the bank credit risk model were derived from the asymptotic single risk factor (ASRF) framework (Gordy, 2000). The ASRF framework was the conceptual background underlying the internal risk-based approach defined in second international banking regulatory accord known as Basel II (Gordy, 2003). Pykhtin (2012) incorporated the risk into the ASRF framework that underlie the Basel capital

rules. Yang (2014) used the ASRF model to quantify systematic risk of bank portfolio

default. Benes et al. (2014a) used the ASRF framework to incorporate credit risk and

portfolio defaults. I use the ASRF framework to calculate the default ratios within an

entire portfolio of bank loans to make a connection between defaults and the

macroeconomic variables.

Loan Portfolio Value Theory

The probability distribution of portfolio loss determines the amount of capital

necessary to support a portfolio of debt securities. Vasicek (2002) developed a loan

portfolio value model that is useful to calculate the portfolio loss. The loan portfolio

value model is valid under the assumption that all loans in the portfolio have the same

maturity, the same probability of default, and the same pairwise correlation of the

borrower assets (Vasicek, 1987). In addition, the loan portfolio model is used for

measuring portfolio risk, calculation of Value-at-Risk (VaR), portfolio optimization, and

structuring and pricing of debt portfolio derivatives (Vasicek, 2015). I use the loan

portfolio theory to estimate the amount of capital need for supporting a portfolio of debt

securities.

Bank Balance Sheets and Capital Regulation

The incentive-based mechanism is an effective tool for banks' capital regulation.

Milne and Whalley (2000) developed an incentive-based formal model for capital

regulation. The bank's capital decision is a continuous dynamic process. As the banking

business becomes sophisticated, financial regulators have difficulty to compute banks'

risks. As a result, the internal ratings based (IRB) approach becomes more useful for

bank's risk management systems (Milne, 2002). The incentive-based capital regulation process encourages to use the IRB method.

Imperfections in Equity Flows

External flows of bank capital are imperfect during balance sheet expansions and banking crises (Peura & Keppo, 2006). Informational costs, time delays in recapitalization, or strategic behavior of banks are responsible for this imperfection (Van den Heuvel, 2002). The implication of this imperfection is that the balance sheet cycles are not supported by inflows and outflows of capital, but supported by the changes in the underlying risks (Adrian et al., 2013). Another implication is that bank recapitalization choices are limited to internal sources. So, bank lending decision and risk management are determined by the capital requirement. Banks have also non-diversifiable risk on their balance sheet, and have limited recapitalization options. So, banks hold more than minimum capital required by the regulator (Jokipii & Milne, 2008). The size of capital buffer varies over time depending on macroeconomic conditions. I use Milne's (2002) two layers of external capital flow imperfections model in my study.

Basic Specification of the Model

The model represents a small open economy with a financial sector (Benes et al., 2014a). The financial sector consists of representative and competitive banks. The banks are in the business of extending loans and creating corresponding deposits. Banks can extend or deflate its balance sheet freely and only limited by the risk bearing capacity of bank equity or bank capital channel (Van den Heuvel, 2002). The bank capital channel works based on two assumptions. First, banks need to maintain certain percentage of

capital to meet the regulation. Second, banks cannot raise fresh equity from capital market instantaneously and is not costless due to imperfections in equity market. So, banks rely upon retained earnings and internal sources.

The model included representative households. These households make their decision on consumption, investment, labor, and deposits. They get their loans from banks acting as individual borrowers. The loans provide the households purchasing power for consumption and investment. The individual borrowers are considered as identical ex-ante. They have different stochastic threshold of defaults ex-post.

The model used standard inputs. The supply side consists of domestic input factors, capital, and labor, intermediate imports to produce local goods. Local goods are used for consumption, investment, and export. The local good markets operate under monopolistic competition. The nominal wages and final prices are assumed sticky. The countries are considered as price takers in international trade. Banks have access to international finance. The households cannot issue debt or equity instruments. Their international transactions are cleared through bank-issued liabilities. In the following section, I discuss about banks, households, local supply, monetary policy, macroprudential policy, exchange rate, symmetric equilibrium and aggregation, and other part of the model in following sections.

Banks

The banks' decision-making process consists of two stages. In the first stage, the banks decide the optimal size of its balance sheet based on capital requirement. In the second stage, banks design lending policy to satisfy the conditions set in the first stage.

Optimal Size of Bank Balance Sheet

The bank determines the optimal size of bank balance to maximize the ex-post shareholder value (Van den Heuvel, 2008). The bank balance sheet consists of homogeneous loan portfolio, volume of deposits, and bank capital. The model assumed that banks are owned by domestic households and cash flows are evaluated by the representative house-hold's shadow value of wealth. Banks increase the amount of capital up to the point where return on equity equals to household's discount factor:

$$\max_{\{L_t, D_t, E_t\}} \mathbb{E}_t\left[\frac{\hat{\beta}\Psi_{t+1}}{\Psi_t}(R_{L,t}L_t(1-\lambda G_{t+1}) - R_t D_t - \pi L_t\left[1 - \Pi_t(\hat{G}_t)\right] - E_t - \frac{1}{2}\chi_E \Delta^2_{E,t}\right.$$

Where $L_t = D_t + E_t$

Ψ = representative household's shadow value of wealth

$R_{L,t}$ = aggregate average lending rate

L_t = total value of bank lending

λ = a loss-given-default parameter

G_{t+1} = the ex-post portfolio default ratio

R_t = the deposit rate, and at the same time the policy rate

d_t = the volume of deposits created

π = the regulatory penalty for capital shortfalls

Π_t = the C.D.C. for the portfolio default ratio

$\hat{G}_t$ = the cut-off portfolio default ratio

E_t = the ex-ante value of bank capital (equity)

$\frac{1}{2}\chi_E \Delta^t_{E,t}$ = the adjustment cost of bank capital

Individual Lending

Banks decide their individual lending policy and desired rate of return. Bank determine rate of return based on the optimal size of its balance sheet. Then, it gives instructions to loan officers to offer borrowers individual lending supply curve defined all possible combinations of lending rate based on loan portfolio. Borrower selects the suitable point on the lending curve.

Households

The representative households consist of a large number of individual members. They make two types of decision. First case, they make decision individually. Second case, they make decision as a whole. Idiosyncratic risk factors are introduced in the process. We review the preferences and constraints of households and explain optimizing problems, and optimality conditions of household.

The household's lifetime optimality function is as follows:$\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t [(1 - \varepsilon) \log(C_t - \varepsilon \backslash \bar{C}_{t-1}) - (\eta + 1)^{-1} N_t^{\eta+1}]$

where C_t = the household's real consumption of goods

$\bar{C}_{t-1}$= the reference level in consumption with external habit formation.

N_t = hours worked

The household's decision makings are subjected to four constraints (Benes et al.,2014a):

1. A dynamic budget constraint:

$$d_t + P_{K,t}\sum K_t^i - \sum L_t^i - R_{t-1}d_{t-1} - R_{K,1}P_{K,t-1}\sum K_{t-1}^i + \sum R_{L,t-1}^i L_{t-1}^i$$

$$- W_t N_t \left(1 - \frac{1}{2}\chi_W \Delta_{W,t}^2\right) - P_t C_t + P_t I_t \left(1 + \frac{1}{2}\chi_I \Delta_{I,t}^2\right) - P_{K,t}I_t$$

$$- \bar{\Lambda}_t = 0$$

where

d_t = the bank deposits held by resident households.

$R_{t-1}D_{t-1}$ = the gross earnings on bank deposits from last period.

$P_{K,t}\sum K_t^i$ = the total value of claims to physical capital held by individual

members.

$R_{K,1}P_{K,t-1}\sum K_{t-1}^i$ = the total gross earnings on capital from last period.

$R_{K,t}$ = the ex-post return on physical capital, including rentals, S_t , and

capital

   gains,

$$R_{K,t} = \frac{S_t + (1 - \delta)P_{K,t}}{P_{K,t-1}}$$

$\sum L_{t,i}$ = the total amount borrowed in bank loans by individual members

$\sum R_{L,t-1}L_{t-1}$ = the total gross cost of bank loans from last period

$W_t N_t$ = the household's labor income

$\frac{1}{2}\chi_W \Delta_{W,t}^2$ = a wage inflation adjustment cost term,

   with $\Delta_{W,t} = log\frac{W_t}{W_{t-1}} - log\frac{\bar{W}_{t-1}}{\bar{W}_{t-2}}$

$P_t C_t$ = outlays on consumption

$P_t I_t$ = outlays on investment

$\frac{1}{2}\chi_I\Delta_{I,t}^2$ = an investment adjustment cost, with $\Delta_{I,t} = log\frac{I_t}{I_{t-1}}$

$P_{K,t}I_t$ = the resale value of new investment installed by the household

$\overline{\Lambda_t}$ sums up all flows into or out of the budget constraint that are not internalized by the household or its members

2. A labor demand constraint:

$N_t = \left(\frac{W_t}{\overline{W_t}}\right)^{\mu/(\mu-1)} \overline{N_t}$

Where μ = Monopoly power

W = Nominal wage rate

N = hours worked

3. A financing constraint:

$\overline{d_t} = \varphi_C P_t C_t + \varphi_I P_t I_t + \varphi_K P_{K,t}\Sigma K_t^i$

Where φ_C = Financing of consumption

φ_I = Financing of investment

φ_K = Financing of physical capital

K = Physical capital in production

P_K = Price of claims on physical capital

4. Bank lending supply constraint:

$R_{L,t}^i\left(1 - \lambda p_t^i\right) = \hat{R}_t$

Where R_L = Lending rate

$\hat{R}_t$ = Rate of return

$\forall i = 1, \ldots\ldots, n$

The complete Lagrangian for household is as follows:

$$\mathcal{L}_0 = \sum_{t=0}^{\infty} \beta^t \{[(1-\varepsilon)\log(C_t - \varepsilon\bar{C}_{t-1}) - (\eta+1)^{-1}N_t^{\eta+1}]$$

$$+ \Gamma_t \left[d_t + P_{K,t}\Sigma K_t^i - \Sigma L_t^i - R_{t-1}d_{t-1} - R_{K,1}P_{K,t-1}\Sigma K_{t-1}^i \right.$$

$$+ \Sigma R_{L,t-1}^i L_{t-1}^i - W_t N_t \left(1 - \frac{1}{2}\chi_W \Delta_{W,t}^2\right) - P_t C_t$$

$$+ P_t I_t \left(1 + \frac{1}{2}\chi_I \Delta_{I,t}^2\right) - P_{K,t}I_t - \Lambda_t \right]$$

$$+ \Gamma_t \Psi_t \left[\varphi_C P_t C_t + \varphi_I P_t I_t + \varphi_K P_{K,t}\Sigma K_t^i - d_t \right]$$

$$+ \Gamma_t \sum_{i=1}^{n} \Psi_t^i [\hat{R}_t - R_{L,t}^i (1 - \lambda p_t^i)]\}$$

Individual Members

An individual house member i pick a combination of bank loan L_t^i, a lending rate $R_{L,t}^i$, and the holdings of physical capital K_t^i to maximize expected value of the Lagrangian.

$$\max_{\{L_t^i, R_{L,t}^i, K_t^i\}} \mathbb{E}_t[\mathcal{L}_0]$$

The first-order conditions with respect to L_t^i and K_t^i are as follows:

$$L_t^i: \quad \Gamma_t(1 + \Psi_t) = \beta\mathbb{E}_t[\Gamma_{t=1}(1+\Psi)(1+A_t^i)]R_{L,t}^i$$

$$K_t^i: \Gamma_t(1 + \varphi_K\Psi) = \beta\mathbb{E}_t\{\Gamma_{t+1}[R_{K,t+1} + \Psi_{t+1})R_{L,t}^i k_t^i A_t^i]\}$$

where

Individual loan-to-value ratio, $k_t^i = L_t^i / P_{K,t}K_t^i$

Premium in household intertemporal conditions, $A_t^i = \frac{\lambda p_t^i \prime}{\omega - \omega\lambda p_t^i - \lambda p_t^i \prime}$

1. The Household as a Whole

The households as a whole optimize the expected value of the Lagrangian by choosing consumption C_t, investment I_t, bank deposits d_t, and the wage rate W_t.

$$\max_{\{C_t, I_t, d_t, W_t\}} \mathbb{E}_t[\mathcal{L}_0]$$

The first order conditions with respect to $C_t, I_t, W_t, and\ d_t$ are as follows under the symmetric equilibrium assumptions $\bar{C}_t = C_t, \bar{W}_t = W_t, and\ \bar{N}_t = N_t$

$$C_t: \quad \frac{1}{C_t - \varepsilon C_{t-1}} = \Gamma_t P_t (1 + \varphi_C \Psi),$$

$$I_t: \quad P_{K,t} \approx P_t + \chi_I P_t (\Delta_{I,t} - \beta \mathbb{E}_t[\Delta_{I,t+1}] + \varphi_I \Psi_t)$$

$$W_t: \quad \mu \frac{N_t^\eta}{\Gamma_t W_t} - 1 \approx (1 - \mu) \chi_W (\Delta_{W,t} - \beta \mathbb{E}_t[\Delta_{W,t+1}])$$

$$d_t: \quad \Gamma_t = \beta \mathbb{E}_t[\Gamma_{t+1}(1 + \Psi)] R_t$$

Local Supply

Local producers, local retailers, and exporters are part of local supply chain.

Local Production

The local production is described by a Cobb-Douglas production function:

$$Y_t = M_{Y,t} \zeta^M [U_t(N_{Y,t} - n)]^{\zeta_N} k_t^{1 - \zeta_M - \zeta_N}$$

Where n = the level of overhead required to conduct production

k_t = demanded capital

U_t = exogeneous technology

The local producers maximize the present value of pay-offs as follows:

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \Gamma_t [P_{Y,t} Y_t \left(1 - \frac{1}{2} \chi_Y \Delta_{Y,t}^t \right) - P_{M,t} M_{Y,t} - W_t N_{Y,t} - S_t k_t]$$

Where

Cost adjustment term of two input factor, $\Delta_{Y,t} = \log \frac{n_t}{M_{Y,t}} - \log \frac{n_{t-1}}{M_{Y,t-1}}$

Effective labor input, $n_t = N_{Y,t-n}$

The optimal behavior of the local producer with respect to labor, intermediate

imports, and capital are as follows:

$$N_t : \frac{W_t(N_{Y,t-n})}{\zeta_N P_{Y,t} Y_t} \approx 1 - \frac{\chi_Y}{\zeta_N} (\Delta_{Y,t} - \beta \mathbb{E}_t [\Delta_{Y,t+1}])$$

$$Y_{M,t} = \frac{P_{M,t} M_{Y,t}}{\zeta_M P_{Y,t} Y_t} \approx 1 - \frac{\chi_Y}{\zeta_M} (\Delta_{Y,t} - \beta \mathbb{E}_t [\Delta_{Y,t+1}])$$

$$k_t : \frac{S_t k_t}{(1 - \zeta_M - \zeta_N) P_{Y,t} Y_t} = 1$$

Local Distribution

Local distributors sell locally produced goods and maximize the present value of

pay-offs by choosing his output Z_t and the final price $P_{Z,t}$. Local distributors' expected

value is as follows:

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \Gamma_t [P_{Z,t} Z_t \left(1 - \frac{1}{2} \chi_P \Delta_{P,t}^2 \right) - P_{Y,t} Z_t]$$

The aggregate form of the first order condition is as follows:

$$P_{Z,t} : \mu \frac{P_{Y,t}}{P_{Z,t}} - 1 \approx (1 - \mu) \chi_P (\Delta_{P,t} - \beta \mathbb{E}_t [\Delta_{P,t+1}])$$

Exporting Industries

Local exporters use following Leontief production function to produce export goods.

$$Xt = \min\{\frac{U_{X,t}N_{X,t}}{\alpha}, \frac{M_{X,t}}{1-\alpha}$$

where

$U_{X,t}$ = labor productivity in local production sector

$M_{X,t}$ = imports to produce export goods

Exporter maximize the present value and future pay-offs as follows:

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \Gamma_t \left[P_{X,t}X_t \left(1 - \frac{1}{2}\chi_X \Delta_{X,t}^2 \right) - W_t N_{X,t} - P_{M,t}M_{X,t} \right]$$

where

$\Delta_{X,t}$ = exporter cost adjustment term based on level of export

First-order condition for the optimal level of output:

$$\frac{\Phi_{X,t}}{P_{X,t}} \approx 1 + \chi_X(\Delta_{X,t} - \beta\mathbb{E}_t[\Delta_{X,t}])$$

where

$$\Phi_{X,t} = \frac{\alpha W_t}{U_{X,t}} + (1-\alpha)P_{M,t}$$

Monetary and Macroprudential Policy

The monetary authority sets inflation target based on interest rate. The interest rate rule is as follows:

$$logR_t = \theta_1 logR_{t-1} + (1-\theta_1)\{logR + \theta_2\mathbb{E}\left[\log\left(\frac{P_{t+3}}{P_{t-1}} \right) - \gamma \right]\}$$

The prudential regulator formulates macroprudential policy to maintain capital adequacy ratio, ϕ constant. Time varying macroprudential policy is another way to implement it.

Exchange Rate

Both resident and nonresident have bank deposit. The local deposits are denominated in local currency and the foreign deposits are denominated either in local currency or foreign currency. The one–period ahead forward rate,

$$\hat{S}_{t-1,t} = \mathbb{E}[S_{t+1}]$$

Symmetric Equilibrium and Aggregation

The proposed market-clearing and symmetric-equilibrium conditions (Benes, Kumof & Laxton, 2014a) :

- market for physical capital clears, $k_t = K_{t-1}$

- market for domestic labor clears, $N_t = N_{Y,t} + N_{X,t}$

- market for local goods clears, $Y_t = Z_t$

- market for imports clears, $M_t = M_{Y,t} + M_{X,t}$

- market for bank loans clears, $L_t = \sum L_t^i$

- law of motion for the aggregate supply of physical capital is given by $K_t = (1 - \delta)K_{t-1} + I_t$

- aggregate quantities externalized in optimization equal the respective individual quantities: $\bar{R}_{E,t} = R_{E,t}, \bar{E}_t = E_t, \bar{C}_t = C_t, \bar{W}_t = W, \bar{N}_t = N_t, \bar{P}_{Z,t} = P_{Z,t}, and \bar{Z}_t = Z_t$

Budget Constraint, $\Lambda_t = P_{Y,t}Y_t\left(1 - \frac{1}{2}\chi_Y\Delta^t_{Y,t}\right) - P_{M,t}M_{Y,t} - W_tN_{Y,t} - S_tk_t +$

$P_{Z,t}Z_t\left(1 - \frac{1}{2}\chi_P\Delta^2_{P,t}\right) - P_{Y,t}Z_t + P_{X,t}X_t\left(1 - \frac{1}{2}\chi_X\Delta^2_{X,t}\right) - W_tN_{X,t} - P_{M,t}M_{X,t} + R_{E,t}E_t -$

$E_{t-1} + \frac{1}{2}W_tN_t\chi_W\Delta^2_{W,t} + \frac{1}{2}P_{I,t}I_t\chi_I\Delta^2_{I,t} + \frac{1}{2}P_{Y,t}Y_t\chi_Y\Delta^2_{Y,t} + \frac{1}{2}P_{Z,t}Z_t\chi_P\Delta^2_{P,t} +$

$\frac{1}{2}P_{X,t}X_t\chi_X\Delta^2_{X,t} + \frac{1}{2}E_t\chi_E\Delta^2_{E,t}$

The aggregate law of motion for the investment position of the country:

$$F_t - F_{t-1} = (R_{t-1} - 1)F_{t-1} - (P_{X,t}X_t - P_{M,t}M_t) + \lambda H_t R_{L,t}L_{t-1}$$

where $\lambda H_t R_{L,t}L_{t-1} = $ Total loss from default loans

Extensions and Modification

Benes et al. (2014a) extended the model to make it more realistic. The extended

model would help to simulate large scale distress.

Foreign Exchange Indexation

Benes et al. (2014a) relaxed the assumption of local denomination of bank loans

and allocated a fixed proportion, $\chi \in [0,1]$, of loans indexed to foreign currency. Benses

et al. introduced currency mismatches in non-financial sector, and hedged the banks. This

scheme required the repayment of each individual loan be inclusive of some proportion

of ex-post unexpected nominal exchange rate depreciation or appreciation. The ex-post

actual repayment schedule for loans made at time t-1 is

$$R_{L,t-1}L_{t-1}\left(1 - \xi_L + \xi_L\frac{T_t}{\mathbb{E}_{t-1}[T_t]}\right)$$

where $\xi_L = $ percentage of foreign exchange indexation of bank loans.

Benes et al. (2014a) assumed that the cut-off portfolio default ratio, $\hat{G}_t$, was independent of the exchange rate. The cut-off default ratio is as follows:

$$\hat{G}_t = \frac{1}{\lambda}[1 - \frac{R_t d_t (1 - \xi_F + \xi_F \frac{T_{t+1}}{\mathbb{E}_t[T_{t+1}]})}{(1-\phi)R_L L_t (1 - \xi_L + \xi_L \frac{T_{t+1}}{\mathbb{E}_t[T_{t+1}]})}]$$

The cut-off portfolio default ratio, $\hat{G}_t = \frac{1}{\lambda}[1 - \frac{R_t d_t}{(1-\phi)R_L L_t}$

The export value of bank capital, $E_t = [R_{L,t-1}L_{t-1}(1 - \lambda \hat{G}_t) -$

$$R_{t-1}D_{t-1}]\left(1 - \xi + \xi \frac{T_t}{\mathbb{E}_{t-1}[T_t]}\right) + R_{L,t-1}L_{t-1}\lambda(\hat{G}_{t-1} - G_t)(1 - \xi_L + \xi_L \frac{T_t}{\mathbb{E}_{t-1}[T_t]})$$

Foreign Ownership of Banks

Benes et al. (2014a) extended the model by allowing a fix proportion τ for local ownership of bank and $1 - \tau$ for foreign ownership of bank. The household budget constraint with mixed ownership is as follows:

$$\Lambda_t = P_{Y,t}Y_t \left(1 - \frac{1}{2} \chi_Y \Delta_{Y,t}^t\right) - P_{M,t}M_{Y,t} - W_t N_{Y,t} - S_t k_t$$

$$+ P_{Z,t}Z_t \left(1 - \frac{1}{2} \chi_P \Delta_{P,t}^2\right) - P_{Y,t}Z_t + P_{X,t}X_t \left(1 - \frac{1}{2}\chi_X \Delta_{X,t}^2\right)$$

$$- W_t N_{X,t} - P_{M,t}M_{X,t} + R_{E,t}E_t - E_{t-1} + \frac{1}{2}W_t N_t \chi_W \Delta_{W,t}^2$$

$$+ \frac{1}{2}P_{I,t}I_t \chi_I \Delta_{I,t}^2 + \frac{1}{2}P_{Y,t}Y_t \chi_Y \Delta_{Y,t}^2 + \frac{1}{2}P_{Z,t}Z_t \chi_P \Delta_{P,t}^2 + \frac{1}{2}P_{X,t}X_t \chi_X \Delta_{X,t}^2$$

$$+ \frac{1}{2}E_t \chi_E \Delta_{E,t}^2 + \frac{1}{2}\tau E_t \chi_E \Delta_{E,t}^2$$

The aggregate law of motion for the investment position under mixed ownership:

$$F_t - F_{t-1} = (R_{t-1} - 1)F_{t-1} - (P_{X,t}X_t - P_{M,t}M_t) + \lambda H_t R_{L,t}L_{t-1} + (1$$

$$- \tau)(R_{E,t}E_{t-1} - E_t)$$

For zero local ownership $\tau = 0,$ the above equation reduces to

$$L_t - d_t = R_{L,t-1}L_{t-1} - R_t D_{t-1} - (P_{X,t}X_t - P_{M,t}M_t)$$

Direct Exchange Rate Pass Through

The imports and imports prices affect the final demand indirectly through imported intermediate goods. The pass-through of the exchange rate and foreign price shocks is gradual, and distributed over time in many economics. Benes et al. (2014a) introduced direct import intensity parameter for direct exchange rate pass through. The final demand price index is as follows:

$$P_t = \pi P_{M,t} + (1 - \pi)P_{Z,t}$$

where $\pi =$ direct import intensity of final goods

$P_{Y,t} =$ Price of locally produced goods

$P_{M,t} =$ Price of imported goods

Consumption and Current Income

The representative household's optimization in the basic model assumed a permanent income hypothesis. Cambell and Mankiw (1990) found considerable departures from actual consumption. Benes et al. (2014a) introduced dependence of households on current income to suppress the permanent income effect. The budget constraint with the cost term is as follows:

$$d_t + P_{K,t}\sum K_t^i - \sum L_t^i - R_{t-1}d_{t-1} - R_{K,1}P_{K,t-1}\sum K_{t-1}^i + \sum R_{L,t-1}^i L_{t-1}^i$$

$$- W_t N_t \left(1 - \frac{1}{2}\chi_W \Delta_{W,t}^2\right) + P_t C_t (1 + \frac{1}{2}\chi_C \Delta_{C,t}^2$$

$$+ P_t I_t \left(1 + \frac{1}{2}\chi_I \Delta_{I,t}^2\right) - P_{K,t}I_t - \Lambda_t = 0$$

where $\Delta_{C,t} = logC_t - log\bar{O}_t - \alpha_C$

$$O_t = \frac{W_t N_t - (R_{L,t-1} - 1)L_{t-1}J_{L,t}}{P_t}$$

$$\alpha_C = logPC - log[WN - (R_L - 1)L]$$

The first-order optimization condition for consumption with the current income dependence is as follows:

$$\frac{1}{C_t - \varepsilon C_{t-1}} \approx \Gamma_t P_t (1 + \varphi_C \Psi_t + \chi_C \Delta_{C,t})$$

Asset Price Bubbles

Benes et al. (2014a) introduced asset price bubble using an exogenous process B_t and modified it ex-ante as follows:

$$\mathbb{E}_t[r_{t+1}] = B_t \mathbb{E}_t[logR_{K,t+1}]$$

where $logB_t = \varrho_B \log B_{t-1} + \vartheta_{B,t}$

The unanticipated shocks to the bubble process are through the parameter ϑ.

Benes et al. (2014a) enhanced the traditional DSGE model. Then, Benes et al. (2014b) presented a number of simulations to illustrate model's key mechanisms. Benes et al. simulated shocks to productivity growth, riskiness of bank borrowers, deviations of asset prices from their fundamental values, bank equity, and foreign interest rate. Benes et al. also simulated to changes in minimum capital adequacy ratios and changes in the countercyclicality of bank capital requirements. Benes et al. presented the effects of different shocks on the annual growth rate of gross domestic product, the rate of the bank nonperforming loans to total gross loans, the cash deficit/surplus calculated as percent of GDP, inflation, and money growth.

Gaps in Research

The IMF DSGE model is a prototype simulation model. The model's parameters were calibrated to match the basic facts of financial crisis (Benes et al., 2014b). Benes et al. did not apply their model to any country. There is a gap in the literature to apply the country level data in their model and verify its effectiveness in mitigating the impact of financial crisis. I proposed to verify the effectiveness of the model in mitigating the impact of financial crisis in Pakistan. The financial system of Pakistan consists of both conventional and Islamic financial sectors. I collected conventional sector parameters, Islamic sector parameters, and country level macroeconomic data, and conducted simulations using IMF DSGE model for both sectors separately. Then, I compared the results of the simulation.

Summary and Conclusions

I discussed financial crisis theories from the perspective of traditional and Islamic financial economists. The Keynesian business cycle theory, the Monetarist business cycle theory, the Austrian business cycle theory, and the real business cycle theory are important in traditional financial economics. The Islamic financial system is a zero-interest based risk sharing financial system. The Islamic financial economist claimed Islamic financial system would mitigate the impact of financial crisis. I discuss study population, sample procedures, and data analysis plan in details in Chapter 3.

Chapter 3: Research Method

I examined the impact of Islamic financial principles on mitigating the severity of the pandemic-caused financial crisis in Pakistan. Islamic financial principles have unique guidelines. According to Islamic financial principles, interest rate is zero. Here both the borrower and the lender share profit or loss based on an agreed upon percentage. The risk-bearing principle is unique in this system. In a conventional system, the borrowers carry all the risks. In the Islamic financial system, both the borrower and lender share the risk. Researchers claimed that the Islamic financial system could mitigate the impact the severity of financial crisis (Alrifai, 2015). Researchers assessed the mitigating effect of the Islamic financing model during and after the COVID-19 pandemic. They concluded that the Islamic financing model could contribute to the world economy in the economic recovery during and after the COVID-19 pandemic process (Arzova & Shahin, 2021). I verified their claim using a state-of-the-art IMF-DSGE model. I inserted conventional financial sector parameters, Islamic financial sector parameters and country-level macroeconomic data of Pakistan in this model and verified their claim. Pakistan has a hybrid financial system, which consists of both conventional and Islamic financial sectors.

I collected conventional financial sector parameters, Islamic financial sector parameters, and country-level macroeconomic data from the websites of the Central Bank of Pakistan, the International Monetary Fund, and the World Bank. In Chapter 3, I describe the data collection plan. I also discuss the target population and present my data

analysis plan. Then I discuss the threats to validity in my study. Finally, I discuss external validity, internal validity, construct validity, and ethical procedures.

Research Design and Rationale

I conducted a cross-sectional quantitative study to examine the impact of the Islamic financial principles on mitigating the severity of the pandemic-induced financial crisis in Pakistan. The Islamic financial system is based on several principles. It does not allow any interest. It allows profit and loss sharing at a predetermined rate. It does not allow risk shifting from the lender to the borrower. It allows risk sharing by the lenders and borrowers. It also does not allow gharar (Daly & Frikha, 2016). Gharar is defined as doubtfulness or uncertainty in business transactions. Gharar indicates the riskiness of a transaction.

The important parameters that indicate financial crisis are aggregate demand, price variable, bank specific financial variable, and non-bank-specific financial variable. I selected these four variables as dependent variables in my study. The independent variables were consumption, government spending, investment, trade balance, wage, CPI, policy interest rate, real exchange rate, real value of capital stock, real bank credit, lending spread, portfolio default ratio, post default capital adequacy ratio, net foreign asset to GDP, physical capital stock, and real asset price.

I used a cross-sectional design in my research. This design measures the characteristics of parameters at one point in time (Salkind, 2010). I used randomize conventional financial sector parameters, Islamic financial sector parameters, and country-level macroeconomic economic data of Pakistan from 2020. I examined the

effect of the independent variables on dependent variables at one point in time. This cross-sectional design was suitable for my study. A longitudinal design was not appropriate for my study. It requires comparing parameters across time.

I used an enhanced IMF-DSGE model for my study. Benes et al. (2014a) enhanced the DSGE model by incorporating nonlinearities. The IMF-DSGE model incorporated the nonlinearities generated by the vicious interactions between asset prices, bank lending conditions, and the real economy during a financial crisis. Bank balance sheets played a critical role in these interactions, and banks changed the economic propagation mechanism.

Methodology

Population and Sampling Procedures

The population of this study was aggregate demand, price variable, bank specific financial variable, and nonbank financial variable of the economy of Pakistan. The economy of Pakistan consists of the Islamic financial sectors and the conventional financial sectors. Initially, the Islamic economic sector was a small percentage of Pakistani economy. The share of Islamic economic sector has been increasing over time. Now, the Islamic economic sector is a large percentage of the overall Pakistani economy. I collected conventional financial sector parameters, Islamic financial sector parameters, and country level macroeconomic data of Pakistan from 2020.

Data Collection

I collected data directly from the websites of the Central Bank of Pakistan (State Bank of Pakistan), the International Monetary Fund, and the World Bank. The Central

Bank of Pakistan provided the macroeconomic and financial data of Pakistan through its

website. The International Monetary Fund and the World Bank provided country-level

macroeconomic data of Pakistan through their websites. The websites contained data of

aggregate demands, price variable, nonbank financial variable, and bank-specific

financial variables. I collected the required data from 2020.

I also collected baseline parameter values from the websites and papers produced

by the researchers of International Monetary Fund. I needed three sets of baseline

parameter values for my research. These were parameters affecting steady state, policy

parameters, and other parameters. Parameters affecting steady state were as follows:

- discount parameter (β)

- reduced discount parameter ($\acute{\beta}$)

- loss given default (λ)

- total credit risk (ω)

- prediction of total credit risk ($\bar{\omega}$)

- cross-correlation of exposures (σ)

- financing of consumption (φ_C)

- financing of investment (φ_I)

- financing of physical capital (φ_K)

- domestic labor in exports (κ)

- inverse elasticity of labor supply (η)

- depreciation of physical capital (δ)

- labor share of domestic production (ζ_N)

- import share of domestic production (ζ_M)

- monopoly power (μ)

- location parameter for stochastic default threshold (ρ)

- direct import in final demand (π)

- local ownership of banks (τ)

I used a few policy parameters for my simulation. I obtained the values of policy parameters from the websites of the Central bank of Pakistan, International Monetary Fund, and World Bank. The policy parameters were as follows:

- minimum capital adequacy ratio (ϕ)

- regulatory penalty (ν)

- inflation target (γ)

- monetary policy smoothing (θ_1)

- monetary policy reaction to inflation (θ_2)

I also required few adjustment parameters for my research. I collected these parameters from the same websites and research papers. The additional parameters were as follows:

- nonprice lending conditions response (o)

- bank capital adjustment cost (χ_E)

- consumption habit (ε)

- current income dependence (χ_C)

- wage adjustment cost (χ_W)

- price adjustment cost (χ_P)

- input factor adjustment cost (χ_Y)

- export adjustment cost (χ_X)

- investment adjustment cost (χ_I)

- financial dollarization (ι)

I also got steady-state characteristics parameters of banking and real economy. The banking parameters were capital adequacy ratio, capital buffers, capital-to-assets ratio, lending spread, individual risk component of lending spread, regulatory component of lending spread, and bank-deposits-to-GDP-ratio. The real economy parameters were total-consumption-to-GDP-ratio, business-investment-to-GDP ratio, export-to-GDP ratio, share of value added in exports, net-exports-to-GDP ratio, and foreign-debt-to-GDP ratio. The appendix shows the steady-state characteristics parameters of the conventional banking system, Islamic banking system, and real economy of Pakistan.

Study Variables

Before presenting my hypotheses, I defined the study variables that would be used in my research. I used four classes of variables: aggregate demand, price variable, nonbanking financial variable, and bank-specific financial variables. Each class of variables depends on several subvariables. The National Bureau of Economic Research (NBER, 2010) uses these variables to indicate business cycle. According to NBER, a recession is a significant decline in economic activity spread across the economy lasting more than few months. A recession begins after the economy reaches at the peak of economic activity and ends as the economy reaches the trough. NBER uses the data generated by the Bureau of Economic Analysis of the U.S. Department of Commerce to

identify the peak and trough of economic activity. In the following sections, I describe these variables in detail.

Aggregate Demand

Aggregate demand is the overall demand of all goods and services in a country. Aggregate demand is described using three subvariables: consumption, government spending, investment, and trade balance. The operational definitions of the variables are as follows:

Consumption is the use of goods and services by households. It is the final purpose of economic activity. The level of consumption is a measure of an economy's productive success. Macroeconomists are interested in aggregate consumption. The aggregate consumption and saving influence an economy's long-term productive capacity. On the other hand, the aggregate consumption expenditure helps to understand macroeconomic fluctuations and the business cycle (Iyigun & Owen, 2004)

Government spending represents government consumption. Government spending is measured by subtracting household consumption and investment from the gross domestic product.

Investment is the purchase of goods for future wealth creation. The companies acquire production equipment to increase the total outputs of goods. The increased output causes the country's gross production to rise. Sound investment causes economic growth.

Trade balance is the difference between a country's exports and imports. The positive difference is known as surplus and the negative difference is known as deficit.

Price Variable

This variable consists of four subvariables: wage, CPI, policy interest rate, and real exchange rate:

Wage is the remuneration paid to an employee by an employer for the employee's contribution. Wage depends on law, productivity, and unionization.

CPI is the average change in price over time for a basket of consumer goods and services. CPI is an indicator of inflation. CPI is also an indicator of the effectiveness of government economic policy.

Policy interest rate is set by the monetary authority to influence the main monetary variables in the economy. The authority may increase this rate to curb inflation, currency depreciation, excessive credit growth, or capital outflows. The authority may decrease it to increase economic activity.

Real exchange rate is the ratio of the foreign price level and the domestic price level. The foreign price level is converted into a domestic price level using a nominal exchange rate.

Bank-Specific Financial Variable

These special financial variables are related to the bank. These bank-specific financial variables are real value of capital stock, real bank credit, lending spread, portfolio default ratio, and post default capital adequacy ratio.

Real value of bank capital stock is the real value of bank equity.

Real bank credit is the total borrowing capability bank provide to borrowers.

Lending spread is the difference between the borrowing and lending rates of a bank. Lending spread is like the gross margin of nonfinancial institutions.

Portfolio default ratio (G*) is the proportion of defaults in an entire bank loan portfolio. Default happens due to an underestimate or underpricing of credit risk.

Post-default capital adequacy ratio is the ratio of capital to risk-weighted assets. It indicates the bank's risk of insolvency from excessive losses. It promotes stability and efficiency of financial systems.

Nonbank Financial Variable

This variable is defined using three subvariables: net foreign asset to GDP, physical capital stock, and real asset price.

Net foreign asset to GDP is expressed in the percentage of net foreign asset with respect to GDP.

Physical capital stock consists of machinery, buildings, computers, and similar objects. It is one of the three primary factors of production.

Real asset price indicates the price of physical or tangible assets.

Study Hypotheses

The main purpose of this study was to examine the effectiveness of the Islamic financial principles in mitigating the impact of pandemic-induced financial crisis in Pakistan in 2020. The financial system of Pakistan is a hybrid system that consists of both a conventional financial sector and an Islamic financial sector. I collected conventional financial sector parameters, Islamic financial sector parameters, and the macroeconomic data of Pakistan from 2020. Then I inserted them into the IMF-DSGE model separately. I

used the IMF-DSGE model to produce two sets of outputs for aggregate demand, price

variable, bank specific financial variable, and nonbank financial variable of both sectors.

Then I tested the following hypotheses to achieve the purpose of the study:

Hypothesis 1

I developed the first hypothesis to test the effect of Islamic financial system on

aggregate demand of Pakistani economy during the COVID-19 pandemic period 2020.

The aggregate demand of Pakistani economy depends on consumption, government

spending, investment, and trade balance.

H_o1 : The Islamic financial system did not have an effect on consumption,

government spending, investment, and trade balance of Pakistani economy during the

COVID-19 pandemic period 2020.

H_a1 : The Islamic financial system had an effect on consumption, government

spending, investment, and trade balance of Pakistani economy during the COVID-19

pandemic period 2020.

Hypothesis 2

I developed the second hypothesis to test the effect of Islamic financial system on

price variable of Pakistani economy. The price variable of Pakistani economy depends on

wage, consumer price index (CPI), policy interest rate, and real exchange rate.

H_o2 : The Islamic financial system did not have an effect on wage, consumer

price index, policy interest rate, and real exchange rate of Pakistani economy during the

COVID pandemic period 2020.

H_a2 : The Islamic financial system had an effect on wage, consumer price index, policy interest rate, and real exchange rate of Pakistani economy during the COVID pandemic period 2020.

Hypothesis 3

I developed the third hypothesis to test the effect of Islamic financial system on the bank specific financial variable of Pakistani economy. The bank specific financial variable of Pakistani economy depends on real value of capital stock, real bank credit, lending spread, portfolio default ratio, and post default capital adequacy ratio.

H_o3 : The Islamic financial system did not have an effect on the real value of capital stock, real bank credit, lending spread, portfolio default ratio, and post default capital adequacy ratio of Pakistani economy during the COVID pandemic period 2020.

H_a3 : The Islamic financial system had an effect on the real value of capital stock, real bank credit, lending spread, portfolio default ratio, and post default capital adequacy ratio of Pakistani economy during the COVID pandemic period 2020.

Hypothesis 4

I developed the fourth hypothesis to test the effect of Islamic financial system on the non-bank specific financial variable of Pakistani economy. The non-bank specific financial variable of Pakistani economy depends on net foreign asset to GDP ratio, physical capital stock, and real asset price.

H_o4 : The Islamic financial system did not have an effect on the net foreign asset to GDP ratio, physical capital stock, and real asset price of Pakistani economy during the COVID-19 pandemic period 2020.

H_a4 : The Islamic financial system had an effect on the net foreign asset to GDP ratio, physical capital stock, and real asset price of Pakistani economy during the COVID-19 pandemic period 2020.

Hypothesis 5

The fifth hypothesis tested the ability of the linearized and non-linearized IMF DSGE model to capture the financial crisis dynamics of the economy of Pakistan during the COVID-19 pandemic period 2020 for the conventional banking sector.

H_o5 : The nonlinearized IMF-DSGE model was not better than the linearized IMF-DSGE model in capturing the financial crisis dynamics of the Pakistani economy during the COVID-19 pandemic period in 2020 for the conventional banking sector.

H_a5 : The nonlinearized IMF-DSGE model was better than the linearized IMF-DSGE model in capturing the financial crisis dynamics of the Pakistani economy during the COVID-19 pandemic period in 2020 for the conventional banking sector.

Hypothesis 6

The sixth hypothesis tested the ability of the linearized and non-linearized IMF DSGE model to capture the financial crisis dynamics of the economy of Pakistan during the COVID pandemic period 2020 for the Islamic banking sector.

H_o5 : The nonlinearized IMF-DSGE model was not better than the linearized IMF-DSGE model in capturing the financial crisis dynamics of the Pakistani economy during the COVID-19 pandemic period in 2020 for the Islamic banking sector.

H_a5 : The nonlinearized IMF-DSGE model was better than the linearized IMF-DSGE model in capturing the financial crisis dynamics of the Pakistani economy during the COVID-19 pandemic period in 2020 for the Islamic banking sector.

Data Analysis Plan

I used the software Matlab developed by Mathworks Inc. to simulate IMF-DSGE model (Benes et al., 2014a). I also used IRIS Toolbox (IRIS, 2018). IRIS is an open-source toolbox for macroeconomic modeling and forecasting tool used in Matlab. IRIS integrates core modeling functions with supporting infrastructure and includes a variety of tools for simulation, estimation, forecasting, and model diagnostics. The supporting infrastructure has the capability for data management, time series analysis, and reporting.

I used Matlab and IRIS to simulate IMF-DSGE model using country level macroeconomic data of Pakistan for the conventional banking sector and Islamic banking sector separately. I plotted the results of the simulation and compared the results of simulation of the conventional banking sector and Islamic banking sector, and verified the impact of the Islamic financial principles on the dependent variables on mitigating the severity of pandemic-triggered financial crisis in 2020.

Threats to Validity

Validity referred to the fact that the content had not been lost in the translation from premise to conclusion (Fuller, 2010). Cook and Campbell (1979) explained the various means by which extraneous factors could present alternative explanations of research outcomes. These alternative explanations might conceal the presumed true effect that the independent variables have on the dependent variables. The scientifically credible

research design must rules out these alternative explanations. The research design must eliminates the threats to the ability of researchers for making inferences (Greenstein, & Davis, 2012). The important form validities are external validity, internal validity, construct validity.

External Validity

External validity refers to the degree that relations among variables observed in one sample of observations in one population would hold for other samples of observations within the same population or in other populations (Frey, 2018). External validity deals with the generalizability of results (Yilmaz, 2013). The questions of external validity arise whenever empirical research makes use of a sample to examine how two or more variables are related within a larger population (Pearl, & Bareinboim, 2014). The same issue arises when a researcher seeks to extend results drawn from one population to a new population.

I used the financial sectors data and macroeconomic data of Pakistan in my study. The results of the study might be generalizable to other countries with similar macroeconomic conditions. The result would be applicable to the countries with hybrid financial systems. It would also be applicable to the countries that were introducing Islamic financial system. However, the result of the study would not be applicable to the countries with different macroeconomic systems. It might not be applicable to the countries with only conventional financial system.

Internal Validity

Internal validity refers to the accuracy of statements made about the causal relationship between the manipulated variable and the measured variable (Salkind, 2010). Internal validity indicates the ability of a research design to provide evidence of a cause-effect relationship between an independent variable and a dependent variable (Allen, 2017). Internal validity does not refer specifically to testing and measurement but rather to a study taken as a whole (Frey, 2018). One of the threats to internal validity of this study was regression to mean selection. This threat happens when extreme result of one quarter might affect the overall result. I addressed this threat by excluding the extreme outliers before analyzing it. Another threat was instrumentation. Instrumentation causes differences if one instrument is used to assess in a pretest and different instrument is used in a posttest (Allen, 2017). I addressed instrumentation by using the same instrument for pretest and posttest for the study. Other threats to internal validity are history, maturation, mortality, compensation, compensatory rivalry, and demoralization. These threats are not relevant to my study as there was no experiment using human participants.

Construct Validity

Construct validity is a logical inference from which some test generates results that sufficiently corroborate theoretical conceptualization (Allen, 2017). Construct validity is related to collection and application of the validity evidence intended to support the interpretation and use of test scores as measures of particular construct (Salkind, 2010). I used IMF-DSGE model that examined the vulnerabilities associated with excessive credit expansions and supported macroprudential policy analysis. In the

IMF-DSGE model, bank loans create purchasing power that facilitates adjustments in the real economy. However, excessively large, and risky loans damage balance sheets and create the conditions for a financial crisis. Benes et al. (2014b) verified the model captures the basic facts of both pre-crisis and post-crisis phases of financial cycles. Based on these results, there would be no threat to the construct validity in my study.

Ethical Procedures

I collected data from the sources including Central Bank of Pakistan, International Monetary Fund, and the World Bank. As there was no human participant involve in my research, I did not need to follow ethical procedures for participant recruitment and data collection. The financial sectors parameters and country level macroeconomic data are available for public. So, confidentiality and protection of data is not applicable for my study. As I did not work for any of the above organizations, conflict of interest was absent. None of the above organization sponsored this study. I got approval from institutional review board (IRB). The IRB approval number is 01-25-19-0403066. I started data collection after getting approval.

Summary

I conducted cross-sectional quantitative research for my study. I explained the design and the rationale behind selecting the research method and design. I also explained why other research methods and designs were not suitable for my study. I discussed about the population of the study in methodology section. The population was the country level macroeconomic data of Pakistan.

The dependent variables of this study were aggregate demand variables, price variables, bank specific financial variables, and non-bank specific financial variables. The independent variables were consumption, government spending, investment, trade balance, wage, CPI, policy interest rate, real exchange rate, real value of capital stock, real bank credit, lending spread, portfolio default ratio, post default capital adequacy ratio, net foreign asset to GDP, physical capital stock, and real asset price. I used Internal Monetary Fund enhanced Dynamic Stochastic General Equilibrium (IMF-DSGE) model for my study.

I discussed data analysis plan of my study. I used the software Matlab to simulate the IMF-DSGE model. The simulation also used open-source IRIS Toolbox for macroeconomic modeling and forecasting in Matlab. After that, I discussed about external validity, internal validity, construct validity, and ethical procedures.

I collected conventional financial sector parameters, Islamic financial sector parameters, and country level macroeconomic data of Pakistan from the websites of the Central Bank of Pakistan, the International Monetary Fund, and the World bank. I inserted the data into the IMF-DSGE model and analyzed it. I report the results in Chapter 4 and discuss conclusions and recommendations in Chapter 5.

Chapter 4: Results

The purpose of this cross-sectional quantitative study was to examine the impact of the Islamic financial principles on mitigating the effect of the pandemic-induced financial crisis on the economy of Pakistan in 2020. The important Islamic financial principles are zero interest, shared risk, profit loss sharing policies, and no uncertainty in transaction. The independent variables of this study were banking sector parameters and country-level macroeconomic parameters of Pakistan. The dependent variables were aggregate demand, price variable, bank-specific financial variable, and nonbank financial variable. The independent variables related to aggregate demand were consumption, government spending, investment, and trade balance. The independent variables related to price variable were wage, CPI, policy interest rate, and real exchange rate. The independent variables related to bank-specific financial variable were real value of capital stock, real bank credit, lending spread, portfolio default ratio, and post default capital adequacy ratio. The independent variables related to non-bank-specific financial variable were net foreign asset to GDP, physical capital stock, and real asset price. These variables were the best indicators for assessing an economy of a country. Pakistan's financial system consists of both a conventional banking sector and an Islamic banking sector. I collected the country-level macroeconomic data of Pakistan. I also collected the data of the conventional financial sector and the Islamic banking sector of Pakistan. I inserted the collected data into the IMF-DSGE model separately. The collected data met the assumptions based on which IMF-DSGE model was developed. Then I examined the impact of the Islamic financial principles on mitigating the effect of the pandemic-

induced financial crisis on the economy of Pakistan by comparing the output of the simulated models. I used the results of simulation to test the hypotheses and answer the research question.

<div align="center">**Data Collection**</div>

I collected data directly from the websites of the Central Bank of Pakistan, the International Monetary Fund, and the World Bank. The Central Bank of Pakistan provides the macroeconomic and financial data of Pakistan through its website. The websites of the International Monetary Fund and the World Bank also provided country-level macroeconomic data. The websites contain data of aggregate demands, price variable, nonbank financial variable, and bank-specific financial variables. I also collected data from the research papers. I collected all the required data of 2020 during the global pandemic due to COVID-19. The banking parameters were capital adequacy ratio, capital buffers, capital-to-assets ratio, lending spread, individual risk component of lending spread, regulatory component of lending spread, and bank-deposits-to-GDP-ratio. The real economy parameters were total-consumption-to-GDP-ratio, business-investment-to-GDP ratio, export-to-GDP ratio, share of value added in exports, net-exports-to-GDP ratio, and foreign-debt-to-GDP ratio.

<div align="center">**Study Results**</div>

Contractionary Shock to Bank Capital

Figure 1 shows the effects of an exogenous 10% loss of regulatory bank equity in a single period for the conventional banking sector. Two simulation scenarios differed in how difficult it was for banks to recapitalize themselves following this shock. In case of

the black solid line, banks recapitalized only from retained earnings. Here banks charged

higher loan interest rates. In case of the red dashed line, they also recapitalized by

accessing equity markets. The access to equity markets is subject to costs and delays.

Figure 1

Conventional Banking Sector

Figure 2 shows the effects of an exogenous 10% loss of regulatory bank equity in

a single period for the Islamic banking sector. Two simulations scenarios differed in how

difficult it was for banks to recapitalize themselves following this shock. In case of the

black solid line, banks recapitalized only from retained earnings. In case of the red

dashed line, they also recapitalized by accessing equity markets. The access to equity

markets is subject to costs and delays.
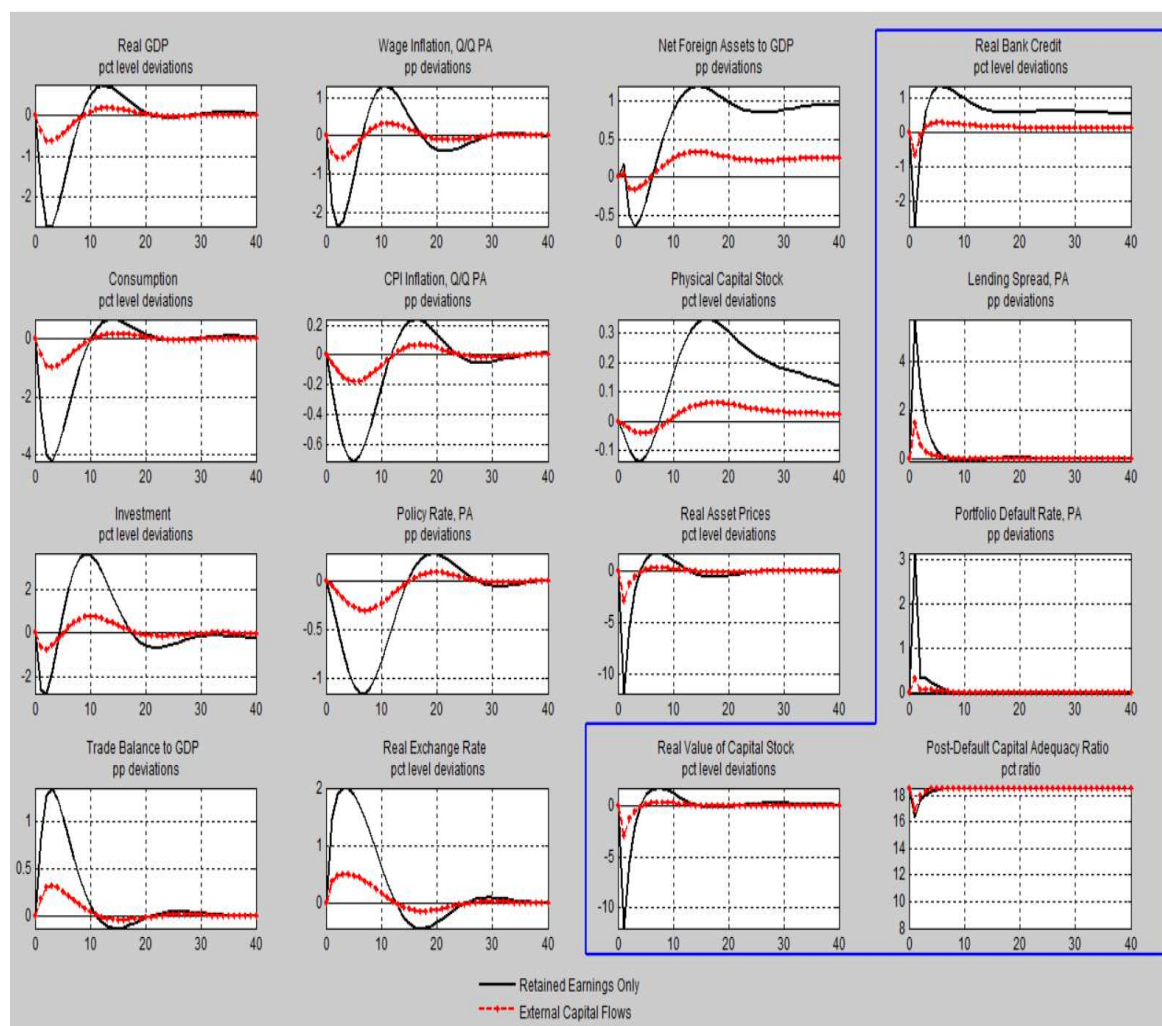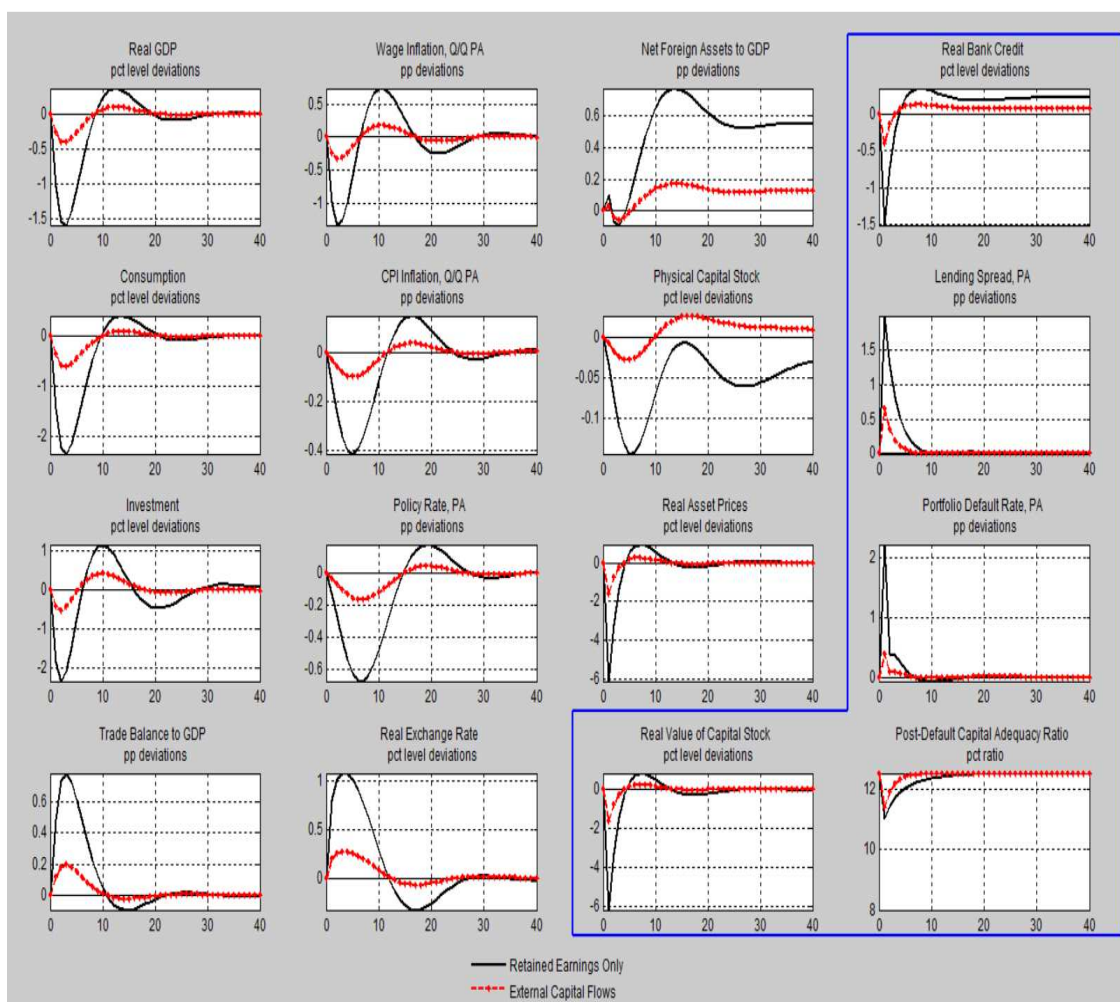
Figure 2

Islamic Banking Sector

Nonlinear Versus Linear Simulations

Figure 3 shows the simulation results for the same source of shocks for a

linearized and a nonlinearized IMF-DSGE model using the parameters of the

conventional banking sector. The solid black line shows the simulation results of the linearized model, which fail to capture the crisis dynamics adequately. The dashed red line shows the simulation results of the nonlinearized model, which captures the crisis dynamically.

Figure 3

Conventional Banking Sector
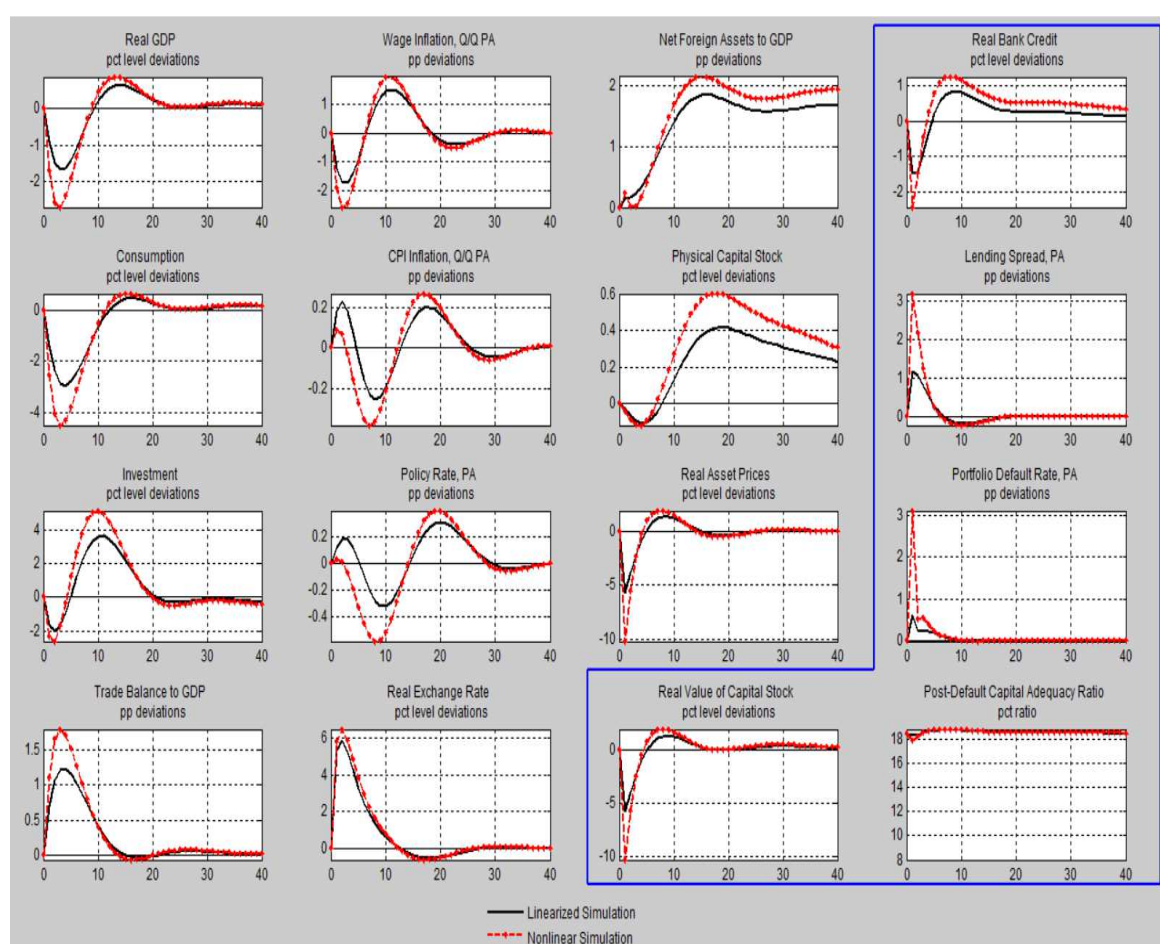
Figure 4 shows the simulation results for the same source of shocks for a linearized and a nonlinearized model of the Islamic banking sector. The solid black line shows the simulation results of the linearized model, which fail to capture the crisis

dynamics adequately. The dashed red line shows the simulation results of the

nonlinearized model, which captures the crisis dynamically.

Figure 4

Islamic Banking Sector
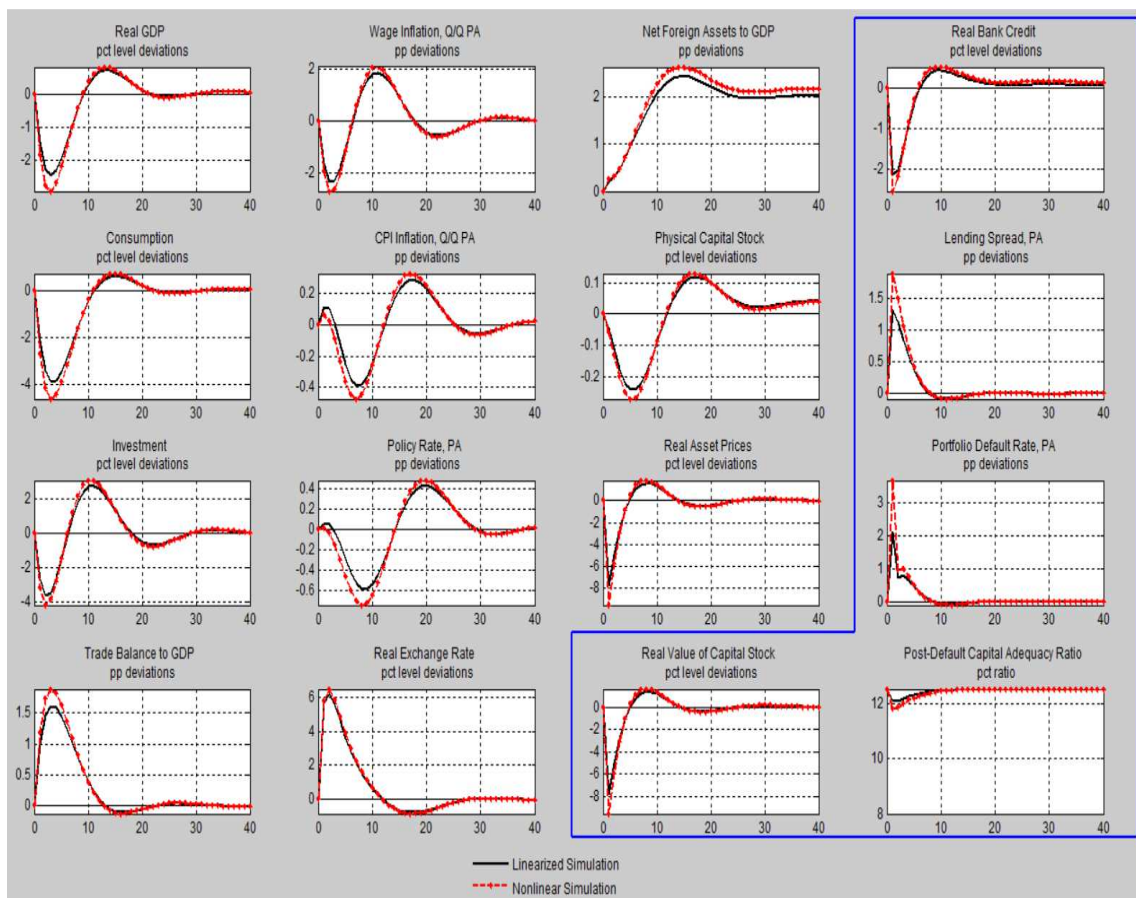
Research Question

To what extent did an Islamic financial system mitigate the effect of the

pandemic-induced financial crisis on the economy of Pakistan during the period 2020?

Hypotheses

The banking sectors of Pakistan consists of both traditional and Islamic financial

sectors. I collected country-level macroeconomic data of Pakistan for the year 2020 and

data related to both the conventional financial sector and the Islamic banking sector. Then I inserted the data into the enhanced DSGE model developed by Benes et al. (2014a) and tested the following hypotheses:

Hypothesis 1

The first hypothesis tested the effect of the Islamic financial system on the aggregate demand of the economy of Pakistan during the pandemic period 2020. The aggregate demand of the Pakistani economy depends on consumption, government spending, investment, and trade balance.

H_o1 : The Islamic financial system did not have an effect on consumption, government spending, investment, and trade balance of the Pakistani economy during the COVID-19 pandemic period 2020.

H_a1 : The Islamic financial system had an effect on consumption, government spending, investment, and trade balance of the Pakistani economy during the COVID-19 pandemic period 2020.

Result: The Islamic financial system had positive effect on the aggregate demand of the Pakistani economy during the COVID-19 pandemic period 2020.

Hypothesis 2

The second hypothesis tested the effect of the Islamic financial system on the price variable of the Pakistani economy during the COVID-19 pandemic period 2020. The price variable of the Pakistani economy depends on wage, CPI, policy interest rate, and real exchange rate.

H_o2 : The Islamic financial system did not have an effect on wage, consumer price index, policy interest rate, and real exchange rate of the Pakistani economy during the COVID-19 pandemic period 2020.

H_a2 : The Islamic financial system had an effect on wage, consumer price index, policy interest rate, and real exchange rate of the Pakistani economy during the COVID-19 pandemic period 2020.

Result: The Islamic financial system had a positive effect on the price variables of the Pakistani economy during the COVID-19 pandemic period 2020.

Hypothesis 3

The third hypothesis tested the effect of the Islamic financial system on the bank-specific financial variables of the Pakistani economy during the COVID-19 pandemic period 2020. The bank-specific financial variables of the Pakistani economy depend on real value of capital stock, real bank credit, lending spread, portfolio default ratio, and post default capital adequacy ratio.

H_o3 : The Islamic financial system did not have an effect on the real value of capital stock, real bank credit, lending spread, portfolio default ratio, and post default capital adequacy ratio of the Pakistani economy during the COVID-19 pandemic period 2020.

H_a3 : The Islamic financial system had an effect on real value of capital stock, real bank credit, lending spread, portfolio default ratio, and post default capital adequacy ratio of the Pakistani economy during the COVID-19 pandemic period 2020.

Result: The Islamic financial system had a positive effect on the bank-specific financial variables of the Pakistani economy during the COVID-19 pandemic period 2020.

Hypothesis 4

The fourth hypothesis tested the effect of the Islamic financial system on the non-bank-specific financial variable of the Pakistani economy during the COVID-19 pandemic period 2020. The non-bank-specific financial variable of the Pakistani economy depends on net foreign asset to GDP ratio, physical capital stock, and real asset price.

H_o4 : The Islamic financial system did not have an effect on the net foreign asset to GDP ratio, physical capital stock, and real asset price of the Pakistani economy during the COVID-19 pandemic period 2020.

H_a4 : The Islamic financial system had an effect on the net foreign asset to GDP ratio, physical capital stock, and real asset price of the Pakistani economy during the COVID-19 pandemic period 2020.

Result: The Islamic financial system had a positive effect on the non-bank-specific financial variables of the Pakistani economy during the COVID-19 pandemic period 2020.

Hypothesis 5

The fifth hypothesis tested the ability of the linearized and non-linearized IMF DSGE model to capture the financial crisis dynamics of the economy of Pakistan during the COVID-19 pandemic period 2020 for the conventional banking sector.

H_o5 : The nonlinearized IMF-DSGE model was not better than the linearized IMF-DSGE model in capturing the financial crisis dynamics of the Pakistani economy during the COVID-19 pandemic period in 2020 for the conventional banking sector.

H_a5 : The nonlinearized IMF-DSGE model was better than the linearized IMF-DSGE model in capturing the financial crisis dynamics of the Pakistani economy during the COVID-19 pandemic period in 2020 for the conventional banking sector.

Result: The non-linearized IMF DSGE model is better than the linearized IMF-DSGE model to capture the financial crisis dynamics of Pakistani economy during the COVID-19 pandemic period 2020 for the conventional banking sector.

Hypothesis 6

The sixth hypothesis tested the ability of the linearized and non-linearized IMF DSGE model to capture the financial crisis dynamics of the economy of Pakistan during the COVID-19 pandemic period 2020 for the Islamic banking sector.

H_o5 : The nonlinearized IMF-DSGE model was not better than the linearized IMF-DSGE model in capturing the financial crisis dynamics of the Pakistani economy during the COVID-19 pandemic period in 2020 for the Islamic banking sector.

H_a5 : The nonlinearized IMF-DSGE model was better than the linearized IMF-DSGE model in capturing the financial crisis dynamics of the Pakistani economy during the COVID-19 pandemic period in 2020 for the Islamic banking sector.

Result: A non-linearized IMF DSGE model was better than the linearized IMF-DSGE model to capture the financial crisis dynamics of Pakistani economy during the COVID-19 pandemic period 2020 for the Islamic banking sector.

Summary

The Islamic financial system had positive effects on the aggregate demand, the price variables, the bank specific financial variables, and the non-bank specific financial variables of the economy of Pakistan during the COVID-19 pandemic period 2020. The Islamic financial system was better to manage consumption, investment, and trade balance. Moreover, the Islamic financial system was better to control wage, consumer price index (CPI), policy interest rate, and real exchange rate. Furthermore, the Islamic financial system was better to regulate real value of capital stock, real bank credit, lending spread, portfolio default ratio, and post default capital adequacy ratio. Additionally, the Islamic financial system was also better to regulate net foreign asset to GDP ratio, physical capital stock, and real asset price. These variables indicate the health of the economy of Pakistan. So, the Islamic financial system was effective to mitigate the effect of COVID-19 pandemic generated financial crisis on the economy of Pakistan during the period 2020. Furthermore, the non-linearized IMF DSGE model was better than the linearized IMF DSGE model in capturing the financial crisis dynamics of Pakistani economy during the COVID-19 pandemic period 2020 for both the conventional financial sector and the Islamic banking sector.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this quantitative cross-sectional study was to examine the impact of the Islamic financial principles on mitigating the effect of the pandemic-triggered financial crisis on the economy of Pakistan. The independent variables of this study were conventional financial sector parameters, the Islamic financial sector parameters, and country-level macroeconomic data of Pakistan. The dependent variables were aggregate demand, price variable, bank-specific financial variable, and non-bank-financial variable. These variables were the best indicators for assessing the impact of the Islamic financial principles in mitigating the effect of the pandemic-induced financial crisis on the economy of Pakistan in 2020. I inserted the banking parameters of the conventional financial sector and the Islamic financial sector and country-level macroeconomic parameters of Pakistan into the IMF-DSGE model. Then I verified the impact of the Islamic financial principles on mitigating the effect of the COVID-19 pandemic on the economy of Pakistan in 2020. The quantitative research method was appropriate for collecting numerical data and simulation. A cross-sectional study was also suitable to collect data for one period for this study.

The results of the simulations showed that the Islamic financial sector was better able to manage the aggregate demand, price variables, bank-specific financial variables, and non-bank-specific financial variables of the economy of Pakistan during the COVID-19 pandemic period 2020. Overall, the Islamic financial system was effective in mitigating the effect of the pandemic-triggered financial crisis on the economy of Pakistan in 2020.

Interpretation of Findings

The effects of contractionary shock on the variables related to bank capital were shown in Figure 1 and Figure 2 (see Chapter 4) for the conventional financial sector and the Islamic financial sector of the economy of Pakistan in 2020. The contractionary shock was equivalent to an exogeneous 10% loss of regulatory bank capital with two scenarios of external capital flows and retained earnings only. In the conventional banking sector, the real value of capital shock was -12.0% with only retained earnings and -3.0% with external capital flows. For the Islamic banking sector, the real value of capital shock was -6.0% with only retained earnings and -1.8% with external capital flows. The Islamic banking sector was better able to cope with capital shock for both cases of only retained earnings and external capital flows. For the conventional banking sector, the real bank credit was decreased by 2.8% with only retained earnings and -0.8% with external capital flows. For the Islamic banking sector, the real bank credit was decreased by -1.5% with only retained earnings and -0.4% with external capital flows. The Islamic banking sector was better able to provide real bank credit to customers for both cases with only retained earnings and with external capital flows. For the conventional banking sector, the lending spread was increased by 5% with only retained earnings and 1.8% with external capital flows. For the Islamic banking sector, the lending spread was increased by 2% with only retained earnings and 0.7% with external capital flows. The Islamic banking sector was better able to manage lending spread for both cases with only retained earnings and with external capital flows. This sector coped with the pandemic-induced financial crisis without raising the lending spread comparable to the conventional banking sector. The

portfolio default rate of the conventional financial sector increased by 3% with only retained earnings and 0.4% with external capital flows. The portfolio default rate of the Islamic banking sector increased by 2.2% with only retained earnings and 0.4% with external capital flows. The Islamic banking sector was marginally better to manage the portfolio default rate with only retained earnings and equivalent with external capital flows. The post default capital adequacy ratio of the conventional financial sector was decreased by 2.2% with only retained earnings and 2.1% with external capital flows. The post default capital adequacy ratio of the Islamic banking sector declined by 1.4% with only retained earnings and 1.2% with external capital flows. The Islamic banking sector was better able to manage the post default capital adequacy ratio for both cases with only retained earnings and with external capital flows. The Islamic banking was better able to stay away from the minimum capital adequacy regulatory threshold. Therefore, the Islamic financial system had a positive effect on the bank-specific financial variables of the economy of Pakistan in 2020.

Additionally, the effects of contractionary shock to nonbank variable are shown in Figure 1. In the conventional banking sector, the net foreign asset to GDP was reduced by 0.6% before being increased to 1.2% for only retained earnings, and the net foreign asset to GDP was reduced by 0.2% before increasing to 0.4% for external capital flows. For the Islamic banking sector, the net foreign asset to GDP was reduced by 0.1% before increasing to 0.7% for only retained earnings, and the net foreign asset to GDP was reduced by 0.1% before increasing to 0.2% for external capital flows. The Islamic banking sector was better able to manage the net foreign asset to GDP for both cases with

only retained earnings and with external capital flows. There was less undershoot and overshoot. Moreover, for the conventional banking sector, the percentage of physical capital shock was negative 0.15% with only retained earnings and negative 0.02% with external capital flows. For the Islamic banking sector, the percentage of physical capital shock was negative 0.15% with only retained earnings and negative 0.03% with external capital flows. The Islamic banking sector showed similar results for both cases of only retained earnings and external capital flows. Furthermore, for the conventional banking sector, the real asset price was reduced by 12% with only retained earnings and 3% with external capital flows. For the Islamic banking sector, the real asset price was reduced by 6% with only retained earnings and 1.8% with external capital flows. The Islamic banking sector was better able to manage the real asset price for both cases of only retained earnings and external capital flows. Overall, the Islamic financial system had a positive effect on the non-bank-specific financial variables of the economy of Pakistan.

The effects of contractionary shock on aggregate demand of the economy of Pakistan were shown in Figure 1 with the conventional financial sector and the Islamic financial sector. In the conventional banking sector, the GDP was shrunk by 2.8% with only retained earnings and 0.7% with external capital flows. For the Islamic banking sector, the GDP was shrunk by 1.6% with only retained earnings and 0.4% with external capital flows. The Islamic banking sector was better able to manage the reduction of GDP for both cases of only retained earnings and external capital flows. Moreover, for the conventional banking sector, the consumption was decreased by 4.1% with only retained earnings and 1% with external capital flows. For the Islamic banking sector, the

consumption was decreased by 2.2% with only retained earnings and 0.6% with external capital flows. The Islamic banking sector was better able to manage consumption for both cases of only retained earnings and external capital flows. Furthermore, for the conventional banking sector, the investment was diminished by 2.6% with only retained earnings and 0.6% with external capital flows. For the Islamic banking sector, the consumption was diminished by 2.2% with only retained earnings and 0.5% with external capital flows. The Islamic banking sector showed performance similar to the conventional financial sector in managing investment for cases with only retained earnings and with external capital flows. Additionally, for the conventional banking sector, the trade balance to GDP was increased by 1.4% with only retained earnings and 0.3% with external capital flows. For the Islamic banking sector, the trade balance to GDP was increased by 0.7% with only retained earnings and 0.2% with external capital flows. For the Islamic banking sector, the trade balance to GDP increased less due to less reduction in consumption. In other words, the reduction in imports was less. In case of external capital flows, both the conventional financial sector and the Islamic banking sectors showed similar performance. Overall, the Islamic financial system had a positive effect on the variables related to aggregate demand of the economy of Pakistan.

The effects of contractionary shock on the price variables of the economy of Pakistan are shown in Figure 1. In the conventional banking sector, the wage inflation was reduced by 2.2% with only retained earnings and 0.6% with external capital flows. For the Islamic banking sector, the wage inflation was reduced by 1.4% with only retained earnings and 0.35% with external capital flows. The Islamic banking sector was

better able to manage wage inflation with only retained earnings. However, the Islamic banking sector showed similar performance with external capital flows. Additionally, for the conventional banking sector, the CPI inflation was reduced by 0.7% with only retained earnings and 0.2% with external capital flows. For the Islamic banking sector, the CPI inflation was reduced by 0.42% with only retained earnings and 0.1% with external capital flows. The Islamic banking sector was slightly better able to manage CPI inflation for both cases of only retained earnings and external capital flows. Also, for the conventional banking sector, the policy rate was reduced by 1.2% with only retained earnings and 0.3% with external capital flows. For the Islamic banking sector, the policy rate was reduced by 0.68% with only retained earnings and 0.2% with external capital flows. The conventional banking sector was better able to manage the policy rate for both cases with only retained earnings and with external capital flows. The policy rate need to be reduced less for the Islamic banking sector. In addition, for the conventional banking sector, the real exchange rate was devalued by 2% with only retained earnings and 0.5% with external capital flows. For the Islamic banking sector, the real exchange rate was devalued by 1% with only retained earnings and 0.25% with external capital flows. The Islamic banking sector was better able to manage the real exchange rate for both cases with only retained earnings and with external capital flows. Therefore, the Islamic financial system had a positive effect on the price variables of the economy of Pakistan.

Figure 3 shows the simulation results for a linearized and a nonlinearized IMF-DSGE model using the same source of shocks as the parameters of the conventional banking sector. The real value of the capital shock was -10% for the linearized and

nonlinearized IMF-DSGE model. The real bank credit was decreased by -1.5% and -2.5% for the linearized and nonlinearized IMF-DSGE model. The lending spread was increased by 1.0% and 3.1% for the linearized and nonlinearized IMF-DSGE model. The portfolio default rate was increased by 0.5% and 3.2% for the linearized and nonlinearized IMF-DSGE model. The nonlinearized IMF-DSGE model was more effective than the linearized IMF-DSGE model in capturing the financial crisis dynamics of the Pakistani economy during the COVID-19 pandemic period 2020 for the conventional banking sector.

Figure 4 shows the simulation results for a linearized and a nonlinearized IMF-DSGE model using same source of shocks as the parameters of the Islamic banking sector. The real value of the capital shock is -10% for the linearized and nonlinearized IMF-DSGE model. The real bank credit was decreased by -2% and -2.5% for the linearized and nonlinearized IMF-DSGE model. The lending spread was increased by 1.25% and 1.75% for the linearized and nonlinearized IMF-DSGE model. The portfolio default rate was increased by 2% and 3.5% for the linearized and nonlinearized IMF-DSGE model. The nonlinearized IMF-DSGE model was more effective than the linearized IMF-DSGE model in capturing the financial crisis dynamics of the Pakistani economy during the COVID-19 pandemic period 2020 for the Islamic banking sector.

Recommendations

The enhanced IMF-DSGE model incorporated the financial sector in its design (Benes et al., 2014a). Benes et al. (2014a) included three key design features in this model: bank credit creation, aggregate risk, and global nonlinearities. The model had the

capability to study vulnerabilities associated with excessive credit expansions and asset price bubbles, and the consequences of different macroprudential policies. The model had the capability to differentiate between good and bad credit expansions. The model might be used to analyze alternate macroprudential policies in dealing with the immediate aftermath of a financial crisis. Researchers might use this capability to recommend policies to prevent a financial crisis. These features made it the appropriate model to examine the mitigating effect of Islamic financial principles on the Pakistani economy during the COVID-19 pandemic period 2020.

The model did not include the issues related to excessive risk-taking behavior of banks. The banks were always fully hedged in the IMF-DSGE model. The quantitative properties of the IMF-DSGE model when subjected to large shocks would contain enormous uncertainty. The implications of nonlinearities under conditions of excessive leverage in the banking and nonfinancial sectors might limit the effects of such nonlinearities. The countercyclical macroprudential policies might also limit the effects of such nonlinearities. Future researchers might need to address these issues when using this IMF-DSGE model.

Implications

My study might contribute to advancing practices and policies. The legislative branch might use the findings of my research to devise regulations to reduce the impact of the financial crisis. The regulators might also use it to devise the financial policy to mitigate the intensity of the financial crisis. The central banks might apply it to formulate the procedure to oversee the financial institutions. The study might help policymakers

identify key elements that might affect the economy. The study It might provide a coherent and internally consistent way of viewing the economy.

Many stakeholders might benefit from the results of this research. Economists might use the findings to develop techniques to maximize the GDP of a country. The study might help banks maintain stability and avoid bankruptcy. A stable banking system is good for business. The study might also help to stabilize the economy and minimize unemployment. The study might increase the quality of life by offering stable jobs. Ultimately, it might help to promote economic and social justice.

Conclusions

The Islamic financial system was more effective than the conventional financial system in mitigating the effect of the pandemic-generated financial crisis on the economy of Pakistan in 2020. The nonlinearized IMF-DSGE model was better than the linearized IMF-DSGE model in capturing the financial crisis dynamics of the Pakistani economy during the COVID-19 pandemic period 2020 for both the conventional banking sector and the Islamic banking sector. Confounding factors might effect both the independent and dependent variables of the Pakistani economy during the COVID-19 pandemic period 2020 for both the conventional banking sector and the Islamic banking sector.

References

Adelson, M. (2013). The deeper causes of the financial crisis: Mortgages alone cannot explain it. *Journal of Portfolio Management*, *39*(3), 16–31. https://doi.org/10.3905/jpm.2013.39.3.016

Adrian, T., Colla, P., & Shin, H. S. (2013). Which financial frictions? Parsing the evidence from the financial crisis of 2007 to 2009. *NBER/Macroeconomics Annual, 27*, 159–214. https://doi.org/10.1086/669176

Adrian, T., & Gopinath, G. (2021). *Addressing inflation pressures amid and enduring pandemic*. International Monetary Fund. https://blogs.imf.org/2021/12/03/addressing-inflation-pressures-amid-an-enduring-pandemic/

Ahmad, E. R., & Milhem, A. K. (2016). Ideological principles and bases in financial transactions. *International Journal of Arts & Sciences*, *9*(1), 147–158.

Aisyah, A., & Reza, G. (2020). Islamic finance and COVID-19 recovery: The role profit-loss sharing contract. *Jurnal Pengurusan*, *59*, 1–5. https://doi.org/10.17576/pengurusan-2020-59-02

Akerlof, G. A., & Shiller, R. J. (2009). *Animal spirits: How human psychology drives the economy, and why it matters for global capitalism*. Princeton University Press.

Alessi, L., Ghysels, E., Onorante, L., Peach, R., & Potter, S. (2014). Central Bank Macroeconomic Forecasting During the Global Financial Crisis: The European Central Bank and Federal Reserve Bank of New York Experiences. *Journal of*

Business & Economics Statistics, 32(4), 483–500.

https://doi.org/10.1080/07350015.2014.959124

Alrifai, T. (2015). *Islamic finance and the new financial system: An ethical approach to preventing future financial crises*. John Wiley & Sons.

Altavilla, C., Pariès, M. D., & Nicoletti, G. (2019). Loan supply, credit markets and the euro area financial crisis. Journal of Banking & Finance, 109, 105658.

https://doi.org/10.1016/j.jbankfin.2019.105658

Angell, J. (1935). The 100 percent reserve plan. *Quarterly Journal of Economics*, *50*, 1-35.

Acharya, V., Philippon, T., Richardson, M., & Roubini, N. (2009). The Financial Crisis of 2007-2009: Causes and Remedies. *Financial Markets, Institutions & Instruments, 18*(2), 89–137. https://doi.org/10.1111/j.1468-0416.2009.00147_2.x

Arouri, M. E., Ben, A. H., Jawadi, N., Jawadi, F., & Louhichi, W. (2013). Are Islamic finance innovations enough for investors to escape from a financial downturn? Further evidence from portfolio simulations. *Applied Economics*, *45*(24), 3412–3420. https://doi.org/10.1080/00036846.2012.707776

Arzova, A. B., & Shahin, B. S. (2021). The role of the Islamic financial model with its philosophy, isnstruments and charcateristics in mitigating the economic impacts of the COVID-19. *Bilimname*, *44*(1), 451–489.

https://doi.org/10.28949/bilimname.861879

Askari, H., Iqbal, Z., Krichene, N., & Mirakhor, A. (2010). *The stability of Islamic finance.* John Wiley & Sons.

Askari, H., Iqbal, Z., Krichene, N., & Mirakhor, A. (2012). *Risk sharing in finance: The Islamic finance alternative.* John Wiley & Sons.

Askari, H., Krichene, N., & Mirakhor, A. (2014). On the stability of an Islamic financial system. *PSL Quarterly Review*, *67*(269), 131–167. https://rosa.uniroma1.it/rosa04/psl_quarterly_review/article/view/12463/12271

Atkinson, P., & Delamont, S. (Eds.). (2010). *SAGE qualitative research methods*. SAGE Publications Inc.

Baldini, A., Benes, J., Berg, A., Dao, M. C., & Portillo, R. A. (2015). Monetary Policy in Low Income Countries in the Face of The Global Crisis: A Structural Analysis. *Pacific Economic Review, 20*(1), 149–192. https://doi.org/10.1111/1468-0106.12098

Benes, J., Kumhof, M., & Laxton, D. (2014a). Financial crises in DSGE models: Selected applications of MAPMOD. International Monetary Fund.

Benes, J., Kumhof, M., & Laxton, D. (2014b). *Financial crises in DSGE models: A prototype model.* International Monetary Fund. https://www.imf.org/external/pubs/ft/wp/2014/wp1457.pdf

Bernanke, B. S. (1995). The macroeconomics of the Great Depression: A comparative approach. *Journal of Money, Credit & Banking*, *27*(1), 1–28. https://doi.org/10.2307/2077848

Bernanke, B. (2013). The crisis as a classic financial panic. *States News Service*. https://www.federalreserve.gov/newsevents/speech/bernanke20131108a.htm

Blanchard, O. (2014). Where danger lurks. *Finance & Development*, *51*(3), 28–31.

Bordo, M. D., & Olivier, J. (2002). Boom-busts in asset prices, economic instability, and

    monetary policy. *National Bureau of Economic Research*.

    https://doi.org/10.3386/w8966

Bordo, M. D., & Haubrich, J. G. (2017). Deep recessions, fast recoveries, and financial

    crises: evidence from the American record. *Economic Inquiry, 55*(1), 527.

    https://doi.org/10.1111/ecin.12374

Borio, C. (2014). The financial cycle and macroeconomics: What have we learned?

    Journal of Banking & Finance, 45, 182–198.

    https://doi.org/10.1016/j.jbankfin.2013.07.031

Bureau of Labor Statistics. (2020). *Unemployment rate rises to record high 14.7 percent

    in April 2020*. https://www.bls.gov/opub/ted/2020/unemployment-rate-rises-to-

    record-high-14-point-7-percent-in-april-2020.htm

Bureau of Labor Statistics. (2021). Consumer prices up 6.8 percent for year ended

    November 2021. https://www.bls.gov/opub/ted/2021/consumer-prices-up-6-8-

    percent-for-year-ended-november-2021.htm

Caggiano, G., Castelnuovo, E., & Pellegrino, G. (2021). Uncertainty shocks and the great

    recession: Nonlinerities matter. *Economics Letters, 198*, 1.

    https://doi.org/10.1016/j.econlet.2020.109669

Christiano, L. J., Eichenbaum, M. S., & Trabandt, M. (2015). Understanding the great

    recession. *American Economic Journal: Macroeconomics, 7*(1), 110-67.

    https://doi.org/10.1257/mac.20140104

Claessens, S., Ghosh, S. R., & Mihet, R. (2013). Macro-prudential policies to mitigate

    financial system vulnerabilities. *Journal of International Money and Finance, 39*,

    153-185.

Claessens, S., & Kose, M. M. A. (2013). *Financial crises explanations, types, and*

    implications. International Monetary Fund.

    https://www.imf.org/en/Publications/WP/Issues/2016/12/31/Financial-Crises-

    Explanations-Types-and-Implications-40283

Clarida, R. H., Duygan-Bump, B., & Scotti, C. (2021). The COVID-19 crisis and the

    Federal Reserve's policy response. Retrieved from

    https://www.federalreserve.org. https://doi.org/10.17016/FEDS.2021.035

Curry, T. J., Johnson, J. J., & Feldman, R. E. (2012). Regulatory Capital Rules:

    Standardized Approach for Risk- Weighted Assets; Market Discipline and

    Disclosure Requirements. *Federal Register (National Archives & Records*

    Service, Office of the Federal Register), *77*(169), 52888–52975.

Cutler, D.C., & Summers, L. H. (2020). The COVID-19 pandemic and the $16 trillion

    virus. *Journal of American Medical association, 324*(15), 1495-1496.

    https://doi.org/10.1001/jama.2020.19759

Cynthia, L, Gough, S., & Land, L. (2004). *Experimental quantitative designs. In*

    Resources for nursing research (pp. 107-115). SAGE Publications Ltd.

Daly, S., & Frikha, M. (2016). Islamic finance: Basic principles and contributions in

    financing economic. *Journal of the Knowledge Economy, 7*(2), 496-512.

    https://doi.org/10.1007/s13132-014-0222-7

Di Maggio, M., & Kermani, A. (2017). Credit-Induced Boom and Bust. *Review of Financial Studies, 30*(11), 3711–3758. https://doi.org/10.1093/rfs/hhx056

Diaw, A. (2015). The global financial crisis and Islamic finance: a review of selected literature. *Journal of Islamic Accounting and Business Research, 6*(1), 94-106. https://doi.org/10.1108/JIABR-03-2012-0015

di Patti, E. B., & Sette, E. (2016). Did the securitization market freeze affect bank lending during the financial crisis? Evidence from a credit register. *Journal of Financial Intermediation, 25*, 54-76. https://doi.org/10.1016/j.jfi.2015.06.002

Dotsey, M. (2013). DSGE models and their use in monetary policy. *Business Review Q, 2*, 10-16.

Ejaz, N., & Khan, H. (2014). The underlying cause of the Global Financial Crisis: An Islamic perspective. *A Journal of Applied Economics and Policy, 33*(1), 45-54. https://doi.org/10.1111/1759-3441.12060

Eriksson, P., & Kovalainen, A. (2008). *Qualitative methods in business research*. SAGE Publications Ltd.

Erdem, E. (2017). Analyzing the gradual revelation and wording of riba (interest) verses in the holy qur'an considering the commerce, finance and infaq system of islam. *Turkish Journal of Islamic Economics, 4*(2), 91-126.

Fakri, U. N., & Darmawan, A. (2021). Comparison of Islamic and conventional banking financial performance during the Covid-19 period. *International Journal of Islamic Economics and Finance, 4*, 19-40. https://doi.org/10.18196/ijief.v4i0.10080

Foldvary, F. E. (2015). The Austrian Theory of the Business Cycle. *American Journal of Economics and Sociology, 74*(2), 278-297. https://doi.org/10.1111/ajes.12098

Friedman, M., & Schwartz, A. J. (1965). Money and business cycles. In The state of monetary economics (pp. 32-78). *National Bureau of Economic Research*. https://www.nber.org/chapters/c5179

Friedman, M. (1972). Have monetary policies failed?. *The American Economic Review, 62*(1/2), 11-18.

Friedman, M., & Schwartz, A. J. (1963). Money and Business Cycles. *Review of Economics and Statistics, 45,* 32–78. https://doi.org/10.2307/1927148

Garrison, R. W. (1989). The Austrian theory of the business cycle in the light of modern macroeconomics. *The Review of Austrian Economics, 3*(1), 3-29. https://doi.org/10.1007/BF01539555

Ghassan, H. B., & Fachin, S. (2016). Time series analysis of financial stability of banks: Evidence from Saudi Arabia. *Review of Financial Economics, 31*, 3-17. https://doi.org/10.1016/j.rfe.2016.06.007

Hall, R. E. (2015). Quantifying the lasting harm to the US economy from the financial crisis. *NBER Macroeconomics Annual*, 29(1), 71-128. https://doi.org/10.1086/680584

Hasan, Z. (2020). The impact of COVID-19 on Islamic banking in Indonesia during the pandemic era. Journal of Entrepreneurship & Business, 8(2), 19-32. https://doi.org/ 10.17687/JEB.0802.03

Harrison, F. (2010). *Boom Bust : House Prices, Banking and the Depression of 2010: Vol. 2nd updated edition*. Shepheard-Walwyn.

Hart, A. G. (1935). The Chicago Plan of Banking reform: Proposal for making monetary management effective in the United States. *The Review of Economic Studies, 2*(2), 104-116.

Hassan, M. K., Rabbani, M. R., & Abdulla, Y. (2021). Socioeconomic Impact of COVID-19 in MENA region and the Role of Islamic Finance. *International Journal of Islamic Economics and Finance*, *4*(1), 51-78. https://doi.org/10.18196/ijief.v4i1.10466

Hayek, F.A. (1935). *Prices and Production*. Augustus M. Kelly.

Hudea, O. S., Toma, S. G., & Burcea, M. (2014). The new classical theory and the real business cycle model. *SEA-Practical Application of Science, 3*(5), 25-30. Retrieved from https://seaopenresearch.eu/Journals/articles/SPAS_5_3.pdf

Hussain, M. (2014). Performance and potential of Islamic finance: A contextual study in the UK. *Journal of Shi'a Islamic Studies, 7*(4), 441-510. https://doi.org/10.1353/isl.2014.0038

International Monetary Fund (2021). World Economic Outlook Report, October 2021. https://www.imf.org/

Iyigun, M. F., & Owen, A. L. (2004). Income inequality, financial development, and macroeconomic fluctuations. *Economic Journal, 114*(495), 352–376. https://doi.org/10.1111/j.1468-0297.2004.00212.x

Jeon, B. N., Yao, Y., Chen, M., & Wu, J. (2021). The impact of macroprudential policies on bank risk under economic uncertainty: Evidence from emerging Asian economies. *Journal of the Asia Pacific Economy*, 1–32. https://doi.org/10.1080/13547860.2021.2024380

Kababji, M. (2016). Economic systems human thoughts and Islamic precepts. *Journal of Islamic Banking and Finance, 33*(2) 94-107.

Karmelavičius, J., & Ramanauskas, T. (2019). Bank credit and money creation in a DSGE model of a small open economy. *Baltic Journal of Economics, 19*(2), 296–333. https://doi.org/10.1080/1406099X.2019.1640958

Kassim, S. H., & Majid, M. S. A. (2010). Impact of financial shocks on Islamic banks Malaysian evidence during 1997 and 2007 financial crises. *International Journal of Islamic & Middle Eastern Finance & Management, 3*(4), 291–305. https://doi.org/10.1108/17538391011093243

Keen, S. (1995). Finance and economic breakdown: modeling Minsky's financial instability hypothesis. *Journal of Post Keynesian Economics*, *17*(4), 607-635. https://www.tandfonline.com/loi/mpke20

Kydland, F. E., & Edward, C. P. (1982). Time to build and aggregate fluctuations. *Econometrica, 50*(6), 1345-1370. https://www.econometricsociety.org/publications/econometrica

Keynes, J. M. (1936). *The General Theory of Employment, Interest, and Money*. Harcourt, Brace, and World.

King, R. G., Plosser, C. I., & Rebelo, S. T. (1988). Production, growth and business cycles: The basic neoclassical model. *Journal of Monetary Economics, 21*(2-3), 195-232. https://www.journals.elsevier.com/journal-of-monetary-economics/

Kumar, A., Mallick, S., & Sinha, A. (2021). Policy errors and business cycle fluctuations: Evidence from an emerging economy. *Journal of Economic Behavior & Organization, 192*, 176. https://doi.org/10.1016/j.jebo.2021.10.004

Krugman, P. (2008). Response to Nelson and Schwartz. *Journal of Monetary Economics, 55*(4), 857–860. https://doi.org/10.1016/j.jmoneco.2008.05.011

Lebdaoui, H., & Wild, J. (2016). Islamic banking presence and economic growth in Southeast Asia. *International Journal of Islamic and Middle Eastern Finance and Management, 9*(4), 551-569. https://doi.org/10.1108/IMEFM-03-2015-0037

Lee, S. (2021). Monetary and fiscal policies in the United States. In B. Andreosso-O'Callaghan, W. Moon, W. Sohn (Eds.), *Economic policy and the COVID-19 crisis: The macroeconomic response in the US, Europe and East Asia* (pp. 15-37). Routledge. https://doi.org/10.4324/9781003153603-1

Long, J., & Plosser, C. (1983). Real business cycles. *Journal of Political Economy, 91*, 39-69. https://doi.org/10.1086/261128

Lucas, R. (1976). Econometric Policy Evaluation: A Critique. In Brunner, K.; Meltzer, A. The Phillips Curve and Labor Markets. *Carnegie-Rochester Conference Series on Public Policy 1*. American Elsevier.

Lucas, R. E., & Sargent, T. J. (1979). After Keynesian macroeconomics. *Federal Reserve*

    Bank of Minneapolis Quarterly Review, 3(2), 1-16.

    https://www.minneapolisfed.org/research/quarterly-review

Ma, Y. (2016). Policy shocks and macroeconomic fluctuations in a two country

    dynamic stochastic general equilibrium model: Evidence from China. *Asian*

    Economic Journal, 30(1), 25-45. https://doi.org/10.1111/asej.12083

McLeay, M., Radia, A., & Thomas, R. (2014). Money creation in the modern economy.

    Bank of England Quarterly Bulletin, 54(1), 14-27.

    https://www.bankofengland.co.uk/quarterly-bulletin/quarterly-bulletins

Mackintosh, S. P. (2014). The global financial and economic crisis, and the creation of

    the financial stability board. *World Economic, 15*(3), 103-119.

    https://ssrn.com/abstract=1543508

Malliaris, A. G., Shaw, L., & Shefrin, H. (Eds.). (2016). *The global financial crisis and*

    its aftermath: Hidden factors in the meltdown. Oxford University Press.

Mankiw, N. G. (1989). Real business cycles: A new Keynesian perspective. *Journal of*

    economic perspectives, 3(3), 79-90. https://doi.org/10.1257/jep.3.3.79

Milne, A. (2009). Macroprudential policy: What can it achieve?. *Oxford Review of*

    Economic Policy, Vol. 25, No. 4, pp. 608–629.

Minsky, H. (1986). *Stabilizing an Unstable Economy*. New Have, CT: Yale University

    Press.

Mises, L. (1953). *The Theory of Money and Credit*. Yale University Press.

Mises, L. (2008). *Human Action*. Ludwig von Mises Institute.

Moon, W., & Sohn, W. (2021). Economic policy and the Covid-19 crisis: The

    macroeconomic response in the US, Europe, and East Asia. In B. Andreosso-

    O'Callaghan, W. Moon, W. Sohn (Eds.), *Economic policy and the COVID-19*

    crisis: The macroeconomic response in the US, Europe and East Asia (pp. 15-37).

    Routledge. https://doi.org/10.4324/9781003153603-1Ökte, M. (2010)

Ökte, M. (2010). Fundamental of Islamic economy and finance: Theory and practice.

    Electronic Journal of Social Sciences, *9*(31), 180-208.

    http://www.acarindex.com/dosyalar/makale/acarindex-1423879031.pdf

Pareed, A. O. (2021). Islamic financing services for stimulating COVID affected

    economics: A theoretical analysis. *Journal of Academic Research in Economics,*

    13(3), 379-391.

 Plosser, C. I. (1989). Understanding real business cycles. *Journal of Economic*

    Perspectives, 3(3), 51-77. https://doi.org/10.1257/jep.3.3.51

Rabbani, M.R., Bashar, A. Nawaz, N., Karim, S., Ali, M. A., Rahiman, H., & Alam, M.

    S. (2021). Exploring the role of Islamic Fintech in combating the aftershocks of

    COVID-19: The open social innovation of the Islamic Financial System. *Journal*

    of Open Innovation: Technology, Market and Complexity, *7*(136), 136.

    https://doi.org/10.3390/joitmc7020136

Rasoulinezhad, R. (2012). The concept of Islamic dynamic stochastic general equilibrium

    method in the financial theme. *American Journal of Business and Management,*

    1(3), 113-118. https://doi.org/10.11634/216796061706150

Reinhart, C. M., & Rogoff, K. (2009). *This time is different: Eight centuries of financial folly.* Princeton University Press.

Roullear-Pasdeloup, J. (2018). The government spending multiplier in a (mis) managed liquidity trap. *Journal of Money, Credit and Banking, 50*(2-3), 293-315. https://doi.org/10.1111/jmcb.12461

Rotemberg, J. (1982). Sticky prices in the United States. *Journal of Political Economy, 90*, 1187-1211. https://doi.org/10.1086/261117

Rotemberg, J., & Woodford, M. (1997). An optimization-based econometric framework for the evaluation of monetary policy. *NBER Macroeconomics Annual*, 12, 297-361. https://doi.org/10.1086/654340

Salerno, J. T. (2012). A Reformulation of Austrian Business Cycle Theory in Light of the Financial Crisis. *Quarterly Journal of Austrian Economics*, *15*(1), 3–44.

Salim, B. F., & Mahmoud, M. H. (2016). Islamic Finance: Is it a time to be considered as an alternative during financial crisis times? A comparative study in Gulf Cooperation Council. *International Journal of Economics and Financial Issues, 6*(3), 1123-1131.

Salkind, N. (2010). Cross-sectional design. In N. Salkind (Ed.), *Encyclopedia of research design* (pp. 314-315). SAGE Publications Inc.

Samad, A. (2021). Global financial crisis and Islamic bank efficiency: Are efficiencies stable or impacted? Evidence from Pakistann Islamic banks. *Journal of Accounting & Finance, 21*(2), 96-111. https://doi.org/10.33423/jaf.v21i2.4240

Shah, S. Z., & Bhutta, N. T. (2016). Does Islamic finance prevent financial crises: A global perspective. *Journal of Finance, Accounting, and Management, 7*(2), 31.

Smets, F., & Wouters, R. (2003). An estimated dynamic stochastic general equilibrium model of the euro area. *Journal of the European Economic Association, 1*(5), 1123-1175. https://doi.org/10.1162/154247603770383415

Taylor, J. B., & Uhlig, H. (2017). *Handbook of macroeconomics*. Elsevier.

Tarık, A., & Dolgun, M. H. (2016). The Chicago Plan from the Lenses of Islamic Finance: Implications for Financial Stability and Indebtedness. *International Journal of Islamic Economics and Finance Studies, 1*(2), 87-111. https://dergipark.gov.tr/ijisef/issue/29333/313861

The National Bureau of Economic Research. (2010). *US business cycle expansions and contractions*. https://www.nber.org/

Tirole, J. (2011). Illiquidity and all its friends. *Journal of Economic Literature*, *49*(2), 287-325.

Trabelsi, M. A. (2011). The impact of the financial crisis on the global economy: can the Islamic financial system help?. *The Journal of Risk Finance, 12*(1), 15-25. https://doi.org/10.1108/15265941111100049

Waemustafa, W., & Sukri, S. (2016). Theory of gharar and its interpretation of risk and uncertainty from the perspectives of authentic hadith and the holy quran: A qualitative analysis. *International Journal of Economic Perspectives, 10*(2), 21-33.

World Bank. (2021a). Global Economic Prospect.

https://reliefweb.int/report/world/world-bank-global-economic-prospects-june-

2021

World Bank. (2021b). GDP data. https://data.worldbank.org/

indicator/NY.GDP.MKTP.CD

Zaman, A., & Qadir, J. (2017). Putting social justice first: The case of Islamic economics.

Journal of Islamic Banking & Finance, 34(4), 87-99.

Appendix : Macroeconomic Parameters of Pakistan

Table 1

Steady State Characteristics (Conventional Banking Sector)

Parameter	International Monetary Fund (Emerging Economics)	Pakistan	
Capital adequacy ratio	11.41%	15.53%	State Bank of Pakistan
Capital buffers	3.41%	4.33%	Noreen
Capital to asset ratio	10.98%	7.12%	State Bank of Pakistan
Lending spread	2.37%	3.10%	
Individual risk component of lending spread	1.22%	2.2066%	Calculated
Regulatory component of lending spread	1.13%	0.8789%	Calculated
Bank-deposits-to-GDP-radio	56%	32.60%	State Bank of Pakistan

Table 2

Steady State Characteristics (Real Economy)

Parameter	International Monetary Fund (Emerging Economics)	Pakistan	
Total consumption to GDP ratio	79%	78.5%	SBP
Business consumption to GDP ratio	19%	15.4%	SBP
Export to GDP ratio	62%	8.79% (2019)	World Bank
Share of value added in exports	30%	8.3%	SBP
Net-exports-to-GDP ratio	2%	2.5%	World Bank
Foreign-debt-to-GDP ratio	20%	42.71%	SBP

Table 3

Steady State Characteristics (Islamic Banking Sector)

	Pakistan	
Capital adequacy ratio	10.00%	Circulation of State Bank of Pakistan
Lending spread	4.1%	Research Paper: Shaikh et al. (2013)