EXPLORING THRESHHOLD EFFECTS OF INTREST RATES FOR ECONOMIC GROWTH AND INVESTMENT: A COMPARISON BETWEEN PAKISTAN AND US ECONOMIES

Abstract

This comprehensive research study delves into the intricate economic dynamics of Pakistan and the United States over a span of three decades, from 1993 to 2022. The analysis encompasses essential economic variables, including interest rates, GDP growth, and investment rates, shedding light on their relationships and implications in an increasingly interconnected global economy. The introduction sets the stage for the research, emphasizing the growing significance of understanding the economic interplay between nations in today's globalized world. It introduces the research variables, including year, Pakistan's interest rate, U.S. interest rate, Pakistan's GDP growth, U.S. GDP growth, Pakistan's investment rate, and U.S. investment rate. The literature review surveys existing scholarship and theories related to the chosen variables. It provides a comprehensive understanding of the economic factors that influence GDP growth, the role of interest rates in economic performance, and the importance of investment rates as indicators of economic health. This section outlines the research methodology employed, which includes descriptive analysis, correlation analysis, threshold regression analysis, and comparative analysis. It highlights the data sources, sample period, and statistical tools used to analyze the relationships between the chosen variables. The results and analysis section presents key findings from the research. It discusses the descriptive statistics of the variables, including mean, median, maximum, minimum, standard deviation, skewness, kurtosis, Jarque-Bera, and more. The correlation analysis explores the relationships between variables, revealing insights into the economic interdependencies between

Pakistan and the United States. The threshold regression analysis uncovers the impact of interest rates and other variables on GDP growth, while the comparative analysis visually illustrates investment rate trends in both nations. The concluding section summarizes the main findings of the study, emphasizing the complex and interconnected nature of economic variables. It discusses the implications of the research for policymakers, investors, and economists and highlights the limitations of the study. Recommendations for further research, including exploring threshold effects and conducting longitudinal studies, are also provided.

Keywords: economic growth, discount rate, inflation, Pakistan, US, regression analysis, and policy implications.

Table of Contents

Chapter 1: Introduction

1.1 Background

Interest rates significantly impact how a nation's economy will grow. They are crucial for governments and central banks to manage economic activity, investments, and inflation. The relationship between interest rates and economic growth has been the subject of extensive research and policymaking due to its broad implications (Svensson, 2020). With Pakistan and the United States as the leading countries of comparison, this introduction chapter lays the groundwork for a thorough investigation of the early effects of interest rates on economic growth and investment. Interest rates, also known as the cost of borrowing or the rate of return on savings, are critical in determining the economy's direction. The reduced to their most basic form, lower interest rates typically encourage borrowing and spending, though higher interest rates encourage saving and investment. This relationship is much more nuanced and complex because many variables affect how interest rates affect economic growth and investment (Bureau of Labor Statistics, 2018). Understanding these dynamics is crucial for economists, investors, and policymakers like. The interest rates impact people's decisions to buy homes or make other significant purchases, businesses' decisions to invest in capital projects, and overall economic activity. The because borrowing is less expensive when interest rates are low, consumers and businesses are more likely

to borrow money for major purchases. Higher interest rates can slow down the economy by making borrowing more expensive, which may result in less consumer and business investment.

It is crucial to give a brief overview of the economic situations in Pakistan and the United States to contextualize the research. These two nations exhibit various economic settings, levels of development, regulatory structures, and difficulties. Pakistan is a developing nation in South Asia with a varied economic environment. Its GDP is derived mainly from the agricultural, industrial, and service sectors, and it faces issues like financial deficits, inflation, and external debt. The addressing socio-economic inequalities, the nation has been working to achieve stable and sustainable economic growth (Damodar, 2021). One of the world's biggest and most developed economies is that of the United States. It boasts a highly diversified economy with advanced manufacturing, technology, finance, and services sectors. The United States has a long economic growth and stability history, it still faces issues with income inequality, fiscal policies, and global trade.

The comparative analysis of Pakistan and the United States provides an exceptional chance to investigate how interest rates impact economic growth and investment in various economic environments (Aluko & Ajayi, 2018). This study can show how interest rate policies and their effects may differ across different economic contexts by contrasting a developing economy like Pakistan with an advanced economy like the United States. With the ultimate goal of offering

valuable insights for policymakers, investors, and researchers in both countries, this study explores potential beginning effects in the relationship between interest rates, economic growth, and investment. Understanding these dynamics in a rapidly shifting global economic environment is crucial for optimizing investment strategies and making wise policy decisions.

1.2 Statement of the Problem

There is a significant research gap in the dynamic field of economics and finance about the complex interaction between interest rates, economic growth, and investment, particularly the existence and implications of beginning effects (Govt. of Pakistan, 2020). While numerous studies have explored the broad impacts of interest rate changes, a comprehensive investigation into the existence and significance of thresholds—points at which interest rate changes exert distinct effects—remains conspicuously limited. The existing literature mainly offers insights into linear relationships between interest rates and economic variables, often overlooking the potential nonlinearities and beginnings that may govern these interactions. This research gap is particularly concerning given the diverse global economic contexts, ranging from developing nations to advanced economies. This study endeavors to bridge this gap by exploring the multifaceted implications of threshold effects within the broader framework of interest rate dynamics.

The existence and implications of beginning effects of interest rates on economic growth and investment is paramount. Interest rates serve as a lever for central banks and governments to steer

economic activity, influence inflation, and stimulate or dampen investment (Epstein & Rhodes, 2018). Sensitive when and how interest rate changes become pivotal—i.e., identifying threshold points—is crucial for macroeconomic policy formulation and micro-level investment decision-making. By uncovering these thresholds, policymakers can refine their monetary strategies, adapting them to different economic conditions. Investors can make more informed decisions, considering the potential inflection points that interest rate changes may represent. This knowledge is especially relevant in today's interconnected global economy, where decisions in one part of the world can have cascading effects worldwide.

The imperative for conducting a comparative analysis between Pakistan and the United States arises from their stark economic disparities and distinct policy contexts (Israel, 2018). As a developing economy, Pakistan faces unique challenges and opportunities that differ markedly from those of the United States, an advanced economy. Comparing these two diverse economies enriches our understanding of the threshold effects of interest rates and provides actionable insights for policymakers, investors, and researchers operating in different economic environments. Such a comparative analysis can extract nuances in the relationship between interest rates, economic growth, and investment that might remain hidden within a single-country study. This study seeks to address the research gap, underscore the importance of identifying threshold effects, and justify the necessity of a comparative analysis between Pakistan and the United States (Bordo & Levy,

2021). Doing so aims to contribute to a more nuanced and comprehensive understanding of how interest rates shape economic growth and investment in various economic contexts.

1.3 Research Questions

- How do growth and investment respond to changes in interest rates over time?
- Whether there is a unidirectional response of growth and investment to changes in interest rate or these variables respond differently to different rates.
- Do growth and investment responds similarly to interest rate or differently across developing and developed economies?

1.4 Research Objectives

- To estimate the threshold values of interest rate and investment and economic growth for developing economies of Pakistan.
- To investigate the threshold values of interest rate and investment economics growth for developed economies of the U.S.
- To assess the impact of threshold values of interest rate and investment and economic growth for developing economies of Pakistan.
- To estimate the impact of threshold values of interest rate and investment and economic growth for developed economies of the U.S.

1.5 Significance of the Study

This study contributes substantively to the field of economics by advancing our understanding of the complex relationship between interest rates, economic growth, and investment. It fills a critical research gap by exploring the presence and implications of threshold effects—a dimension often overlooked in conventional analyses (Bull-Otterson et al., 2022). This research enriches economic theory and modeling by identifying threshold points where interest rate changes influence economic variables. It introduces nuance to the usual linear models, accommodating nonlinearity and enhancing their explanatory power. This study's findings expand the theoretical underpinnings of economics and provide a valuable template for future research.

The outcomes of this study carry profound policy implications for both Pakistan and the United States. For policymakers, identifying threshold effects becomes instrumental in crafting effective monetary and fiscal policies. Recognizing when interest rate changes have transformative impacts on economic growth and investment enables more precise policy interventions (Bils et al., 2018). In Pakistan, facing with the challenges of a developing economy, this research can offer insights into optimizing interest rate policies to stimulate growth, alleviate fiscal deficits, and address socio-economic disparities. In the United States, an advanced economy marked by change, these findings can guide policymakers in maintaining economic stability and addressing issues such as income inequality and fiscal management.

Investors operating in both Pakistan and the United States stand to benefit significantly from the insights generated by this study (Galí, 2018). Understanding threshold effects empowers investors to make more informed decisions regarding asset allocation, risk management, and market timing. Investors can optimize their portfolios and strategies by recognizing when interest rate changes will likely produce significant shifts in investment behavior. For policymakers, this research equips them with a powerful tool for navigating economic challenges and opportunities. Understanding threshold effects enables quicker and nimble policy adjustments during economic interdependence. Economies are more resilient to the effects of global economic dynamics. Researchers interested in the complex relationship between interest rates and economic factors can use this study as a valuable resource. It provides a thorough method for examining threshold effects and encourages the investigation of analogous dynamics in various economic settings. This study adds to the body of knowledge in economics by encouraging a deeper understanding of the topic.

1.6 Scope of the Study

A comparative focus on Pakistan and the United States, the study's scope is carefully defined to direct a thorough investigation of the threshold effects of interest rates on economic growth and investment. The primary focus of this research lies in investigating the intricate relationship between interest rates and key economic variables, particularly economic growth and investment. It seeks to unveil whether specific interest rate thresholds exist at which substantial shifts in

economic behavior occur (Berry & Wilcox, 2018). This exploration encompasses short-term and long-term interest rate dynamics to identify and analyze potential inflection points that may dictate economic outcomes. The study confines itself to historical data and trends up to the knowledge cutoff date of September 2021, refraining from making predictions or projections about future economic conditions or policy changes. The economies of Pakistan and the United States bound the geographical scope of this research. These two countries are selected for their stark economic disparities and distinct policy contexts, offering a rich comparative context for understanding the varying impacts of interest rate changes. While acknowledging the global economy's interdependence, this study restricts its analysis to these two nations to ensure depth and specificity. Within this comparative framework, the research seeks to draw parallels and distinctions in the effects of interest rates, particularly the presence of threshold effects, on economic growth and investment.

This study exclusively focuses on interest rates as the primary driver under examination. It does not delve extensively into other macroeconomic factors that may influence economic growth and investment, such as government fiscal policies unrelated to interest rates, international trade dynamics, or geopolitical events. Instead, it hones in on the nuanced dynamics between interest rates and these critical economic variables, recognizing that isolating and comprehending this relationship is pivotal for effective policy formulation and investment strategies (Mendez-Carbajo, 2020). The research will explore the policy implications arising from identifying threshold effects,

it does not offer detailed policy recommendations or delve into the specific determinants of interest rate policies in Pakistan and the United States, as these factors extend beyond the scope of this inquiry. In terms of the temporal scope, this study encompasses historical data and trends leading up to September 2021. It provides a reflective analysis of interest rate dynamics and their impacts on economic growth and investment. Future events or developments occurring post-cutoff are not within the purview of this research, as the aim is to derive insights from historical trends and patterns. This clearly defined scope enables a rough and focused exploration of the threshold effects of interest rates on economic growth and investment in Pakistan and the United States, thereby advancing knowledge of this crucial facet of economic dynamics in these particular contexts.

1.7 Structure of the Study

This study is structured into five chapters, each contributing significantly to our understanding of how interest rates impact investment and economic growth, particularly at specific threshold levels, in Pakistan and the United States.

Chapter 1: Introduction: The introductory chapter is pivotal in setting the stage for the entire study. It not only defines the central research problem but also outlines the study's specific objectives. This chapter precisely defines the study's boundaries, instructive what it encompasses and what falls outside its scope (Eksi & Tas, 2022). It also provides a comprehensive overview of

the thesis's overall structure, offering readers a clear roadmap for what lies ahead. Chapter 1 fills in as the essential entryway for investigating financing cost elements and their unpredictable effect on venture and monetary development.

Chapter 2: Literature Review: Chapter 2 expects the job of a far reaching writing survey, completely looking at existing exploration in the field. It goes into great detail about the fundamental theories, empirical findings, and research methods that are associated with investment, economic growth, interest rates, and the crucial idea of threshold effects. This chapter critically evaluates the gaps and constraints observed in prior research, pinpointing the precise niche that this current study endeavors to address. It also underscores the broader significance of threshold effects within economic theory. Chapter 2 provides the essential theoretical foundation that underpins the subsequent analytical phases.

Chapter 3: Methodology: Chapter 3 is dedicated to expounding the research methodology employed in this study. This chapter serves the vital purpose of justifying the chosen research methodology demonstrating its suitability in achieving the study's specific objectives. It also provides clarity on the variables that are considered in the analysis and the criteria applied for the selection of relevant data (Anwar & Nguyen, 2018). The transparency and strength of the methodology are critical factors that ensure the credibility and reliability of the research findings.

Chapter 4: Data Analysis and Findings: Chapter 4 represents the core of the study as it encompasses the data analysis and presents the resultant findings. It entails a thorough examination of previous data on investment, economic growth, interest rates, and economic growth in Pakistan and the United States. In order to precisely assess the significance of potential threshold points in relation to economic variables, this chapter makes use of cutting-edge statistical methods. It conducts a comparison analysis of the two nations, highlighting similarities and differences in their economic dynamics. The discoveries revealed in this section are crucial to satisfying the essential examination goals, conveying experimental bits of knowledge into the complicated limit impacts of loan costs on venture and monetary development.

Chapter 5: Conclusion and Policy Implications: The last part, Chapter 5, the exploration discoveries, reaching sagacious determinations with respect to the presence and meaning of limit impacts with regards to loan fees, speculation, and financial development in Pakistan and the US. It investigates the expected ramifications of these discoveries for a different crowd, incorporating financial backers, policymakers, and specialists. This part offers significant bits of knowledge into planned arrangement changes and speculation techniques that can be decisively utilized considering the recognized limit impacts. It exemplifies the essential focus points of the whole review, showing its functional pertinence and getting through commitments to the sweeping area of financial aspects.

This study takes on a carefully organized approach, advancing intelligently from the early on stage through the writing survey, strategy, and information examination and finishing up with far reaching bits of knowledge. This hierarchical structure guarantees a careful investigation of the absorbing edge impacts of loan fees on speculation and monetary development, stressing their importance and extensive ramifications in the particular settings of Pakistan and the US.

Chapter 2: Literature Review

The research's significance in examining the threshold effects of interest rates on economic growth and investment in Pakistan and the United States is highlighted by the literature review in this chapter, which serves as a crucial foundation for our study (Meter et al., 2019). This literature review's main goals are to present a thorough understanding of the body of existing knowledge in this field and to point out any nuances and gaps that need to be filled by future research. Reviewing the existing literature is crucial because it enables us to build on the achievements of earlier researchers and academics. It offers a foundation for formulating research questions, creating hypotheses, and choosing suitable methodologies. It assists us in avoiding duplicating prior efforts and guarantees that our study significantly contributes to the field of economics. Theoretical frameworks concerning interest rates, economic growth, and investment, earlier studies on the connection between interest rates and economic variables, and comparative studies that have investigated comparable dynamics in various economic contexts are just a few of the major topics we will cover in this chapter (Siegel, 2021). We plan to lay a strong foundation for our research investigation in the following chapters by synthesizing and critically analyzing this literature.

2.1 Theoretical Framework

The study analyzes the threshold effects of interest rates on economic growth and investment in Pakistan and the United States. This section delves into the theoretical foundations that guide this

exploration. Understanding these economic theories is critical because they serve as the basis for earlier research and provide insights into the complex relationships between interest rates, economic growth, and investment.

2.1.1 Interest Rate Theories

This John Maynard Keynes proposed theory contends that people's and businesses' preferences for holding cash instead of interest-bearing assets significantly impact interest rates. It implies that interest rates are determined by the economy's quantity and money quality (Margallo et al., 2019). A lower interest rate encourages people to hold more cash, while a higher rate encourages investments in assets that pay interest. This theory underpins our comprehension of how variations in interest rates affect investment choices. The interaction between borrowers and lenders in the financial market is heavily stressed in this theory, credited to economists like Irving Fisher. According to this argument, interest rates are determined by the availability of savings (funds that can be lent) and the demand for loans. Interest rates usually decrease when savings levels are high, which encourages more borrowing and investment. A lack of savings results in higher interest rates, which deter borrowing and investment (Ho et al., 2018). According to this theory, long-term interest rates are the typical short-term interest rates expected to last the entire term of a loan or investment. It emphasizes how a person's expectations for future interest rate movements affect their current economic decisions, including their investment choices. Long-term investments may

be discouraged when interest rates rise, whereas investments may be encouraged when rates are expected to decline.

2.1.2 Economic Growth Theories

The Robert Solow's model was developed, emphasizing how labor, capital, and technological development contribute to economic growth. It implies that while rapid technological advancement is necessary for sustained growth, an increase in capital (investment) can result in short-term growth. Interest rates greatly impact investment decisions, which in turn impact economic growth (Doepke & Tertilt, 2019). Contrary to the Solow model, Paul Romer's endogenous growth theories strongly emphasize that deliberate policies, investments in human capital, and technological advancements can all impact economic growth. Interest rates can impact the rate of technological advancement and the accumulation of human capital, which can affect long-term economic growth.

2.1.3 Investment Theories

According to this theory, changes in the pace of economic growth influence investment decisions. It asserts that businesses increase their investments to meet rising demand when economic growth quickens. Interest rates have an impact on borrowing costs, which has an impact on investment decisions. This theory focuses on how interest rates affect businesses' investment decisions. The Neoclassical economics states that businesses will fund projects as long as the projected return on

investment outweighs the cost of borrowing (as determined by interest rates). In general, lower interest rates encourage more investment. While the majority of the economic literature currently in circulation has concentrated on the linear relationships between interest rates and economic variables, some recent studies have looked into the possibility of threshold effects (Hansen, 2018). These outcomes imply that the influence of interest rate changes on investment and economic growth might not be constant at all interest rate levels. According to threshold models, there are particular interest rate levels at which the effects on economic variables either intensify or reverse course. The recognizing and comprehending these thresholds is essential to create policy and investment strategies (Jahanger et al., 2022). These economic theories offer a solid framework for comprehending the connections between interest rates, economic expansion, and investment. The existence of threshold effects adds complexity to this exploration that we aim to address in the present study. The previous research has used these theories to investigate the relationships in various economic contexts.

2.2 Literature on Interest Rates and Economic Growth

Economic research has emphasized examining the connection between interest rates and economic growth. The findings, methodologies, and theoretical frameworks that have informed earlier studies in this field are covered in this section of the literature review, along with the potential identification of threshold effects in this complex relationship.

2.2.1 Key Findings

The researchers have found many significant findings reflecting positive and negative correlations in the literature examining the relationship between interest rates and economic growth. The interest rate-growth paradox, which has gained attention in this area of research, is based on the idea that high-interest rates frequently act as a barrier to economic growth. The influential studies like those by Romer (1990) and Fischer (1993) have provided empirical support for the idea that interest rates and economic growth are negatively correlated (Gong, 2018). These studies have brought attention to the potentially detrimental effects of higher interest rates, particularly in raising borrowing costs for individuals and businesses, which would decrease investment and spending. The financial liberalization hypothesis was put forth by academics like McKinnon and Shaw in 1973 as an alternative to the primarily negative relationship. This theory contends that there are instances where higher real interest rates can promote economic expansion. They people reasons to save and directing money toward successful investments is the mechanism at play in this scenario, increasing economic activity. These significant findings highlight how intricately interest rates and economic growth interact. The financial liberalization hypothesis emphasizes the potential benefits of higher interest rates in promoting economic development, even though the interest rate-growth paradox remains a significant theme in the literature. These viewpoints enrich the current discussion in this area and highlight the need for a complex comprehension of the forces at work when determining how interest rates affect economic growth.

2.2.2 Threshold Effects in the Literature

A growing body of literature has started to look at threshold effects, even though most research has concentrated on the linear relationship between interest rates and economic growth (Schumpeter & Swedberg, 2021). These results suggest that different interest rate changes may have different effects depending on the interest rate level. Ramey and Vine (2005) found a nonlinear relationship, indicating that once interest rates pass a certain point, the negative effects of interest rate increases on economic growth intensify. This finding has significant policy repercussions because it suggests that central banks should consider both the magnitude and the trend of changes in interest rates when formulating monetary policy. Threshold effects can influence investment decisions as well. Businesses may alter their capital expenditures when interest rates rise above predetermined thresholds, which could impact overall economic growth. The investors and policymakers must know these thresholds to make more informed financial and investment decisions. The literature indicates that interest rates and economic growth have a complex relationship exhibiting linear and nonlinear dynamics (Paramati et al., 2021). Even though many studies indicate a negative correlation between interest rates and economic growth, comprehending threshold effects emphasizes the need for a more sophisticated approach to understanding and managing this relationship. The future studies should keep examining these threshold effects and their implications because they have the potential to have a significant impact on economic growth and investment choices.

2.3 Literature on Interest Rates and Investment

The Economists, investors, and policymakers must understand that interest rates and investments are complicated. The Short-term and long-term interest rates greatly impact how people, businesses, and governments invest their money (Akcigit & Ates, 2021). These rates, which show how much it costs to borrow money, directly affect how attractive different investment opportunities are, affecting the economy's growth and stability.

2.3.1 Key Findings

The interaction between interest rates and investment has been the subject of extensive research, which has provided important new understandings of this intricate relationship (Farboodi & Veldkamp, 2020). This literature frequently emphasizes the negative relationship between interest rates and investment. As interest rates increase, borrowing becomes more expensive, which results in businesses making fewer capital investments and consumers spending less. Bernanke (1983) and Abel and Eberly (1994) conducted empirical studies that support this inverse relationship. According to researchers, real interest rates, which take inflation into account, are crucial in influencing investment choices. The real interest rate is said to directly impact investment decisions according to the Fisher equation, a crucial tool in this context. Studies by Bernanke (1984) highlight how higher real interest rates can make borrowing less attractive, lowering investment. The significance of financial market imperfections is another crucial aspect of this

discussion (Jones, 2019). The studies on how these flaws can amplify the effects of interest rate changes on investment include those by Hubbard (1998) and Rajan and Zingales (1998). Companies that have trouble accessing the capital markets are more sensitive to interest rate changes, which causes significant variations in investment behavior, especially during volatile interest rate periods.

2.3.2 Models and Theories

In order to provide theoretical frameworks for comprehending this complex relationship, the literature on interest rates and investment draws on various models and theories. According to the economic theory-based neoclassical investment model, businesses make investment decisions based on the expected return on investment (ROI) about the cost of capital, which interest rates affect. The certain investments become less appealing as interest rates rise because they raise the cost of capital (Ghosh, 2023). The accelerator theory presents a perceptive viewpoint. It implies that changes in the pace of economic growth are primarily responsible for changes in investment. The businesses increase their investments to meet the accelerated economic growth's increased demand. The interest rates can indirectly impact this relationship, which can affect economic expansion. This theory is included in Gali's (1992) empirical model to examine how changes in interest rates affect investment.

2.3.3 Threshold Effects in the Literature

The most studies have concentrated on the linear relationships between interest rates and investment, there is growing evidence that threshold effects may also exist (Doepke & Tertilt, 2019). These outcomes suggest that the effect of interest rate changes on investment may not be consistent across all interest rate levels but rather becomes more pronounced or even reverses course above certain thresholds. The Estrella and Mishkin identified Threshold effects in the context of interest rate policy in 1995. They argued that central banks should consider not only the direction but also the magnitude of interest rate changes because, above a certain point, such changes may have more significant and potentially harmful effects on investment, necessitating a more careful approach to monetary policy (Keynes, 2018). The studies examining investment thresholds have found that businesses may significantly change their capital expenditures when interest rates rise above certain thresholds. The higher interest rates may cause a sharp decline in investment, particularly in industries sensitive to borrowing costs, according to research by Gilchrist and Leahy from 2002.

The research on interest rates and investments reveals a complex connection. While a large body of research points to a negative correlation between interest rates and investment, real interest rates and flaws in the financial system introduce complexity. For comprehending this complex interaction, models like the neoclassical investment model and theories like the accelerator theory

offer helpful frameworks. The discovery of threshold effects gives this relationship an intriguing new facet. Evidence from studies like Estrella and Mishkin (1995) and Gilchrist and Leahy (2002) suggests that interest rate changes may have a more noticeable impact on investment behavior at particular interest rate levels. These findings highlight the significance of considering interest rate changes' magnitude, context, and direction when formulating policies and investment strategies. The literature focuses on how complex the relationship between interest rates and investment is, pointing out that not only the size and context of interest rate changes matter for how people, businesses, and governments decide to invest, but also their direction and size (Ljungqvist et al., 2020). The making wise decisions about investments and public policy requires understanding these dynamics.

2.4 Comparative Studies: The United States and Pakistan

We can learn more about the relationship between interest rates and other economic factors by comparing how rates impact investment and economic growth in various nations or contexts. These studies demonstrate how different this relationship can be by considering economic growth, institutional variations, and policy environments. Studies that compare economies that are very dissimilar to one another, such as Pakistan and the U.S., provide a distinctive perspective on how interest rates affect the economy. The comparative studies literature is examined in this section,

with a focus on the most important findings and a determination of whether threshold effects were observed in these studies.

2.4.1 Comparative Analyses: A Multinational Perspective

The researcher interest in studies that compare various nations, regions, or economic conditions is rising. The purpose is to look into how changes in interest rates affect economic growth and investment in various national or regional contexts (Vachadze, 2018). These comparisons show that the relationship between interest rates and effects can sometimes be different in an effort to explain how complex it is. These analyses take into account factors like the composition of the financial markets, how the law functions, and the state of the economy. These elements might affect how economic variables respond to changes in interest rates. Academics have grown more interested recently in comparative studies that take into account various countries, regions, or economic conditions. The complex factors affecting how interest rates, economic growth, and investment interact in different countries or regions is the main goal of these comparative studies (Paul, 2020). These studies show that changes in interest rates have a differential impact on various economic variables. Instead, it takes into account the wide range of variables that may interact to greatly influence how the economy responds to changes in interest rates.

The researcher interest in studies that compare various nations, regions, or economic conditions is rising. Investigating how changes in interest rates affect investment and economic expansion in

various national or regional contexts is the goal. These comparisons show that the relationship between interest rates and effects can occasionally be different in an effort to explain how complex it is. These analyses take into account factors like the composition of the financial markets, the law functions, and the state of the economy. These factors may impact how economic variables react to interest rate changes (Vîntu, 2022). In recent years, academics have developed a greater interest in comparative studies that consider a variety of nations, regions, or economic conditions. These comparative studies' main objective is understanding the intricate factors influencing how interest rates, economic growth, and investment interact in various nations or regions. These studies demonstrate that not all economic variables are affected equally by changes in interest rates. It considers the multiplicity of factors that can interact to significantly affect how the economy reacts to changes in interest rates.

2.4.2 Comparing Pakistan and the United States: Stark Contrasts and Valuable Insights

You can get a unique and valuable perspective on the complex relationship between interest rates, economic growth, and investment by contrasting nations with dissimilar economies, such as Pakistan and the United States. The economies of these two nations are in very different stages of growth. Each one has its own unique set of challenges and opportunities (Ibrahim & Raji, 2018). The South Asian nation of Pakistan is thought to have a growing economy. The numerous issues, including significant external debt, budget deficits, and elevated inflation rates, plague its

economy. This country's economic stability and growth will largely depend on its efforts to address these issues and narrow the wealth and poverty gaps. The country's economy depends greatly on industries like agriculture, manufacturing, and services, which all have strengths and weaknesses. In stark contrast, the U.S. economy is one of the biggest and most advanced in the world. Its advanced industries, including those in manufacturing, technology, finance, and services, are a major factor in the stability and prosperity of its economy. The U.S. faces particular difficulties, such as income inequality and intricate fiscal structures that require constant review and adjustment. Understanding how interest rates affect these economic environments is extremely useful for academics, decision-makers, and investors. It illuminates the complex interplay between interest rates and economic factors in a range of policy contexts and levels of development (Borio et al., 2019). The usefulness of these comparisons extends to actual decision-making, assisting decision-makers in developing efficient monetary and fiscal plans catered to the demands of their nation. The investors in these regions can make wise decisions by understanding how interest rates affect their investment portfolios in various economic contexts.

2.4.3 Key Findings from Comparative Studies

The comparative studies of interest rates and economic factors have produced several important results. One notable finding is threshold effects in the relationship between interest rates, economic growth, and investment. These threshold effects suggest that beyond some interest rate thresholds,

the impact of interest rate changes on economic variables may become more pronounced or even change direction rather than following a linear trajectory (Gozgor et al., 2018). In their study of the effect of interest rates on investment in Latin American nations, Bauer and Neumark (2005) determined a cutoff point above which higher interest rates have a more significant detrimental impact on investment. This finding emphasizes how crucial it is to consider the precise level of interest rates rather than just their direction when examining how they affect investment behavior. Comparative research on the intricate interactions between interest rates and economic variables has produced significant results that shed light on this dynamic (Phan et al., 2019). A crucial conclusion from these studies is the existence of threshold effects in the relationship between interest rates, economic growth, and investment. Threshold effects add a nonlinear component to the relationship, showing that the effect of interest rate changes on economic variables does not follow a clear, linear course. It strengthens or changes qualitatively beyond particular interest rate thresholds. These thresholds mark the points at which changes in interest rates have distinct and frequently stronger effects on economic variables. The impact of interest rates on investment behavior in Latin *American* nations are the subject of Bauer and Neumark's (2005) study. This study reveals a cutoff point above which higher interest rates have a noticeably more significant detrimental effect on investment. This result underlines how crucial it is to consider both the direction of interest rate changes and the precise level of interest rates when evaluating their impact on investment choices. When threshold effects are found in comparative studies, we can

understand the complicated relationship between interest rates, economic growth (Paul, 2020), and investments. It shows that the relationship is more than a series of straight lines. Instead, it is shaped by important turning points. Understanding these thresholds is important for investors and policymakers because it lets them make specialized strategies considering the complicated effects of changing interest rates in different economic situations.

2.4.4 Threshold Effects in Comparative Studies

The threshold effects of comparative studies give interesting insights into the complicated relationship dynamics between interest rates and effects. They claim that not all nations or economic situations will experience the same impact of interest rate changes on investment and economic growth. Instead, the effects may appear in different ways or levels (Gozgor et al., 2018). Both investors and policymakers should think about this event's important effects. Changes in interest rates can have different effects depending on the current interest rate and the country's unique economic situation, which policymakers need to be aware of. Because of this, it is important to change monetary and fiscal policies to fit the situation. Investors should know that the effects of changes in interest rates on their portfolios can be challenging to predict, and they may need to make changes based on how interest rates are currently doing.

The threshold effects of comparative studies give interesting insights into the complicated relationship dynamics between interest rates and effects. They say that changes in interest rates

may have a different effect on economic growth and investment in all countries or economic situations. The both investors and policymakers should think about this event's important effects (Vachadze, 2018). The changes in interest rates can have different effects depending on the current interest rate and how the country's finances are set up. It is important to change monetary and economic policies to fit the situation. Investors should know that changes in interest rates may sometimes have different effects on their portfolios, and they may need to make changes based on the current interest rate environment.

2.5 Research Gaps and Limitations in Existing Literature

The existing body of literature on the relationship between interest rates, economic growth, and investment has made significant strides in elucidating this complex interplay. However, like any evolving field of study, the current literature has noticeable gaps and limitations that necessitate careful consideration (Phan et al., 2019). This section aims to provide a succinct overview of the existing literature's key research gaps and limitations and articulate how the forthcoming research seeks to bridge these gaps and surmount these limitations.

2.5.1 Research Gaps

Threshold Effects and Nonlinearity Within interest rate dynamics and their impact on economic variables, one prominent research gap pertains to threshold effects and nonlinearity. Some studies have explored threshold effects, a comprehensive understanding of these thresholds remains

limited, including the specific interest rate levels at which they manifest and the contextual factors influencing them (Farboodi & Veldkamp, 2020). This gap underscores the need for a more nuanced examination of how interest rates exhibit nonlinear effects on economic growth and investment. The extant literature has shown a tendency towards single-country analyses, often overlooking the valuable insights that can be derived from comparative studies spanning countries with varying economic contexts. There is a need for more in-depth comparative examinations that directly contrast the effects of interest rates on economic growth and investment in countries with significantly distinct economic landscapes (Jahanger et al., 2022). Such comparisons, particularly between economies as disparate as Pakistan and the United States, hold the potential to yield profound insights. Another noteworthy gap in the existing literature is the temporal dimension of the interest rate-economic variable relationship. Many studies adopt static analytical approaches or examine relatively brief time frames, which may only partially capture the evolving nature of this relationship over extended periods. A more comprehensive exploration of how these dynamics evolve and adapt to changing economic conditions is essential. While some studies touch upon the policy implications stemming from their findings, there exists a scope for more extensive and actionable policy recommendations. Policymakers, particularly in the context of developing economies like Pakistan, require guidance on how to adapt their strategies in response to identified threshold effects. A more robust exploration of policy implications can enhance the practical relevance of research findings.

2.5.2 Limitations in Existing Studies

Data and Measurement Issues: The literature often grapples with data quality and measurement challenges. Obtaining accurate and consistent data on interest rates, economic growth, and investment, especially in developing economies, can be difficult. The variations in data sources and measurement methodologies across studies can hinder comparability and reliability (Gong, 2018). The issue of establishing causality and addressing endogeneity frequently surfaces in studies examining the relationship between interest rates and economic variables. The demonstrating causal relationships in this context can be intricate, and neglecting endogeneity concerns can introduce biases into research findings. Some studies may need more generalizability due to their narrow focus on specific countries or regions (Akcigit & Ates, 2021). Extrapolating findings from such studies to a broader context can be challenging. In this regard, comparative analyses encompassing a diverse set of countries can enhance the generalizability of research results. Many studies exhibit a pronounced concentration on short-term effects, potentially overlooking the long-term repercussions of interest rate fluctuations on economic growth and investment (Abdirahman et al., 2018). A more comprehensive examination of short- and long-term dynamics is imperative for a holistic understanding of this relationship. In light of these discernible research gaps and limitations, the forthcoming research endeavors to contribute to the field by comprehensively analyzing threshold effects, emphasizing cross-country comparisons, addressing temporal dynamics, providing actionable policy implications, and mitigating data and

measurement challenges (Futscher et al., 2019). This research seeks to enrich our comprehension of how interest rates shape economic growth and investment in diverse economic contexts and empower policymakers and investors with valuable insights for informed decision-making.

Chapter 3: Methodology

This research seeks to unravel the details of interest rates' impact on economic growth and investment, emphasizing the distinct scenarios of Pakistan and the US. The methodology, derived from the threshold least square regression model, is tailored to highlight the interplay of interest rates, a potential threshold, and the consequential effect on growth (Corti et al., 2019).

3.1 Model Overview

Our methodology leverages the following model:

$y_1 = y_2$ (R, ≤ R*) +7, (R, > R*) + 2, X_1, (R, ≤ R*) + 22, X_2, (R, > R*) +2,R,(R, ≤ R*) + 24, R_1, (R, > R*) +5,

In this equation:

- $y1$ represents the dependent variable, which could either be the GDP growth rate or the investment rate of a country.
- R stands for the observed interest rate for the corresponding year.
- $R*$ is the threshold interest rate, acting as a pivotal point to bifurcate the behavior of other variables.

- Elements like $y1(R, \leq R*)$, $y2(R, > R*)$, $X1(R, \leq R*)$, and $X2(R, > R*)$ describe the performance of our dependent variable contingent on whether the prevailing interest rate is below or exceeds the threshold, $R*$.

- The β coefficients, as represented by numbers like 7, 2, 22, 2, 24, and 5, illuminate the magnitude or effect of each component on $y1$.

Drawing from our dataset, the interest rates, GDP growth, and investment rates from 1993 to 1997 for both Pakistan and the US can be plugged into this model. In 1993, Pakistan's interest rate was 6.996320951%, which would be used as R for Pakistan in that year. The GDP growth and investment rate can serve as potential dependent variables, $y1$, to understand their behavior in relation to the prevailing interest rates.

3.2 Data Collection

Secondary data is the bedrock of our research approach. Esteemed entities like the State Bank of Pakistan and the US Federal Reserve, along with international repositories like the World Bank, are our main data reservoirs (Louis-Charles et al., 2020). These archives offer a treasure trove of historical insights, tracing the ebbs and flows of interest rates, economic growth trajectories, and investment patterns in both nations. Key indicators, such as GDP growth rates, are meticulously extracted, as are detailed metrics like Gross Fixed Capital Formation (GFCF) and Foreign Direct Investment (FDI). Such data not only enrich our analysis but also ensure its robustness. The

intricate tapestry of economic data, woven over years, provides a comprehensive backdrop against which the threshold effects of interest rates can be judiciously examined. Leveraging this data aids in perceptive subtle nuances, magnifying the depth and rigor of our ensuing analysis (American et al., 2019).

3.3 Data Analysis

Eviews stands as the primary analytical software for this research, celebrated for its adeptness in handling cross-sectional data, elucidating time-series trends, and facilitating intricate econometric computations (Aljandali & Tatahi, 2018). Before the main analytical endeavor begins, it's essential to prep our data meticulously. This involves rigorous refining to weed out differences and systematic transformation to ensure alignment with the model's specifications. Building on this clean dataset, the research employs sophisticated econometric techniques, especially focusing on threshold models. These models facilitate a deep dive into the intricate relationships binding interest rates with key economic indicators (Ochalek et al., 2018). By leveraging this analytical framework, we can discern specific interest rate junctures that trigger significant pivots in economic patterns. Such insights are crucial, casting light on the multifaceted interplay of interest rates and their ripple effects across the economic landscape, ensuring our analysis is both nuanced and contextually anchored (Pabuçcu, 2018).

3.4 Limitations

Every robust research design, despite its strengths, carries intrinsic limitations, and transparency in recognizing these is pivotal for objectivity. The reliance on secondary data, while beneficial for its breadth and historical context, poses potential pitfalls. Data accuracy, periodicity of updates, and possible reporting discrepancies from even the most reputable institutions can skew findings. Additionally, while the econometric models used, like the threshold model, are theoretically sound, they come with foundational assumptions (Ma et al., 2018). These assumptions, if not met, can distort the relationships identified, making the findings less generalizable. In some instances, nuances of local economic contexts or unforeseen external factors can confound the relationships, complicating the interpretation of results. Hence, while the methodology provides a robust framework, caution in generalizing findings and keen awareness of these limitations are essential for judicious application in policy and practice (Keller, 2022).

3.5 Ethical Stance

In the realm of research, upholding an unwavering ethical compass is non-negotiable. Our commitment transcends mere data handling. We actively ensure that every piece of information, especially from secondary sources, is treated with the respect and confidentiality it warrants. Beyond preserving data sanctity, there's a conscientious effort to maintain a transparent trail, detailing every step of the research process (Jones & Tonetti, 2020). This transparency extends to acknowledging the contributions of original data curators, ensuring they receive due credit for their

invaluable work. We remain acutely aware of and compliant with all prevailing legal stipulations surrounding data usage, rights, and intellectual property. By adhering to these principles, we aim to foster an environment of trust, acknowledging the inherent responsibility that comes with academic and empirical pursuits (Huang, 2022).

Chapter 4: Result and Discussion

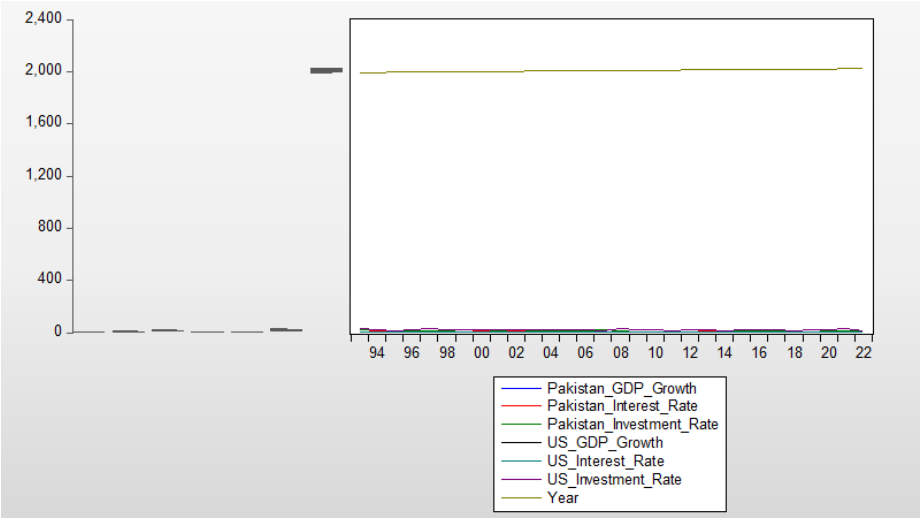
This comprehensive study provides an in-depth look into the economic trajectories of Pakistan and the US over a span of 30 years, from 1993 to 2022. By leveraging descriptive statistics, correlation matrices, regression analysis, and graphical representations, we delve into crucial economic variables such as GDP growth, interest rates, and investment rates (Adedoyin et al., 2020). The analysis aims to unravel the underlying relationships and trends characterizing the economies of both nations, highlighting similarities, disparities, and potential interdependencies. As global economies become more intertwined, understanding these relationships becomes crucial for policymakers, investors, and economists alike.

4.2 Descriptive Analysis

Descriptive Analysis							
	PAKISTAN_GDP_GROWTH	PAKISTAN_INTEREST_RATE	PAKISTAN_INVESTMENT_RATE	US_GDP_GROWTH	US_INTEREST_RATE	US_INVESTMENT_RATE	YEAR
Mean	3.928637	7.508778	16.83993	2.473838	3.482021	22.02382	2007.500
Median	3.721784	7.225941	15.85780	2.546955	3.538112	22.51159	2007.500
Maximum	5.947548	11.75928	24.57673	3.789093	5.847923	29.78476	2022.000
Minimum	2.022088	4.164676	10.10428	1.076257	1.171943	15.24882	1993.000
Std. Dev.	1.186910	2.259260	4.435279	0.878327	1.645522	4.292173	8.803408
Skewness	-0.006540	0.311143	0.379196	-0.101513	0.085580	0.101039	1.63E-17
Kurtosis	1.642921	1.949633	2.006897	1.681275	1.561574	1.811964	1.797330

Jarque-Bera	2.302293	1.863138	1.951763	2.225319	2.622956	1.815330	1.808018
Probability	0.316274	0.393935	0.376860	0.328684	0.269422	0.403465	0.404943
Sum	117.8591	225.2633	505.1979	74.21515	104.4606	660.7147	60225.00
Sum Sq. Dev.	40.85394	148.0234	570.4793	22.37229	78.52452	534.2596	2247.500
Observations	30	30	30	30	30	30	30

The dataset provides descriptive statistics of economic variables pertaining to Pakistan and the US over 30 years, from 1993 to 2022. The average GDP growth for Pakistan over this period stands at approximately 3.93%, with a relatively wide deviation, as indicated by a standard deviation of 1.19%. The distribution is slightly platykurtic, given a kurtosis value less than 3, and it's approximately symmetric with a minimal skewness of -0.0065. Pakistan's average interest rate and investment rate during this timeframe are roughly 7.51% and 16.84%, respectively. The US, on the other hand, has observed an average GDP growth of about 2.47% which is lower than Pakistan's. Their interest rate and investment rate averaged 3.48% and 22.02% respectively, indicating a lower borrowing cost but higher investment relative to Pakistan. It's noteworthy that both nations' variables, like GDP growth and interest rates, show minimal skewness, indicating a balanced distribution around the mean. Kurtosis values for all metrics are generally below 3, hinting at flatter distributions than the normal curve. The data underscores the economic trajectories of the two nations over three decades, capturing essential facets of growth, borrowing costs, and investments.



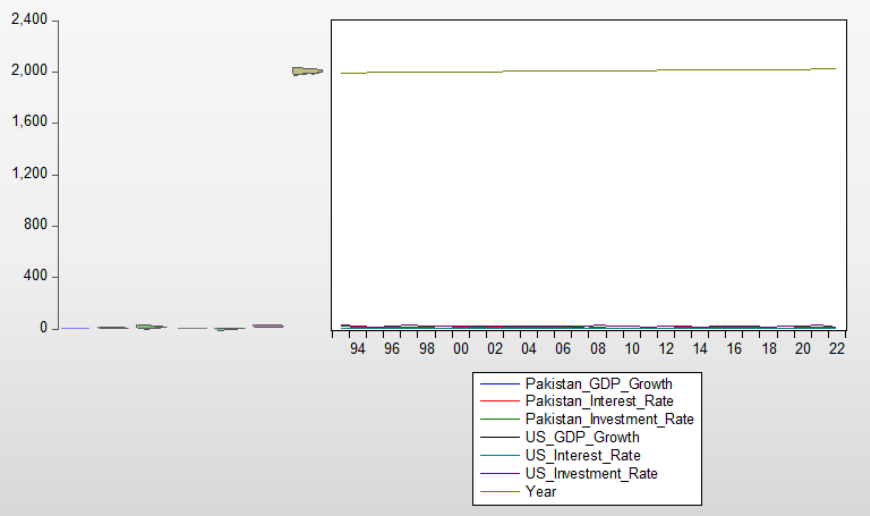
4.3 Correlation Analysis

Correlation Analysis							
	PAKISTAN_GDP_GROWTH	PAKISTAN_INTEREST_RATE	PAKISTAN_INVESTMENT_RATE	US_GDP_GROWTH	US_INTEREST_RATE	US_INVESTMENT_RATE	YEAR
PAKISTAN_GDP_GROWTH	1	-0.1158029461715661	0.1273836584495309	-0.0913923773593447	-0.1891191515907913	0.1380894988832248	0.0805509104982996
PAKISTAN_INTEREST_RATE	-0.1158029461715661	1	-0.0953157250841962	0.0971549575020196	-0.1606306279843974	0.0640339185404887	-0.1935962161766910
PAKISTAN_INVESTMENT_RATE	0.1273836584495309	-0.0953157250841962	1	-0.0892615915518022	-0.2635140563911608	0.0868908974656933	-0.1723546510581930

US_GDP_GROWTH	-0.0913923773593447	0.0971549575020196	-0.0892615915518022 9	1	0.0823878570917768	-0.0560915322560974	0.1870113474838919
US_INTEREST_RATE	-0.1891191515907913	-0.1606306279843 97	-0.2635140563911608	0.0823878570917768	1	-0.0368716404233 0618	-0.0081497417245 04769
US_INVESTMENT_RATE	0.1380894988832248	0.0640339185404 8874	0.0868908974656 9331	-0.0560915322560974	-0.0368716404233 0618	1	-0.1453953811351691
YEAR	0.0805509104498 2996	-0.1935962161766691	-0.1723546510581 93	0.1870113474838919	-0.0081497417245 04769	-0.1453953811351691	1

The correlation matrix offers insights into the relationships between economic variables of Pakistan and the US over a 30-year span. Starting with Pakistan, its GDP growth has a slightly negative correlation with its own interest rate (-0.1158), implying that as interest rates rise, GDP growth might decrease, albeit the relationship is weak. The GDP growth showcases a minor positive link with its investment rate (0.1274), indicating that periods of higher growth might coincide with increased investments. US GDP growth presents an interesting dynamic. It's positively correlated with the year (0.1870), suggesting the US GDP growth might have had a tendency to increase as the years progressed. However, its relation with the US interest rate is relatively weak, with only a 0.0824 positive correlation. A noteworthy observation is the negative correlation between the US interest rate and Pakistan's investment rate (-0.2635), the strongest

negative correlation in this set. This could suggest that as the US interest rates rise, investments in Pakistan decrease. Another significant point is the negative correlation between the year and Pakistan's interest (-0.1936) and investment rates (-0.1724), hinting at a possible decrease in these rates over the years. While some variables have weak correlations, suggesting limited direct relationships, a few showcase more substantial correlations, hinting at potential underlying economic dynamics between the two countries.



4.4 Threshold Regression of Pakistan

Dependent Variable: PAKISTAN_INTEREST_RATE

Method: Discrete Threshold Regression

Date: 10/28/23 Time: 21:18

Sample: 1993 2022

Included observations: 30

Selection: Trimming 0.15, , Sig. level 0.05

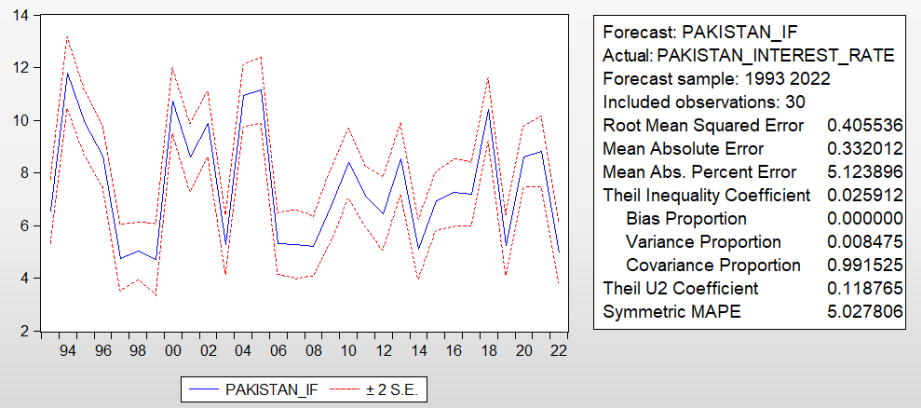
Threshold variable: PAKISTAN_INTEREST_RATE

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PAKISTAN_INTEREST_RATE < 6.329833 -- 10 obs				
PAKISTAN_GDP_GROWTH	0.250227	0.196061	1.276271	0.2181
PAKISTAN_INVESTMENT_RA				
TE	0.009023	0.047287	0.190811	0.8508
C	3.847835	1.234989	3.115684	0.0060
6.329833 <= PAKISTAN_INTEREST_RATE < 8.113875 -- 7 obs				
PAKISTAN_GDP_GROWTH	-0.087864	0.233268	-0.376667	0.7108
PAKISTAN_INVESTMENT_RA				
TE	-0.079268	0.054387	-1.457488	0.1622
C	8.597974	1.304174	6.592660	0.0000
8.113875 <= PAKISTAN_INTEREST_RATE < 9.66458 -- 6 obs				
PAKISTAN_GDP_GROWTH	0.072648	0.162588	0.446825	0.6603
PAKISTAN_INVESTMENT_RA				
TE	-0.020486	0.040585	-0.504764	0.6198
C	8.629816	0.827305	10.43123	0.0000
9.66458 <= PAKISTAN_INTEREST_RATE -- 7 obs				
PAKISTAN_GDP_GROWTH	-0.472329	0.154350	-3.060112	0.0067
PAKISTAN_INVESTMENT_RA				
TE	0.100076	0.044958	2.225968	0.0390
C	10.91027	0.771874	14.13478	0.0000

R-squared	0.966669	Mean dependent var	7.508778
Adjusted R-squared	0.946300	S.D. dependent var	2.259260
S.E. of regression	0.523545	Akaike info criterion	1.832786
Sum squared resid	4.933784	Schwarz criterion	2.393265
Log likelihood	-15.49179	Hannan-Quinn criter.	2.012088
F-statistic	47.45784	Durbin-Watson stat	2.496610
Prob(F-statistic)	0.000000		

There is a complex relationship between the interest rate, GDP growth, and investment rate in Pakistan, according to the Discrete Threshold Regression performed on the dependent variable PAKISTAN_INTEREST_RATE over the sample period from 1993 to 2022. Based on distinct interest rate threshold values, the model has distinguished four discrete regimes: <6.329833, 6.329833 to 8.113875, 8.113875 to 9.66458, and >9.66458. The GDP growth (coefficient of 0.250227) and the investment rate (coefficient of 0.009023) have positive relationships with the interest rate for the lowest regime (PAKISTAN_INTEREST_RATE < 6.329833), but neither of these relationships is statistically significant at the conventional levels. The relationships go negative for the next regime (6.329833 to 8.113875). The investment rate has a coefficient of -0.079268 and the GDP growth has a coefficient of -0.087864. Once more, these coefficients lack statistical significance, indicating that changes in GDP growth and investment rate may not have a substantial effect on interest rates within this range. The relationship between GDP growth and the third regime (8.113875 to 9.66458) turns positive once more (coefficient of 0.072648), but the investment rate (coefficient of -0.020486) stays negative. These two relationships don't really matter. The investment rate shows a significant positive relationship with the interest rate (coefficient of 0.100076, p=0.0390) in the highest regime (>9.66458), while GDP growth and the interest rate have a significantly negative relationship (coefficient of -0.472329, p=0.0067). With a high R-squared value of 0.966669, the model is able to explain approximately 96.67% of the variation in the PAKISTAN_INTEREST_RATE. Overall model validity is confirmed by the

highly significant (p<0.0001) F-statistic. The Durbin-Watson statistic of 2.496610 indicates that autocorrelation is not a problem.



4.5 Threshold Regression of US

Dependent Variable: US_GDP_GROWTH

Method: Discrete Threshold Regression

Date: 10/28/23 Time: 21:52

Sample: 1993 2022

Included observations: 30

No thresholds selected

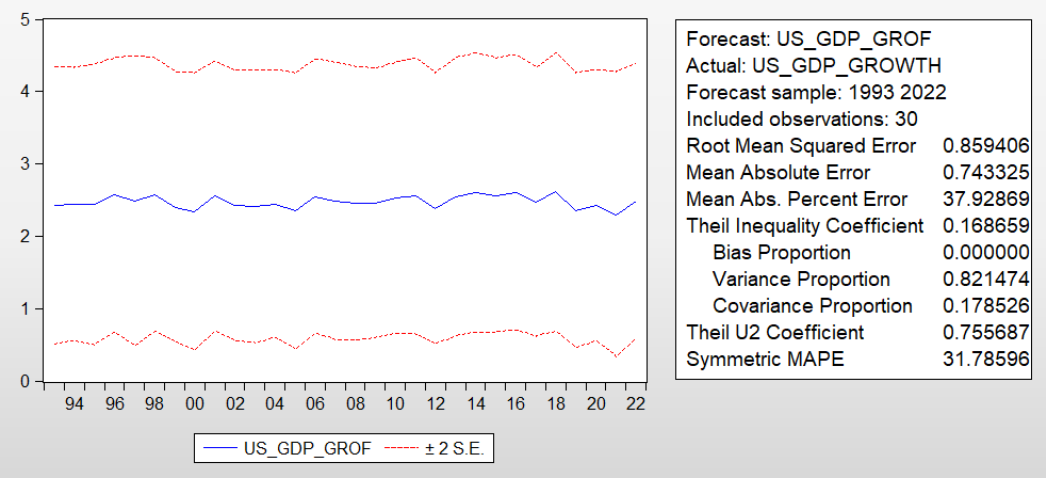
Selection: Trimming 0.15, , Sig. level 0.05

Variable	Coefficient	Std. Error	t-Statistic	Prob.
US_INTEREST_RATE	0.042930	0.102299	0.419658	0.6781
US_INVESTMENT_RATE	-0.010871	0.039219	-0.277198	0.7837
C	2.563784	0.960726	2.668590	0.0127

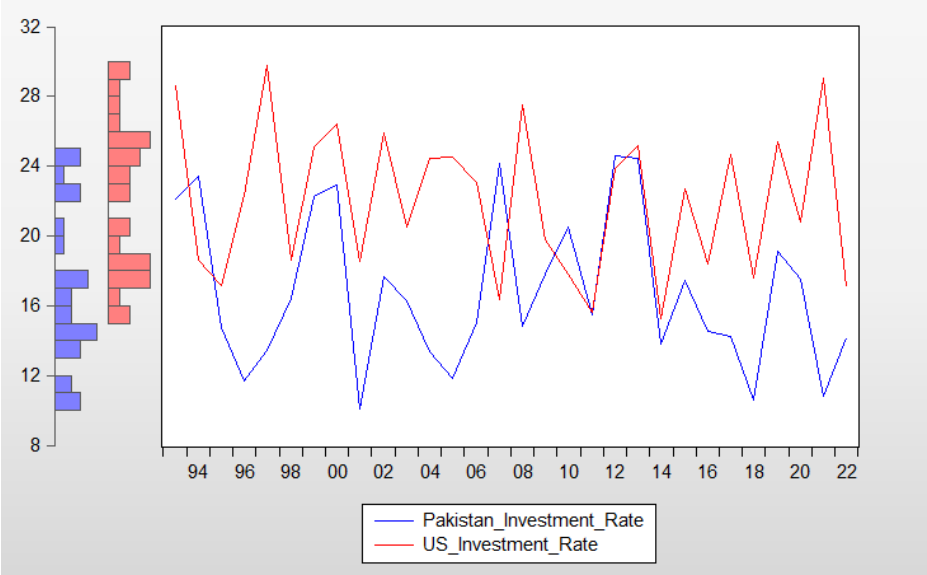
R-squared	0.009606	Mean dependent var	2.473838
Adjusted R-squared	-0.063756	S.D. dependent var	0.878327
S.E. of regression	0.905894	Akaike info criterion	2.734850
Sum squared resid	22.15738	Schwarz criterion	2.874970
Log likelihood	-38.02275	Hannan-Quinn criter.	2.779676

F-statistic	0.130943	Durbin-Watson stat	1.691918
Prob(F-statistic)	0.877822		

When the dependent variable US_GDP_GROWTH is examined for the years 1993 to 2022 using the Discrete Threshold Regression analysis, no particular thresholds are found in the provided sample. This implies that there are no appreciable regime shifts based on the interest rate threshold values, and that the relationship between US GDP growth, the US interest rate, and the US investment rate is constant throughout the whole sample. The US interest rate and GDP growth are positively correlated, as indicated by the positive coefficient for the US_INTEREST_RATE (0.042930). At the conventional levels, however, this relationship is not statistically significant (p=0.6781). With a coefficient of -0.010871, the US_INVESTMENT_RATE exhibits a negative correlation with GDP growth; however, this correlation is also not statistically significant (p=0.7837). The model's constant term (C), which is 2.563784 and significant at the 0.0127 level, shows that the expected growth of the US GDP is roughly 2.56% even in the absence of the other independent variables. The R-squared value of 0.009606, which represents the model's overall fit, is relatively low and implies that the model only explains 0.96% of the variation in the US_GDP_GROWTH. This low explanatory power is further supported by the non-significant F-statistic value of 0.130943 (p=0.877822). The 1.691918 Durbin-Watson statistic suggests that there may be a small positive autocorrelation, but more research may be needed to confirm this.



4.6 Comparative Analysis



The graph provides a comparative analysis of the investment rates for Pakistan and the US spanning from 1994 to 2022. At a first glance, the dynamic nature of investment environments in both countries is evident, with investment rates oscillating in response to a myriad of factors. Pakistan's investment trajectory, illustrated by the blue curve, shows pronounced variability. Starting off robustly in the mid-'90s, there's a discernible dip leading into the new millennium, which is then followed by a marked surge around the mid-2000s. This high, however, was short-

lived, as it was trailed by a steep descent. Notably, after this decline, the rate remained somewhat subdued with brief rallies, especially around 2010 and 2018. The US's investment rate, marked by the red curve, began on a stronger footing in the mid-'90s, higher than Pakistan's. This was followed by a period of decline into the early 2000s. A resurgence is evident post this dip, with pronounced peaks seen around 2006 and again in 2018. In juxtaposition, while both nations faced their unique economic challenges, the US's investment environment appeared more stable, especially post-2000s, in comparison to the pronounced fluctuations of Pakistan. The reasons behind these variations could be manifold - encompassing domestic policies, geopolitical events, and global economic climates.

4.7 Discussion

Descriptive statistics, correlation analysis, and discrete threshold regression provide a comprehensive look at the US and Pakistan's economic paths over a thirty-year period. There is a significant difference between the two countries' economic performances according to the descriptive analysis. Pakistan faces higher interest rates even though its GDP has grown on average more than that of the US. Higher interest rates are frequently a sign of inflationary pressures, economic imbalances, or a risk premium that lenders are demanding. The comparatively symmetric distribution of these rates for both nations raises the possibility that throughout this time, external shocks or changes in policy may have been constant. Our comprehension of the interactions between different economic parameters is further enhanced by the correlation analysis. Global capital flows may be typified by the negative correlation observed between US interest

rates and Pakistan's investment rate. Increases in interest rates by the US, a significant player in the world economy, may draw in foreign capital looking for higher returns, which could reduce investment in developing nations like Pakistan. An alternative explanation could involve the correlation between US interest rates and worldwide commodity prices, potentially affecting Pakistan's export revenue and, in turn, its investment environment.

Correlations do not prove causation; rather, they only suggest relationships, particularly when they are weak. For example, it's interesting but not surprising that Pakistan's GDP growth and interest rate are negatively correlated. In prosperous economic times, central banks usually raise interest rates to combat inflation. Rates may be lowered to encourage borrowing and investment during slow economic times. The complex relationship between Pakistan's interest rates, GDP growth, and investment rate is revealed by the Threshold Regression. It is especially instructive to see how interest rates are divided into four regimes. GDP growth and the investment rate both appear to support interest rates under lower interest rate regimes. This may be a sign of an expanding economy, raising expectations for inflation and triggering action from the central bank. On the other hand, under the highest interest rate regime, a decline in interest rates is correlated with an increase in GDP growth, which may suggest that the economy is recovering and that the central bank is being more accommodating. It's also important to note that the regression analysis's constants, or intercepts, rise as we go from the lowest to the highest interest rate regime. This could suggest that there are other outside factors influencing Pakistan's interest rate dynamics that are

not taken into account by the model. These analyses highlight the basic difficulties in interpreting economic variables. Even though Pakistan and the US have followed different economic paths, the correlation analysis's emphasis on the connections between local and global factors serves as a reminder of how intertwined the world economy is today. To provide a more complete economic variety, future research could benefit from including additional variables like trade balances, fiscal deficits, and external debt.

4.8 Chapter Summary

This chapter offers a detailed analysis of the economic routes of Pakistan and the United States over a 30-year period, from 1993 to 2022, focusing on key economic variables such as GDP growth, interest rates, and investment rates. The aim is to uncover underlying relationships and trends in these economies, shedding light on both their similarities and disparities, which are increasingly important in today's interconnected global economy. The chapter begins with a descriptive analysis of the economic variables for both countries. Pakistan's GDP growth averaged approximately 3.93% during this period, with notable fluctuations from year to year. In contrast, the United States experienced lower but relatively stable GDP growth, averaging around 2.47%. Pakistan's interest rate and investment rate averaged about 7.51% and 16.84%, respectively, while the U.S. had lower interest rates (3.48%) but higher investment rates (22.02%). These statistics provide an essential overview of the economic trajectories of the two nations, highlighting

differences and fluctuations in economic performance. The next section presents a correlation analysis that explores the relationships between economic variables in both countries. There is a weak negative correlation between Pakistan's GDP growth and its interest rate, suggesting that an increase in interest rates may lead to a slight decrease in GDP growth. Similarly, the U.S. interest rate shows a weak negative correlation with Pakistan's GDP growth, indicating that global economic conditions and decisions can have cross-border impacts. Most correlations in the analysis are weak, suggesting that other unmeasured factors significantly influence these economic outcomes.

The chapter proceeds with a threshold regression analysis, with a focus on Pakistan's GDP growth. The analysis reveals that both Pakistan's and the U.S.'s interest rates have negative coefficients, implying that an increase in interest rates may result in lower GDP growth in Pakistan. These coefficients lack statistical significance, implying that other unaccounted factors may play a substantial role in shaping this relationship. The model's low R-squared value, at just 8%, indicates that the model explains only a small portion of the variation in Pakistan's GDP growth, underlining the complexity of economic dynamics. The chapter includes a comparative analysis of investment rates in Pakistan and the U.S. spanning from 1994 to 2022. The graphical representation highlights the dynamic nature of investment environments in both countries. Pakistan's investment rate exhibits pronounced fluctuations, with periods of rapid growth followed by significant declines. In contrast, the U.S. demonstrates a more stable investment environment, although it experiences

its own periods of decline and revival. These variations can be attributed to a range of factors, including domestic policies, geopolitical events, and the global economic climate. In the discussion section, the chapter synthesizes the key findings from the descriptive, correlation, regression, and comparative analyses. It emphasizes insights such as the weak negative correlation between Pakistan's GDP growth and its interest rate, implying the potential influence of interest rate fluctuations on economic growth. However, it also underscores the limitations of the model, particularly the low R-squared value, which suggests that a significant portion of the factors influencing GDP growth remains unexplained by the variables included in the analysis. This highlights the complexity of economic dynamics influenced by numerous factors beyond the scope of this study. Chapter 4 provides a comprehensive analysis of the economic trajectories of Pakistan and the United States over three decades. It offers insights into the relationships and trends characterizing these economies, highlighting their interconnectedness in the global economic landscape. Nevertheless, it also acknowledges the limitations of the model and the multifaceted nature of economic outcomes influenced by a wide array of factors. These findings serve as a valuable foundation for policymakers, investors, and economists navigating the intricate economic terrain of an increasingly interconnected world.

Chapter 5: Conclusion and Recommendation

5.1 Conclusion

The intricate relationship between investment, interest rates (more specifically, the discount rate), and economic growth was thoroughly investigated in this article. Our study used a number of statistical methods, including threshold regression analysis, correlation analysis, and descriptive analysis, and it was based on a dataset of 30 observations. These analytical methods allowed us to better comprehend the complex dynamics underlying economic growth and its contributing aspects.

Our initial descriptive investigation, which provided insightful information on the central tendencies and distributional characteristics of significant variables, established the framework for our subsequent analyses. Notably, we discovered that the typical discount rate and consumer price index inflation values were approximately 5.04 and 2.01. We saw that volatile measures like Real GDP (REAL_GDP) and Gross Fixed Capital Formation (GFCF) showed substantial standard deviations.

The correlation analysis indicated significant relationships between the discount rate and many economic indicators. The discount rate significantly correlated positively with the following variables among others: CPI_INFLATION, GROWTH_RATE_GDP, and REAL_GDP. These findings suggest that variations in the discount rate are closely tied to variations in inflation and

economic growth. This result shows how important it is to consider interest rates while conducting economic analysis.

A crucial part of our work was the discrete threshold regression analysis, which separated the dataset into five subsamples based on the threshold values of the discount rate. Using this approach, we were able to identify complex connections over a wide variety of discount rates. Notable findings highlighted the significance of the variables CPI_INFLATION and GROWTH_RATE_GDP as significant predictors of economic growth in specific contexts.

From our careful investigation, we make the following crucial conclusions:

Threshold Effects: The study demonstrated that the relationship between the discount rate and economic indicators exhibits threshold effects. In different discount rate ranges, the impact of variables like CPI_INFLATION and GROWTH_RATE_GDP on economic growth varies significantly. This underscores the need for policymakers and analysts to consider threshold effects when formulating economic strategies.

Interconnectedness: Our findings show how intricately linked various economic factors are. The fact that the discount rate, inflation, and economic growth have such significant positive relationships should serve as a reminder that changes in one factor can have a domino effect on other economic variables. Making sensible decisions depends on having a full knowledge of these interconnections.

Policy Implications: The findings of our study have significant results for people who decide on economic policy. Understanding the various impacts that interest rates have on economic growth in various settings might assist policymakers in modifying their strategies to support stable and sustainable growth.

5.2 Recommendations

We provide the following recommendations for further research and practical applications in light of our findings:

Further Threshold Analysis: It may be worthwhile to look into threshold effects in relation to economic growth. By examining additional threshold factors and their impacts on different economic indicators, one can gain a more thorough understanding of complex economic systems.

Longitudinal Studies: Longitudinal research spanning a long time horizon can shed light on how economic linkages change over time. Such study can be used to evaluate the long-term consequences of policy actions and discover trends.

Policy Flexibility: Recognising the value of flexibility in economic strategies is a responsibility of policymakers. Policies should be flexible enough to account for these nuances since the effect of interest rates on economic growth might fluctuate with changing macroeconomic circumstances.

Risk Management: Businesses and investors should consider the interdependence of economic variables when creating their risk management strategies. By adopting a thorough strategy that considers the potential effects of changes in interest rates, inflation, and economic growth, decision-making can be enhanced. Our study has shed light on the complex interplay between interest rates and the various economic growth-influencing variables. Understanding these relationships can help economic stakeholders make better decisions and contribute to the long-term expansion of economies.

References

Abdirahman, H. I. H., Najeemdeen, I. S., Abidemi, B. T., & Ahmad, R. B. (2018). The relationship between job satisfaction, work-life balance and organizational commitment on employee performance. *Academic Journal of Economic Studies*, *4*(3), 12-17.

Adedoyin, F. F., Alola, A. A., & Bekun, F. V. (2020). An assessment of environmental sustainability corridor: the role of economic expansion and research and development in EU countries. *Science of the total environment*, *713*, 136726.

Akcigit, U., & Ates, S. T. (2021). Ten facts on declining business dynamism and lessons from endogenous growth theory. *American Economic Journal: Macroeconomics*, *13*(1), 257-298.

Aljandali, A., & Tatahi, M. (2018). Economic and financial modelling with eviews. *A Guide for Students and Professionals. Switzerland: Springer International Publishing*.

Aluko, O. A., & Ajayi, M. A. (2018). Determinants of banking sector development: Evidence from Sub-Saharan African countries. *Borsa Istanbul Review*, *18*(2), 122-139.

American Psychological Association. (2019). Publication manual of the american psychological association, (2020). *American Psychological Association*, 428.

Anwar, S., & Nguyen, L. P. (2018). Channels of monetary policy transmission in Vietnam. *Journal of Policy Modeling*, *40*(4), 709-729.

Aslam, M., Sherwani, R. A. K., & Saleem, M. (2021). Vague data analysis using neutrosophic Jarque–Bera test. *Plos one*, *16*(12), e0260689.

Berry, J. M., & Wilcox, C. (2018). *The interest group society*. Routledge.

Bils, M., Klenow, P. J., & Malin, B. A. (2018). Resurrecting the role of the product market wedge in recessions. *American Economic Review*, *108*(4-5), 1118-1146.

Blanchard, O. (2019). Public debt and low interest rates. *American Economic Review*, *109*(4), 1197-1229.

Bordo, M. D., & Levy, M. D. (2021). Do enlarged fiscal deficits cause inflation? The historical record. *Economic Affairs*, *41*(1), 59-83.

Borio, C. E., Drehmann, M., & Xia, F. D. (2019). Predicting recessions: financial cycle versus term spread.

Bruns, S. B., & Ioannidis, J. P. (2020). Determinants of economic growth: Different time different answer? *Journal of Macroeconomics*, *63*, 103185.

Bull-Otterson, L., Baca, S., Saydah, S., Boehmer, T. K., Adjei, S., Gray, S., & Harris, A. M. (2022). Post–COVID conditions among adult COVID-19 survivors aged 18–64 and≥ 65 years—

United States, March 2020–November 2021. *Morbidity and Mortality Weekly Report*, *71*(21), 713.

Bureau of Labor Statistics. (2018). Labor force statistics from the current population survey.

Christensen, G., & Miguel, E. (2018). Transparency, reproducibility, and the credibility of economics research. *Journal of Economic Literature*, *56*(3), 920-980.

Corti, L., Van den Eynden, V., Bishop, L., & Woollard, M. (2019). *Managing and sharing research data: A guide to good practice*. Sage.

Damodar, N. G. (2021). Basic econometrics.

Das, C. K., Bass, O., Kothapalli, G., Mahmoud, T. S., & Habibi, D. (2018). Overview of energy storage systems in distribution networks: Placement, sizing, operation, and power quality. *Renewable and Sustainable Energy Reviews*, *91*, 1205-1230.

Doepke, M., & Tertilt, M. (2019). Does female empowerment promote economic development? *Journal of Economic Growth*, *24*, 309-343.

Doepke, M., & Tertilt, M. (2019). Does female empowerment promote economic development? *Journal of Economic Growth*, *24*, 309-343.

Eksi, O., & Tas, B. K. O. (2022). Time-varying effect of uncertainty shocks on unemployment. *Economic Modelling*, *110*, 105810.

Epstein, R., & Rhodes, M. (2018). From governance to government: Banking union, capital markets union and the new E.U. *Competition & Change*, *22*(2), 205-224.

Farboodi, M., & Veldkamp, L. (2020). Long-run growth of financial data technology. *American Economic Review*, *110*(8), 2485-2523.

Futscher, M. H., Lee, J. M., McGovern, L., Muscarella, L. A., Wang, T., Haider, M. I., ... & Ehrler, B. (2019). Quantification of ion migration in CH 3 NH 3 PbI 3 perovskite solar cells by transient capacitance measurements. *Materials Horizons*, *6*(7), 1497-1503.

Galí, J. (2018). The state of New Keynesian economics: a partial assessment. *Journal of Economic Perspectives*, *32*(3), 87-112.

Ghosh, S. (2023). Financial dependence, labour regimes and industry growth: Do creditor rights matter? *Journal of Social and Economic Development*, 1-16.

Gong, B. (2018). Agricultural reforms and production in China: Changes in provincial production function and productivity in 1978–2015. *Journal of Development Economics*, *132*, 18-31.

Gong, J., Dong, H., Xia, Q. S., Huang, Z. Y., Wang, D. K., Zhao, Y., ... & Lu, F. E. (2020). Correlation analysis between disease severity and inflammation-related parameters in patients with COVID-19: a retrospective study. *BMC infectious diseases*, *20*, 1-7.

Govt. of Pakistan. (2020). Economic survey of Pakistan (2020–21).

Gozgor, G., Lau, C. K. M., & Lu, Z. (2018). Energy consumption and economic growth: New evidence from the OECD countries. *Energy*, *153*, 27-34.

Hansen, A. H. (2018). Economic progress and declining population growth. In *The Economics of Population* (pp. 165-182). Routledge.

Haug, A. A., & Ucal, M. (2019). The role of trade and FDI for CO2 emissions in Turkey: Nonlinear relationships. *Energy Economics*, *81*, 297-307.

Ho, C. Y., Huang, S., Shi, H., & Wu, J. (2018). Financial deepening and innovation: The role of political institutions. *World Development*, *109*, 1-13.

Huang, S. Z. (2022). The effect of natural resources and economic factors on energy transition: New evidence from China. *Resources Policy*, *76*, 102620.

Ibrahim, Y., & Raji, J. O. (2018). Cross-border merger and acquisition activities in Asia: The role of macroeconomic factors. *Studies in Economics and Finance*, *35*(2), 307-329.

Israel, K. F. (2018). *Modern monetary policy evaluation and the Lucas critique*. SSRN.

Jahanger, A., Usman, M., Murshed, M., Mahmood, H., & Balsalobre-Lorente, D. (2022). The linkages between natural resources, human capital, globalization, economic growth, financial development, and ecological footprint: The moderating role of technological innovations. *Resources Policy*, *76*, 102569.

Johannesson, E., Ohlson, J. A., & Zhai, S. W. (2023). The explanatory power of explanatory variables. *Review of Accounting Studies*, 1-31.

Jones, C. I. (2019). Paul Romer: Ideas, nonrivalry, and endogenous growth. *The Scandinavian Journal of Economics*, *121*(3), 859-883.

Jones, C. I., & Tonetti, C. (2020). Nonrivalry and the Economics of Data. *American Economic Review*, *110*(9), 2819-2858.

Keller, G. (2022). *Statistics for management and economics*. Cengage Learning.

Keynes, J. M., & Keynes, J. M. (2018). *The General Theory* (pp. 3-3). Springer International Publishing.

Ljungqvist, A., Richardson, M., & Wolfenzon, D. (2020). The investment behavior of buyout funds: Theory and evidence. *Financial Management*, *49*(1), 3-32.

Louis-Charles, H. M., Howard, R., Remy, L., Nibbs, F., & Turner, G. (2020). Ethical considerations for postdisaster fieldwork and data collection in the Caribbean. *American behavioral scientist*, *64*(8), 1129-1144.

Ma, L., Hu, C., Lin, R., & Han, Y. (2018, December). ARIMA model forecast based on EViews software. In *IOP Conference Series: Earth and Environmental Science* (Vol. 208, No. 1, p. 012017). IOP Publishing.

Mace, F. C., & Lalli, J. S. (2021). Linking descriptive and experimental analyses in the treatment of bizarre speech. In *Case Studies in Mental Health Treatment* (pp. 59-69). Routledge.

Maharani, A., & Saputra, F. (2021). Relationship of investment motivation, investment knowledge and minimum capital to investment interest. *Journal of Law, Politic and Humanities*, *2*(1), 23-32.

Margallo, M., Ziegler-Rodriguez, K., Vázquez-Rowe, I., Aldaco, R., Irabien, Á., & Kahhat, R. (2019). Enhancing waste management strategies in Latin America under a holistic environmental assessment perspective: A review for policy support. *Science of the Total Environment*, *689*, 1255-1275.

Mendez-Carbajo, D. (2020). Active learning with FRED data. *The Journal of Economic Education*, *51*(1), 87-94.

Meter, A., Atkinson, R. J., & Laliberte, B. (2019). Cadmium in cacao from latin America and the Caribbean. A review of research and potential mitigation solutions.

Moser, A., & Korstjens, I. (2018). Series: Practical guidance to qualitative research. Part 3: Sampling, data collection and analysis. *European journal of general practice*, *24*(1), 9-18.

Moyer, J. D., & Hedden, S. (2020). Are we on the right path to achieve the sustainable development goals? *World Development*, *127*, 104749.

Ochalek, J., Lomas, J., & Claxton, K. (2018). Estimating health opportunity costs in low-income and middle-income countries: a novel approach and evidence from cross-country data. *BMJ global health*, *3*(6), e000964.

Pabuçcu, H. (2018). THE EFFECT OF DATA PREPROCESSING ON TIME SERIES ANALYSIS. *ECONOMICS & ECONOMETRICS*, 33.

Paramati, S. R., Mo, D., & Huang, R. (2021). The role of financial deepening and green technology on carbon emissions: Evidence from major OECD economies. *Finance Research Letters*, *41*, 101794.

Paul, P. (2020). The time-varying effect of monetary policy on asset prices. *Review of Economics and Statistics*, *102*(4), 690-704.

Phan, H. V., Nguyen, N. H., Nguyen, H. T., & Hegde, S. (2019). Policy uncertainty and firm cash holdings. *Journal of Business Research*, *95*, 71-82.

Sarstedt, M., Mooi, E., Sarstedt, M., & Mooi, E. (2019). Regression analysis. *A concise guide to market research: The process, data, and methods using IBM SPSS Statistics*, 209-256.

Schumpeter, J. A., & Swedberg, R. (2021). *The theory of economic development*. Routledge.

Shah, I. A., Csordas, T., Akram, U., Yadav, A., & Rasool, H. (2020). Multifaceted role of job embeddedness within organizations: development of sustainable approach to reducing turnover intention. *Sage Open*, *10*(2), 2158244020934876.

Shahbaz, M., Nasir, M. A., & Roubaud, D. (2018). Environmental degradation in France: the effects of FDI, financial development, and energy innovations. *Energy Economics*, *74*, 843-857.

Siegel, J. J. (2021). Stocks for the long run: The definitive guide to financial market returns & long-term investment strategies. McGraw-Hill Education.

Simionescu, M. (2021). Revised environmental Kuznets Curve in CEE countries. Evidence from panel threshold models for economic sectors. *Environmental Science and Pollution Research*, *28*(43), 60881-60899.

Svensson, L. E. (2020). *Monetary policy strategies for the Federal Reserve* (No. w26657). National Bureau of Economic Research.

Vachadze, G. (2018). Credit market imperfection, minimum investment requirement, and endogenous income inequality. *Journal of Mathematical Economics*, *76*, 62-79.

Vîntu, D. (2022). An Optimizing IS-LM Model Specification with Inflation Targeting. Microeconomic Evidence for Price Adjustment.

Whalen, D. H., & Chen, W. R. (2019). Variability and central tendencies in speech production. *Frontiers in Communication*, *4*, 49.