IBN HALDUN UNIVERSITY
SCHOOL OF GRADUATE STUDIES
DEPARTMENT OF ECONOMICS

MASTER THESIS

THE IMPACT OF THREE CRISES: 1994, 2001 AND 2008-09 ON THE GENERAL UNEMPLOYMENT IN TURKEY

AMAAMA ABDUL-MALIK

THESIS SUPERVISOR

ASSIST. PROF. ŞERİFE GENÇ İLERİ

ISTANBUL, 2021

IBN HALDUN UNIVERSITY
SCHOOL OF GRADUATE STUDIES
DEPARTMENT OF ECONOMICS

MASTER THESIS

THE IMPACT OF THREE CRISES: 1994, 2001 AND 2008-09 ON THE GENERAL UNEMPLOYMENT IN TURKEY

by

AMAAMA ABDUL-MALIK

A thesis submitted to the School of Graduate Studies in partial fulfillment of the requirements for the degree of Master of Arts in Economics

THESIS SUPERVISOR

ASSIST. PROF. ŞERİFE GENÇ İLERİ

ISTANBUL, 2021

APPROVAL PAGE

This is to certify that we have read this thesis and that in our opinion it is fully adequate, in scope and quality, as a thesis for the degree of Master of Art in Economics.

Thesis Jury Members

Title - Name Surname	Opinion	Signature
_____	_____	_____
_____	_____	_____
_____	_____	_____

This is to confirm that this thesis complies with all the standards set by the School of Graduate Studies of Ibn Haldun University.

Date of Submission Seal/Signature

ACADEMIC HONESTY ATTESTATION

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Name Surname: Amaama Abdul-Malik

Signature:

ÖZ

1994, 2001 VE 2008-09 KRİZLERİNİN TÜRKİYE'DEKİ İŞSİZLİK ÜZERİNDEKİ ETKİSİ

Abdul-Malik, Amaama

İktisat Yüksek Lisans Programı

Öğrenci Numarası:194024006

Open Researcher and Contributor ID (ORC-ID): 0000-0002-2185-7674

Ulusal Tez Merkezı Referans Numarası: 10424571

Tez Danışmanı: Dr. Öğr. Üyesi Şerife Genç İleri

Ağustos 2021, 91 sayfa

Türkiye ekonomisi, hükümetin sürekli olarak pazar odaklı uyguladığı reformlardan sonra bile, 1980'lerden bu yana bir dizi ekonomik kriz yaşadı. İşgücü piyasası, krizlerin her birinin ortaya çıkmasıyla birlikte değişiklikler geçirdi. Bu tezin temel amacı, 1994, 2001 ve 2008-09 ekonomik krizlerinin bu dönemlerdeki işsizliğe özel olarak bakarak Türkiye işgücü piyasasını nasıl etkilediğini kontrol etmektir. Çalışma, bu krizlerin (dışsal değişkenlerin) bu dönemlerde işsizliği (içsel değişkenleri) nasıl etkilediğini tahmin etmek için 1990 ile 2019 yılları arasındaki yıllık zaman serisi analizini yapmak için Vektör Otoregresyon X (VARX) modelini kullanmıştır. Deneysel sonuçlar, 2001 ve 2008-09 krizlerinin işsizlik üzerinde olumlu ve önemli bir etkisi olduğunu gösterirken, 1994 krizinin işsizlik üzerinde herhangi bir etkisi yoktur. 2001 yılı, işsizliği en çok etkileyen yıldı ve erkek emeği, kadınlarınkinden daha fazla etki gördü.

Anahtar kelimeler: Eşbütünleşme, Ekonomik Kriz, Türkiye, Okun Yasası, İşsizlik, Vektor Otoregresyon X

ABSTRACT

THE IMPACT OF THREE CRISES: 1994, 2001 AND 2008-09 ON THE GENERAL UNEMPLOYMENT IN TURKEY

Abdul-Malik, Amaama

MA in Economics

Student ID: 194024006

Open Researcher and Contributor ID (ORC-ID): 0000-0002-2185-7674

National Thesis Center Reference Center Number: 10424571

Thesis Supervisor: Assist. Prof. Şerife Genç İleri

August 2021, 91 Pages

The economy of Turkey has gone through a series of economic crises since the 1980s even after the continuous reforms put in place by the government which were market- oriented. The labor market has gone through changes with the advent of each of the crisis. The main aim of this thesis is to check how the economic crisis of 1994, 2001 and 2008-09 affected the labor market of Turkey by looking specifically at the unemployment during these periods. The study used Vector Autoregression X (VARX) model to conduct annual time series analysis from the period of 1990 to 2019 to estimate how these crises (exogenous variables) affected unemployment (endogenous variables) in these periods. The empirical results show a positive and significant impact of the crisis of 2001 and 2008-09 on unemployment while the crisis of 1994 does not have any impact on unemployment. The 2001 crisis affected unemployment most with the male labor experiencing more of the impact than their female counterpart.

Keywords: Cointegration, Economic Crisis, Turkey, Okun's Law, Unemployment, Vector Autoregression X

DEDICATION

This thesis is dedicated to my late parents Malik Keregue and Zelia Munmuni who would have loved to witness my achievement, to my husband Mr. Sadik Jibreal, my children Miraj Jibreal, Ahmed Riyadh and Hajar Nur and my whole family.

ACKNOWLEDGEMENT

All praise and Glory due to Allah for making it possible for me to complete this thesis through His mercy and blessings. My next appreciation goes to my supervisor prof. Şerife Genç Ileri for her corrections, recommendations and guard lines through the period of the thesis. I thank prof. Asad ul Islam for his patience and assistance in running and analyzing the data and results. I will also thank my husband Mr. Sadik for his support from day one. My final thanks go to all who have prayed and supported me throughout my study.

Amaama Abdul-Malik

ISTANBUL, 2021

TABLE OF CONTENTS

ÖZ ..... **v**

ABSTRACT ..... **vi**

DEDICATION ..... **vii**

ACKNOWLEDGEMENT ..... **viii**

TABLE OF CONTENTS ..... **ix**

LIST OF TABLES ..... **xi**

LIST OF FIGURES ..... **xii**

LIST OF SYMBOLS AND ABBREVIATIONS ..... **xiii**

CHAPTER I INTRODUCTION 1

CHAPTER II BACKGROUND OF CRISIS IN TURKEY 4

2.1. The State Of The Turkish Economy Prior And Post 1994 Crisis ..……..4

2.2. The State Of The Turkish Economy Prior And Post 2001 Crisis ..……..6

2.3. The State Of The Turkish Economy Prior And Post 2008-09 Crisis ……..8

CHAPTER III LITERATURE REVIEW 10

3.1. Unemployment And Economic Growth (GDP 10

3.2. Unemployment And Export 12

3.3. Unemployment And Public Debt 13

3.4. Unemployment And Labor Force Participation Rate 14

3.5. Unemployment And Economic Crisis 16

CHAPTER IV DATA AND METHODOLOGY 19

4.1.Data 19

4.2. Chow Break Test 28

4.3. Stationarity Test 29

4.4.Cointegration Test 31

4.5. Vector Autoregression X (VARX) 31

CHAPTER V EMPIRICAL ANALYSIS AND REST.....34

5.1. Break Point Test.....34

5.2. Stationarity Test.....35

5.3. Optimal Lag Length Criteria.....36

5.4. Cointegration Test 38

5.5. Results of VARX Analysis.....39

5.6. Residual Diagnosis.....46

CHAPTER VI CONCLUSION.....50

REFERENCES 53

APPENDIX A.....60

APPENDIX B.....62

APPENDIX C.....69

APPENDIX D 72

APPENDIX E 79

APPENDIX F 81

APPENDIX G 83

APPENDIX H 85

CURRICULUM VITAE 91

LIST OF TABLES

Table 2.1 The State Of Macroeconomic Indicators Before And In The Year Of Each Crisis.....9
Table 4.1 Variables And Data Sources 19
Table 4.2 Descriptive Analysis.....24
Table 4.3 Descriptive Analysis For Division 25
Table 5.1: Breakpoint Test 34
Table 5.2: Unit Root Tests 35
Table 5.3: VAR Lag Order Selection Criteria..... 37
Table 5.4: Result of Cointegratıon Test (VAR lag=2).....38
Table 5.5: Long Run Dynamics.....43
Table 5.6: Short Run Dynamics 46
Table 5.7: Result For Joint Impact f Crisis on Unemployment ……..…..45
Table 5.8: Breusch-Pagan-Godfrey Heteroskedasticity Test 46
Table 5.9: Jarque-Bera Test …….....47
Table 5.10: Breusch-Godfrey Serial Correlation Test.....48

LIST OF FIGURES

Fıgure 4.1 Unemployment Rate Time Series ……..…..…….21
Fıgure 4.2 Log Unemployment Time Series ……..21
Fıgure 4.3 Export And GDP Time Series ……...……..22
Fıgure 4.4 Debt Time Series ……23
Figure 5.1: Unemployment in Turkey ……...……44

LIST OF SYMBOLS AND ABBREVIATIONS

DEBT External debt

EXP Export

F-UMP Female unemployment

GDP Gross Domestic Product

ILO International Labor Organization

LFPR Labor Force Participation Rate

M-UMP Male unemployment

T-UMP Total unemployment

VARX Vector Autoregression X

WDI World Development Indicator

1994 1994 financial crisis

2001 2001 financial crisis

2008 2008 economic crisis

CHAPTER I

INTRODUCTION

Developing economies are affected most when there is an economic crisis due to their integration with the global market. The emergence of an economic crisis has spillover effects on almost all sectors of the economy and its effects have different levels of weight from mild to severe effects which cannot be escaped by anyone. The impact normally hits specific group of people mostly the poor, the marginalized, low-educated, women, and children (Qerimi & Sergi, 2017b).

The economy of Turkey has experienced economic crises in 1994, 2001 and 2008/09 that affected every sector of the economy with the labor market not being an exception. The main aim of this study is to examine the impacts of these crises on Turkey's labor markets from a comparative perspective. An evaluation for the reasons of the crises, as well as influences on the economy and policy recommendations is also provided.

Prior to the crisis of both 1994 and 2001, the economic condition was almost the same but very different from that of 2008/09. Preceding the first two crises, Turkey was characterized by high government debt coupled with a high interest rate as well as high inflation while prior to 2008 crisis high private debt was the characteristic of the economy. Due to these, there were both tight fiscal and monetary policies during the crisis of 1994 and 2001 while 2008 experienced an expansionary policy which was possible due to the growth in the liquidity of developed economies. This reduced the global interest rate enabling borrowing (Cömert,2018; Demirgüç-Kunt & Detragiache 1998)). Moreover, the economic crisis of 2008 mildly affected the banking sector of Turkey as the banks were owned domestically (Qerimi & Sergi, 2017b). The type of policy implemented before and after an economic crisis is part of what determines how severe a crisis will be on the economy as well as the sectors since a lot of the sectors are interrelated.

Due to this, the interest in finding out which of the crisis affected unemployment the most and why it is the case arises. The current study examines the following questions in that regard: Did the three crises affect unemployment in Turkey during these periods? Was there a difference between the degree to which female and male workers were affected by the crisis? Which of these crises had more impact on unemployment and why? Lastly, does the economic crisis have any impact on unemployment? These questions are addressed in the subsequent chapters. The main contribution of this thesis is to be the first work done assessing the impact of these three crises that occurred in Turkey on unemployment.

An economic crisis can be defined as an unanticipated and severe shock to any part of the economy. It could be a crash to the cash market, an increase in inflation or unemployment, or a series of bank failures. The relationship between economic crisis and unemployment is intertwined as a rise of unemployment is inculcated in the definition of crisis. At the outset of an economic crisis, companies experience an increase in cost with a decline or stagnation in returns as demand decreases and they turn to lose money. On the other hand, increases in macroeconomic variables like interest rate during a crisis make debtors pressure businesses to service their debt. Some firms cut down their activities while others close down altogether. This leads to companies cutting off their cost by laying workers off during a crisis. It becomes difficult for the newly unemployed worker to get a new job and the average period of unemployment is lengthened during this period (Investopia, 2021).

Economic crises affect industries, businesses, and the workforce disproportionately. For instance, the crisis of both 1994 and 2001 hit the banking sector of Turkey harder than the remaining sectors while the crisis of 2008-09 affected the real estate, construction, finance and manufacturing sectors the most as well as their employment levels. Firms usually employ from a group of workers with skills and ability levels that vary with the mindset of combining the most productive and less productive to achieve their aim while cutting costs. Whenever firms face any shock it is better for them to lay off those with less productivity than cutting overall wages. The cutting of overall payroll rather can lead to losing higher productive workers for a higher paid job. On the other hand, cutting employment instead motivates the remaining workers to work harder and increase production. The group of people who

normally experience this layoff includes the female labor force, the newly employed, those with low education and experience (Verlagsgesellschaft,2010; Meier, 2011).

My empirical analysis results show that the crisis of 2001 had the most intense impact on the labor market of Turkey especially the male unemployment: about 37 percent of males were unemployed during the crisis while only 23 percent of females were unemployed. The 2008/09 crisis also increased both male and female unemployment by 21 percent and 48 percent respectively. The change in the degree of the impact of the crisis is due to the increase of female labor force participation rate after the 2001 crisis. However, the crisis of 1994 did not have any impact on the labor market as the expansionary policy implemented by the government in the last quarter of 1994 canceled out the increase in unemployment experienced at the beginning of the year. Furthermore, the combined impacts of the three crises were higher for female unemployment (19%) than male unemployment (11%). These findings support the theory and earlier works discussed in this paper. The results also confirm the existence of Okun's law in both the long run and short run. This is a negative relationship between unemployment and GDP. The negative impact is more on the females as they are employed in the most sensitive and flexible part of the economy. Export and labor force participation also have a negative impact on total unemployment as well as male and female unemployment. The labor force participation rate is not significant in the short run for each gender. Lastly, external debt increased the level of unemployment in each of the crises.

The remainder of the paper is as follows. Chapter II gives a summary of the background of the three crises. Chapter III reviews previous literature on the economic crises of 1994, 2001 and 2008/2009 on the unemployment of Turkish labor force. We also review papers that look at other countries that have similar characteristic with Turkey who have experienced similar crisis. Chapter IV focuses on the data and the appropriate methodology to be used. Lastly Chapter V looks at the empirical analysis and the result of the studies. Detailed discussions are provided with the appropriate recommendations given in the final section. Chapter VI then concludes the studies.

CHAPTER II

BACKGROUND OF CRISIS IN TURKEY

The Turkish economy has gone through series of economic crises since the 1980s even after the continuous market-oriented reforms put in place by the government. These include; the 1980-1981 crisis, the 1983 banking crisis, the 1988 stock market and foreign currency crisis, the 1994 financial market crisis, the crisis of 2001, and the global financial crisis of 2008/09. From these crises, the crises of 1994, 2001, and 2008-2009 were the worst crises experienced in Turkey.

2.1. The State of The Turkish Economy Prior To And Post 1994 Crisis

After the foundation of the new Turkish Republic, the government underwent series of different developmental strategies. The government commenced with an economic policy that gave the private sector a critical role in the development of the economy with limited government intervention. However, due to the unavailability of capital and qualified labor, the government failed to achieve the stipulated economic developmental goals. The development of the industrial sector lagged behind the remaining sectors (Savrul *et al*., 2013). This led to the implementation of etatism in the economy of Turkey in the year 1930. According to this ideology, the main aim of the state was to promote growth in the neglected sectors in the economy by the private enterprise. In 1950, the same weight was placed on both the private sector and the state in the development of the industrial sector. The economy was significantly deteriorated in the second quarter of 1950 due to the impromptu steps set in place in the beginning of the year (Savrul *et al*., 2013). To put an end to the deterioration in the economy, the government formed the State Planning Organization (SPO) which designed a five-year plan to improve the development of the economy in 1963 (Krueger & Aktan, 1992). The plan includes an inward economic development approach from 1963 to 1972 and an increase in the formation of capital with import substitution. The targets of the SPO were over-ambitious

which led to a lag in the growth of the Turkish economy with annual inflation of above 100% in late 1979 (Collection, 2002).

The Turkish government on 24 January 1980 launched a stabilization program that was market-oriented and aimed at stabilizing the economy from the distortions caused by the previous reforms. The objective of the program as stipulated by (Onis & Riedel, 1993) included;

- The improvement of balance of payment coupled with an increase in the international competition which transformed the economy from been inward-oriented to export-oriented.
- To decrease inflation
- To increase the freedom of the private sector in allocation of resources.
- Retrenchment in the public sector

The economy was boosted on all sides, which made Turkey's story a successful one among other adjusting economies (Atiyas, 1996). This boom continued until the first quarter of 1993 when the crisis began and ended in the same period in 1994 with unemployment increasing from 11.2% to 12.6%.

As stipulated by Atiyas (1995), there was a reduction in the public sector borrowing requirement from 9% to 4% of GNP in 1980 which was achieved by reducing the deficit of the government and the losses from state enterprises. This rate was maintained until 1987 when a significant jump of 6.1 was experienced due to the fiscal expansion related to the election that year. This led to a mini economic crisis in 1988. Expansionary public sector policies put in place by the government in 1989 led to an increase in domestic demand which created a deficit in the current account and an increase in the inflation rate, overriding the growth in the gross domestic product (GDP). The economy saw an unrealistic growth after 1990 resulting from the inability of the government to find and provide the right policies for capital inflows which laid the foundation for successive economic crises.

By 1993, public sector borrowing had reached 15.2% and it was caused by the poor performance of the state enterprises, increase in the government wage bill, support policies to the agricultural sector, and the operations of the military in southeastern Turkey (Celasun, 1994). As a result of this, the interest rate increased which attracted

capital inflow diverting the public sector dependency from domestic savings to foreign savings. In finding the factors that trigger a banking crisis in an economy, Demirgüç-Kunt and Detragiache (1998) studied the determinants of banking crisis in 29 developing and developed countries that have experienced banking crises between the periods of 1980 and 1994 including Turkey. By using the multivariate logit model, they concluded that a banking crisis comes about when the macroeconomic surrounding is vulnerable with low growth rate, high inflation, and balance of payment crisis coupled with high interest rate. These impacts can be minimized when banks are open for international investments which will bring about competition among banks by improving their services but it can also be hindered by a lack of knowledge on the conditions of local firms and domestic firms.

The research materials used in this thesis show that the 1994 crisis signals that of 2001 with the latter having more impact on unemployment than the former. The ability of authorities to consistently implement the whole package of a stabilization program determines its success (Collection, 2002). Mostly due to political factors, particularly an increase in the political competition following the 1994 crisis, the government of Turkey could not abide by this consistency theory.

In April 1994, the government launched another stabilization program, which was backed by IMF to help solve the damages by the crisis. Even though the success of this program was short-lived it increased exports and reduced imports in the country which in turn improved the macroeconomic indicators in the country including unemployment (Collection,2002).

2.2. The State Of The Turkish Economy Prior To And Post 2001 Crisis

After the early election of December 1995 which was triggered by the inability of the government to mend the fiscal situation and the damages caused by the 1994 crisis, political concerns were more prioritized than fiscal concerns. International Monetary Fund (IMF) discontinued its support from the government thereby not fulfilling the last part of the agreement made in 1994. This led to a further increase in public expenditure and the deterioration of the trade balance of Turkey (Celasun, 1999). Also, the financial crisis in Asia in the third quarter of 1998 worsen the economic condition in Turkey thereby significantly increasing inflation, unemployment as well as both fiscal and current account deficit. The government

then embarked on a tighter fiscal policy backed by the IMF in 1999. This policy was to fix or peg the exchange rate which in turn was expected to spike expectations in inflation. It was also expected for the policy to lead to an appreciation of the currency to attract external capital inflows. Some countries for instance Brazil and Russia succeeded in using this approach to overcome their persistent instability in their prices regardless of the sag in their currencies. Turkey followed the same pattern at the beginning of the program; however, a problem was encountered in the early stage of controlling inflation which led to makers of policy abandoning the peg which in turn led to a swift downtrend amidst high inflation (Akyüz and Boratav 2002). This agreement was not implemented efficiently leading to the crisis of 2001.

Furthermore, the IMF reestablished a new program after the 2001 crisis which includes systematic financial sector changes as well as the economy's governance. The Central Bank was allowed to operate independently which enabled the Bank to implement policies to target inflation. The main component of this policy was a short-term interest rate with a flexible exchange rate. During this period, the advanced economies implemented expansionary monetary policies to reduce interest rate which enables the financial institutions the capacity to generate credit. This boosted the global economy by increasing both domestic and foreign direct investment in developing countries like Turkey. According to Cömert and Çolak (2014), an improvement in the various sectors of the economy was experienced but economic issues like unemployment were not fully resolved. This diversion was short-lived due to the global crisis of 2008 which moved Turkey into a recession.

Akyüz and Boratav (2002) stated that the economic crisis of 2001 in Turkey was triggered by the failure of the International Monetary Fund's promise to stabilize the economy in 1990 and 2000. After the economic bailout by the IMF in 2001, both currency and financial markets were stabilized getting to the end of the year with economic activities and employment remaining miserable. The institutions in a country are important as they drive how severe the impact of the economic and financial crises will be on unemployment.

The structure of employment has been transformed over the past two decades in Turkey. Labor has moved from the agricultural sector to the services and manufacturing sector due to the neoliberal economic policies from 1990. Irrespective

of these policies, unemployment continued to increase until 2005 and peaked at 20% due to decreases in employment. The 2001 financial crisis, in turn, worsens the already deteriorated state of unemployment. This impact is more profound in female unemployment than male unemployment and it is in line with findings of (Verlagsgesellschaft et al., 2010; and Cömert 2018).

2.3. The State Of The Turkish Economy Prior To And Post 2008-2009 Crisis

Meanwhile, the global economic crisis of 2008 from the USA in the last quarter of the year 2007 was due to the failure of the market mechanisms to check and audit its operations which spread throughout the globe. In anticipation of sustaining economic growth, decrease government debt, and lower the current account deficit, the Federal Reserve in the US followed a low interest rate policy (Taylor, 2011). This led to competition in the banking sector making credit attractive to all groups of people. The unchallenged credit access led to consumers over borrowing leading to an increase in the fragility of the financial system. Coupled with the collapse of the boom in the mortgage system led to the 2008 crisis which spread throughout the world especially the developing world as they depend on developed countries in terms of export and loans. The banking sector of Turkey was not severely affected because most of the banks are locally own (Cömert and Uğurlu, 2008). The crisis rather affected Turkey through global inter linkages and the developed computer technology which occurred at a lower unemployment rate than that of 2001 leading to a lesser impact on unemployment as compared to 2001.

The 2008 economic crisis also affected the Turkish economy through its expectation, trade as well as financial channels. It affected exports thereby reducing the production in Turkey which was worsened by the fall in the financial flow into the economy. As Cömert and Çolak (2014) stated the Turkish economy was one of the worst among the developing countries and the worst growth performance after World War II. The state of key macroeconomic indicators is summarized below.

Table 2.1. The State of Macroeconomic Indicators Before And In The Year of Each Crisis

	YEARS						
INDICATORS	1993	1994	2000	2001	2007	2008	2009
GDP PER CAPITA GROWTH (%)	5.93	-6.17	5.03	-7.35	3.78	-0.35	-5.91
GDP GROWTH (%)	7.65	-4.66	6.64	-5.96	5.03	0.84	-4.7
INFLATION RATE (%)	66.09	105.21	54.91	54.4	8.75	10.44	6.25
UNEMPLOYMENT RATE (%)	8.96	8.58	8.38	10.36	8.87	9.71	12.55
ANNUAL CHANGE (%)	0.45	-0.39	-1.19	1.89	0.15	0.84	2.84

Source: WORLDBANK (2020)

Table 2.1 shows how some macroeconomic indicators were affected during each of the three crises. GDP growth, as well as GDP per capita, saw a decline in all the three pre-crisis periods. The magnitude of the decline was the highest in the 2008/2009 crisis. GDP per capita declined from 5.93% in 1993 to -6.17% in 1994, fell from 5.03 in 2000 to -7.35 in 2001, and in 2008 it dropped from 3.78 to -0.35 and further decreased to -5.91 in 2009. Furthermore, the decline in GDP growth is massive in the crisis of 2001 with a decline of -5.96 from 6.64 in 2000. Also, inflation records its highest level as 105.21% in 1994 which is the highest. The value of inflation is also highest prior to the crisis of 1994 than the rest of the crisis with that of 2007 being the lowest.

Unemployment at the end of 2009 was recorded as 12.55% with a change of 2.84 which overtakes the previous crises as this crisis was caused internationally and the country had no control in the short term. During the crisis of 1994 unemployment rate declined by 0.39 percentage points which was due to the increase in employment experienced towards the end of 1994 from the government policies implemented at the time.

CHAPTER III

LITERATURE REVIEW

This study aims to examine the link between macro aggregates and unemployment and how unemployment for different groups of workers was affected during the three crises periods in Turkey. In that regard, it is part of the literature that investigates unemployment at the macro level and its cyclical behavior. In the following subsections, I provide a review of the literature that studies unemployment concerning the macro variables that are used in this study. Hence the following subsections provide both an overview of the literature and motivate the choice of variables used in the empirical model.

3.1. Unemployment And Economic Growth (GDP)

Various studies on the impact of GDP growth on unemployment indicate a negative relationship between them. This relation is formulated as Okun's law in the economic literature. According to Arthur Okun, a percentage increase in real GDP growth above the trend decreases the rate of unemployment by 0.5% by using three different models on data from the US economy (Okun, 1962). Weber (1995) checked the cyclical output on cyclical employment in the USA before and after World War II and found a negative relationship between them with a coefficient of -0.36.Altunöz (2019) applied it for the Eurozone regions and found a negative relationship between unemployment and GDP though the cointegration coefficient is lower as compared to that of the US and other developed countries. The coefficient of male unemployment in absolute terms is higher and more sensitive to the business cycle than female unemployment. This is because males are employed in sectors like construction, electronics, and engineer which are very sensitive (Brincikova and Darmo, 2015). This is also the case for the Scandinavian countries (Hutengs and Stadtmann 2014). Moreover, Salman and Shukur (2014) found that GDP granger causes both total unemployment and male unemployment but the reverse is not the case in Finland. However, the female unemployment has no relationship with GDP.

Khan et al. (2014) also modeled the relationship between unemployment and GDP in Pakistan and found a negative relationship. According to their results, a percentage point decrease in unemployment is triggered by a 0.36% increase in GDP. These findings help policymakers in implementing policies that boost economic growth which in turn decreases the unemployment rate in an economy. The findings of Al-hosban and Edienat (2017) confirmed the inverse relationship between unemployment and GDP in Jordan for the 1982-2016 period.

Furthermore, Sögner (2001) used the Markov-Chain Monte Carlo method to investigate the relation between unemployment and GDP in Austria from 1977 to1995. The results of this study show that to decrease unemployment by 1 percentage point, GDP needs to increase by 4.16%. Appiah et al. (2020) used panel data analysis on Sub-Saharan African countries to analyze how employment, unemployment, and GDP are related and they ascertain a negative relationship between GDP with female unemployment, male unemployment as well as total youth unemployment. Bonaventura et al. (2018) assess how GDP affects unemployment in terms of gender in the Italian regions. The northern regions of Italy had higher GDP growth which is more sensitive to a negative change in female unemployment compared to male unemployment. The southern regions on the other hand are characterized by lower GDP with a higher level of unemployment which is insignificant for female labor.

Dogan (2012) investigated how unemployment responds to some macroeconomic variables in Turkey by using quarterly data from 2000 to 2010. He concluded that unemployment responds negatively to an increase in economic growth, export, and inflation but responds positively to exchange rate, interbank interest rate, and supply of money. Veysel et al. (2018) also found a decline in unemployment and crimes as the GDP increases in Turkey.

On the contrary, the Okun law is not applicable in some countries as they have different settings from the US. Dorel (2008) investigated how unemployment and GDP are interdepended in the Romanian economy. The results of this study suggest that the inverse relationship is not applicable in Romanian in the pre- accession period to European Union. This is associated with the impact of other factors affecting unemployment aside from GDP in the region. Furthermore, it is crucial to assess how the GDP affects unemployment in the long run. Hatti and Larsen (2004)

found a variation between unemployment and economic growth in some countries after checking the long-run impact of some macroeconomic indicators on employment from 10 countries from 1913 to 2016. They attributed these differences to institutional diversity and labor market policies. Aktar and Ozturk (2009) also did not find any long-run relation between unemployment and economic growth in Turkey from the period of 2001 to 2007.

Furthermore, Gil-Alana (2010) conducted a test on UK, USA, and Japan for an empirical application of a bivariate system on unemployment and GDP. The impulse response functions showed that a positive result in output growth has a significant negative impact on unemployment in the short run for the cases of the UK and USA while the effect disappears in the long run. Japan on the other hand had a positive relationship in both the short and long run which was not significant. From the period of 1998-2017, Tru (2019)found that the expenditure of government on education increases tertiary enrollment as well as GDP which in turn decreases the unemployment rate. However, this relationship does not exist in the long run.

In conclusion, we can infer from these studies that GDP is related negatively to unemployment in the short run but no relationship exists among them in the long run as other factors set in to distort their relation.

3.2. Unemployment And Export

In solving the issue of unemployment in developing countries, the stimulation of labor-intensive products for export is encouraged. Normally the relationship between unemployment and export is not visible in the first year of an economic boom until the subsequent years (Moller, 1938; Nambiar, 1979; and Berzinskiene & Juozaitiene, 2011). It is costly and risky for firms to export abroad due to a lot of factors ranging from tariffs, subsidies, foreign market entry cost (beachhead cost), the flexibility of the labor market, exchange rates among others. These normally affect the prices of the exported product as well as the profit of the firm which in turn determines the number of labor to employ. Also, the type of policies put in place has a significant impact on how export will relate to unemployment (Janeba, 2009). For instance, Gaddis and Pieters (2012) found that the trade liberalization in Brazil in the period of 1987-1994 increased the labor force participation of females as well as female employment within this period while male unemployment and market

insecurity increased among men. This is due to the movement of employment from the agriculture and manufacturing sectors to trade and other services.

Porto (2008) studied how a 10% increase in the export prices of agro-manufactured products affects the labor market in Argentina. According to the results of this study, an increase in the labor force participation rate by 0.61% led to a decline in unemployment by 1.23% and an increase in expected wages by 10.3%. Yabuuchi (2003) examined how export processing zones (EPZ) on factor rewards affect domestics intermediate good producing sector, national income, and unemployment in developing countries. An increase in the EPZs is found to increase foreign capital investment leaving national income and domestic factor reward unchanged. This further decreases intermediate output and increases urban unemployment.

A fall of unemployment up to double digits was predicted in the USA in the Post World War II, which did not materialize due to an increase in the export surplus immediately after the war. This was achieved through an increase in GDP in 1946 and 1947 (Taylor et al.,2011). Chang (2005) used the VAR method of variance decomposition and impulse response function to check how dynamic the relationship between foreign direct investment, economic growth, unemployment, and trade is. Their findings on export also showed a negative relationship with unemployment. It can then be concluded that export has a negative relationship with unemployment even in the long run.

3.3. Unemployment And Debt

Higher government debt relative to GDP is connected to an increase in public spending which in turn increases the unemployment rate in the long run. This increase in unemployment is worsened as the future generation pays the increase in the tax burden. However, if public borrowing is invested in capital projects that create employment and impact on other macroeconomic indicators positively then it is worth borrowing (Buselic & Bosna, 2019; Sundaram & Chowdhury 2013). In studying how the budget balance affects unemployment, Von Thadden and Kaas (2004) studied how the economy reacts to a shock under each policy. Unemployment is higher under a balanced budget as the government needs to raise taxes to finance the budget while an unbalanced budget on the other hand allows the government to leave the tax rate unaffected thereby creating new jobs to reduce unemployment. As

found by Tomic (2018) youth unemployment is worsened by low GDP growth, high public debt, corruption, high level of remittances, and a lower share of construction in the European Union.

Knapkova et al (2019) used data for Slovakia from1995-2016 to examine the macroeconomic variables that have a significant impact on the incurrence of public debt. They find that the most significant indicators are the growth of GDP, the size of the public sector, government bonds, openness of the economy, and unemployment. Cahyadin and Ratwianingsih (2020) studied how external debt, exchange rate and unemployment are related in selected ASEAN countries (Malaysia, Thailand, Indonesia, and Philippines) during 1980-2017 by using ARDL-ECM and GRANGER Causality Test. Their results show a co-movement between these variables and they granger cause each other as well.

Furthermore, the end of the 2008 crisis left many countries with higher levels of debt per GDP. This affected many macroeconomic indicators such as unemployment, inflation, and government budget deficit negatively. Kurečić and Kokotović (2016) analyzed how these variables correlate with debt in the 15 countries in European Union. They conclude that a statistically significant correlation exists between the public debt to GDP ratio and the unemployment rate. However, this relationship is stronger for Portugal, Italy, Greece, and Ireland due to their highest level of public debt ratio to GDP. Also, long-term unemployment is one of the key geneses of over indebtedness (Grotlüschen et al. 2019).

3.4. Unemployment And Labor Force Participation Rate

The link between unemployment and labor force participation rate has a key connection with the labor market functions both theoretically and empirically. The relationship between these two variables is linked with the discouraged worker effect or the added worker effect while the unemployment invariance hypothesis shows no relationship in the long run. Apergis and Arisoy (2017) assessed the discouraged worker invariance in the USA labor market and found a negative relationship between unemployment and labor force participation rate. This result shows how dominant the discouraged worker effect is across the US. The unemployment rate and labor force participation are high though the duration of unemployment is appreciably low (Ahn & Hamilton, 2019). Both unemployment and labor force

participation rate have been declining after the 2008 economic crisis. The high unemployment rate following the recession discouraged a lot of unemployed workers from entering the labor force thereby decreasing the unemployment level (Hornstein & Rhodes, 2013).

Tansel and Ozdemir (2018) examine the long-run relationship between unemployment and labor force participation rates in appraising how valid the unemployment invariance hypothesis is in Turkey by using ARDL bounds testing and Gregory Hansen cointegration methods. The results showed no long run relation between unemployment and labor participation for the period of 2000-2011 in Turkey. On the other hand, Kakinada and Miyamoto (2012) used cointegration analysis to exhibit the existence of a long-run negative relation between male unemployment and labor participation in Japan. This result is not the same for female labor. However, a counter result was found by Altuzarra et al.(2019) after using the same methodology in Spain. Their results showed no long-run relationship between unemployment and labor force participation for male workers but a relationship exists for females. Tansel et al. (2016) also did not find any long-run relation for the two variables in Turkey supporting the unemployment invariant hypothesis in the country.

Over time the participation of females in the labor force has been increasing and this is due to an increase in female educational attainment, the ability to postpone fertility, and then change in the general attitude towards female employment. The quota of females in part-time employment is quite high in some OECD countries that have high female employment (Tasseven et al. 2016; Riboud,(1985). Tasseven et al. (2016) investigated the determinants of female labor force participation in the OECD countries for the period of 1990-2013 and they found a positive and significant impact of the unemployment rate, GDP per capita, and fertility rate on female labor participation with fertility rate having the highest impact. Nonetheless, Gasparini and Marchionni (2017) found a slowdown in the labor force participation rate for females especially married women in Latin America due to the increase in economic growth in the region after the 2000s. This led to a reduction in unemployment and an increase in wages for male partners as well as a rise in social assistance which discouraged females from entering the labor market.

Lastly, the relationship between unemployment and labor force participation rate is ambiguous and depends on other factors under consideration. Studies using cross section data yield different results from those that use time series data. The source of bias in cross-section is due to the lack of acknowledgment of the fact that labor participation and unemployment are determined simultaneously in the local labor market which is stable over time and related to other forces while the variation in economy-wide unemployment is due to aggregate demand (Fleisher & Rhodes, 1976).

3.5. Unemployment And Economic Crisis

The magnitude of the effect of an economic crisis on employment depends to some extent on the degree of labor market flexibility, labor market policies, and the period we are looking at. Bernal-Verdugo et al (2012.) investigated the impact of financial crisis on 97 countries within 28 years. Their findings suggest that in the short term the negative effect of a crisis on employment is more profound but it fades away in the medium term in countries with flexible labor institutions unlike those with stiff labor market institutions. Again, policies implemented in the labor market during a crisis have a positive impact on employment in the medium term. The institutions in a country are important as they drive how severe the impact of an economic and financial crisis will be on unemployment. Jianu (2019) showed that exclusive institutions are more vulnerable to shock to the economy and do not resilient easily as inclusive institutions in the European Union.

Unemployment is the main channel through which the weight of a crisis is measured as it affects the social development of the people. Qerimi and Sergi (2017a) investigated the nature and how the 2008 economic crisis affected employment in South-Eastern Europe. They found an unequal effect on particular groups in the region which are women and children, the minorities, as well as migrants and this has worsened the unemployment condition in the region with an increase in the social gap within groups. To help minimize or deal with this impact they suggested a reform in both economic and democratic governance, strengthening of the institutional setting which will help fight corruption and boost cooperation and competition in the region. Grekousis,(2018) studied how the 2008 global crisis affected the unemployment in the European Union by using data between 2008 and 2013. Their results show countries like Portugal, Italy, Greece, and Spain

experienced higher unemployment rates while Germany, Austria, and the surrounding regions experienced more resilient outcomes with the lower unemployment rate.

Economic crises result in the mobility of labor which may mitigate the negative effects of the crisis on labor markets. Labor decides to move conditional on accessibility and availability of a better standard of living elsewhere which worsens the impact of the crisis on the labor market. In Wiesböck et al.(2016) they find that the mobility of labor from the Czech Republic, Hungary, and Slovakia to Austria increased after the 2008-2009 crisis with the majority seen among the most vulnerable group of workers; young, female workers, and the lowly educated workers and this is due to the gradual opening of the Austrian labor market. This minimized the negative impact of the crisis on the unemployment in their home country. Also, there was a rise in economic demand for labor in Austria during the same period. Contrary to this view, Mohino and Ureña (2020,) proposed that governments should work on controlling the level of income disparities among workers to reduce the movement of labor following an economic crisis. Also, policies should be put in place regarding immigration and residential mobility as a movement of labor causes segregation between both the cities labor migrated from to the cities migrated to.

Tambunan (2010) studied the impact of the East-Asian crisis of 1997-98 and the global financial crisis of 2008-09 on the key macroeconomic variables in the Indonesian economy. They found a decline in the impact of the second crisis as compared to the first crisis. The impact of the 2008/09 crisis was higher on Hong Kong, China, and Singapore due to their dependence on export. However, the impact was lesser on Indonesia because they have a large informal sector that absorbed the labor displaced by the crisis. Also, Kroeger and Meier (2011) studied the 2008/2009 crisis on the labor market of Tajikistan and found that the self-employed were affected more than the wage employed. Also, the probability of entering unemployment, inactivity, and unpaid work increased in the period of crisis with females, young and very old individuals being at more risk than the male.

Regarding Turkey, not a lot of empirical work has been carried out concerning the impact of an economic crisis on the labor market. Kahyalar, Ouattara, and Fethi (2020) studied the overall crises from the period 1980 to 2011 in the informal sector

of Turkey. They found a negative impact of each crisis on the labor market of Turkey. Verlagsgesellschaft et al. (2010) used Ordinary Least Squares on a time series data between the period of 1996 and 2010 to investigate which of the 2001 internal crisis and the 2008 external crisis mostly affected the unemployment among the youth in the labor market of Turkey. Their findings suggested an overall significant increase in unemployment within the periods of study with female youth affected most. This impact on female youth is worse in the 2008/2009 crisis than in the rest of the crisis. On the other hand, the crisis of 2001 had a prolonged negative impact at a higher rate on employment than that of 2008 due to the stability of the economy and higher growth rate after the 2001 crisis. The main contribution of this thesis is to be the first work done assessing the impact of the 1994, 2001, and 2008-09 crises on the unemployment of Turkey in terms of gender.

Unlike Verlagsgesellschaft(2010), this study uses Vector Autoregression with exogenous variables (VAR X). This method is chosen because the three crises are added to the VAR model as a dummy and treated as exogenous variables. VARX model is used to model a time series of multivariate variables that are interconnected and influenced by their lags. It also models an exogenous variable that influences the endogenous variables. The model makes it possible for the study of the dynamics of each of the crisis dummies (1994, 2001, and 2008 crisis) and their impact on unemployment.

Nevertheless, the empirical results in this study are similar to the findings of Verlagsgesellschaft (2010) as the crisis of 2001 had the most intense impact on the labor market of Turkey especially the male unemployment: over 58 percent of males were unemployed during this period while 43 percent of female were unemployed. Furthermore, the 2008/09 crisis increased female unemployment (45%) more than the male (21%). Contrarily, the crisis of 1994 did not have any impact on the labor market as the expansionary policy implemented by the government in the last quarter of 1994 canceled out the increase in unemployment experienced at the beginning of the year. Furthermore, the combined impacts of the three crises were higher for female unemployment (19%) than male unemployment (11%).

CHAPTER IV

DATA AND METHODOLOGY

4.1. Data

This study aims to assess whether there are any differences in the economic impacts of these three crises on the labor market. To serve this purpose, I use annual data covering the 1990-2019 periods. This period is considered to check the impact of before, during, and after the crisis on unemployment. The data on Gross Domestic Product (GDP), external debt, and export were retrieved from the database of World Bank Development Indicators (WDI). Unemployment and labor force participation rates are obtained from the International Labor Organization (ILO).

Below is table 4.1 that summarizes the variables and their sources as well as how they are denoted in this study as well as their frequencies.

Table 4.1 Variables And Data Sources

Definition	Variable	Data Frequency	Data source	Data Period
Total Unemployment	T.UMP	Annually	ILO	1990-2019
Female Unemployment	F.UMP	Annually	ILO	1990-2019
Male Unemployment	M.UMP	Annually	ILO	1990-2019
Gross Domestic Product	GDP	Annually	WDI	1990-2019
Export	EXP	Annually	WDI	1990-2019
Labor Force Participation Rate	LFPR	Annually	ILO	1990-2019

Table 4.1 (Continued)

Government Debt	DEBT	Annually	WDI	1990-2019
1994 Crisis	1994	Annually	Author's compilation	1990-2019
2001 Crisis	2001	Annually	Author's compilation	1990-2019
2008/09 Crisis	2008	Annually	Author's compilation	1990-2019

To analyze the data further, a time series for all the variables are presented below. Figure 4.1 shows the time series for all the dependent variables in rate while figure 4.2 shows that of the log of unemployment. All three variables follow the same trend during each of the crises but the female unemployment rate exhibit smaller declines from 1990 to 1994 in figure 4.1. The crisis of 2008 had the highest increase in the unemployment rate while that of 1994 had the lowest increase in all three indicators. The female unemployment rate did not decline as much as the rest after the crisis of 2008 and increased swiftly after 2012 than the remaining rates. Figure 4.2 on the other hand shows the log lines of each series. All the three series lie between 6 and 43 with the log of male unemployment laying on a higher percentage than the log female unemployment**.** Both male and female unemployment as well as total unemployment declined in the crisis of 1994 but increased in the two remaining crises. With the crisis of 2001, unemployment increased continuously till it peaked in 2005 then declined until the 2008 crisis set in. The rate of increase in female unemployment after the 2008 crisis is higher than the male unemployment which is exactly what we see in Figure 4.1.

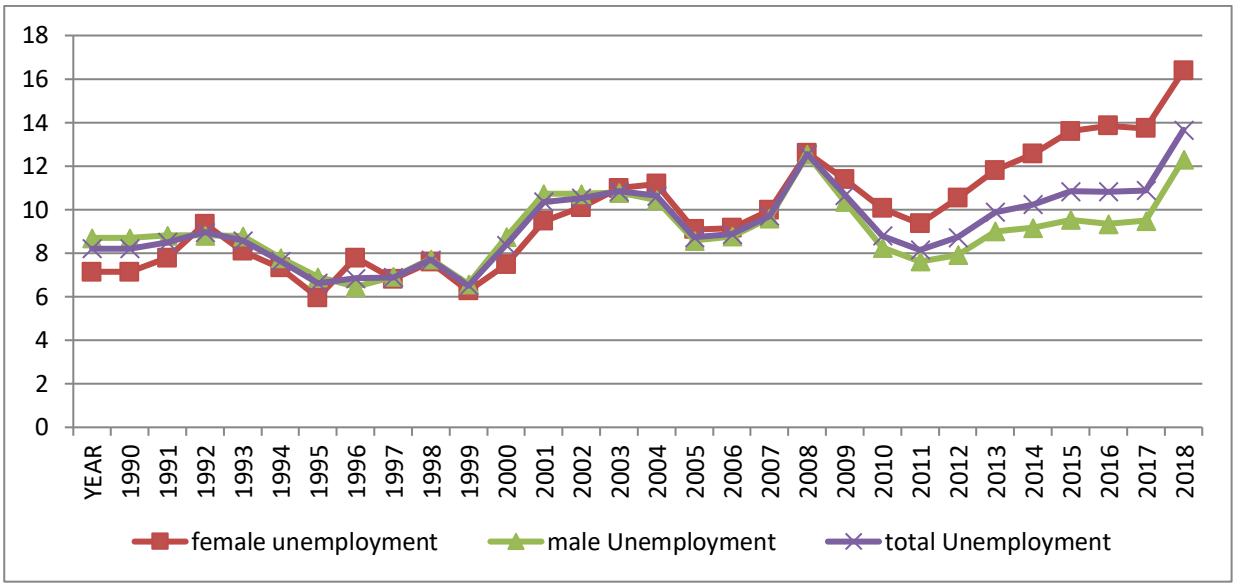


Figure 4.1 Unemployment Rate Time Series

Note: Female unemployment rate is the percentage of unemployed female over the all females in the labor force. Male unemployment rate measures the percentage of unemployed males in the labor force. Total unemployment rate is the percentage of the overall unemployed people in the labor force and it shows the average for both male and female unemployment.

Figure 4.2 Log Unemployment Time Series

Note: The log of each of the series takes the percentage change of the series from their unit change.

Figure 4.3 also shows the time series graph for exports and GDP. Both series have been increasing with GDP starting from about 500 billion liras while export starting from180 billion liras. Both series have been increasing exponentially from the 1990s

till date though there was a decline in each of the crises. Export declined from 1998 till 2001 and increased until it peaked at 2007 but did not stay for long then fell during the crisis of 2008/2009 then rises. GDP looks almost like a straight trend without obvious peaks and downs. The decrease in 2008 was a sharp one as compared to the other two especially the crisis of 2001 which took longer to return upward.

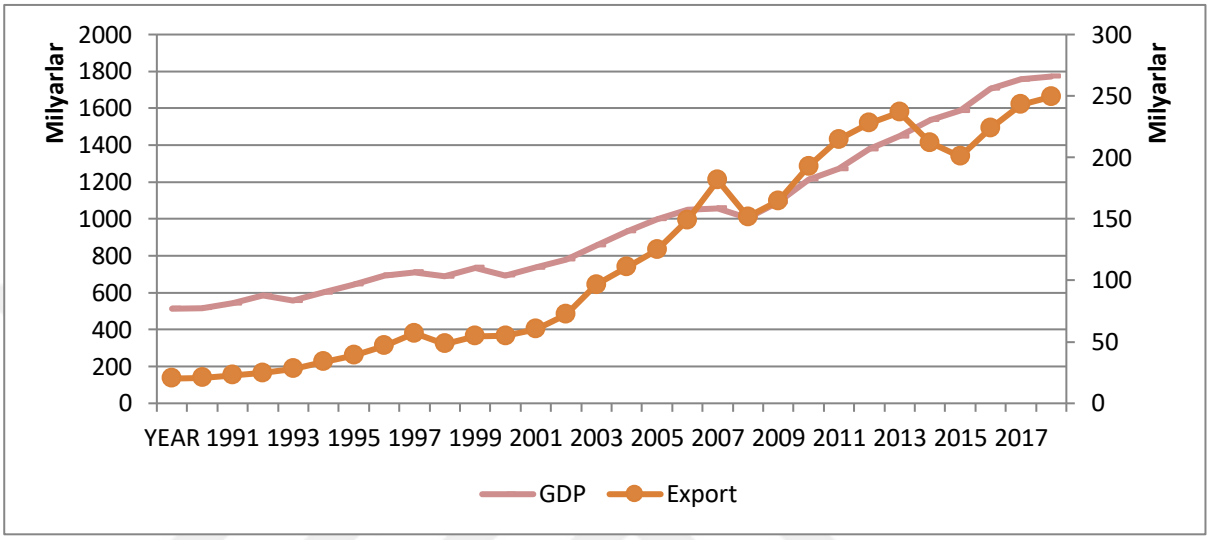


Figure 4.3 Export and GDP Time Series

Note: Export is plotted against the secondary axis .i.e. the axis on the right while GDP is plotted at the left axis (primary). Both the export and GDP are measured in Billions of US Dollars.

Lastly, Figure 4.4 shows the time series for external debt which fluctuates a lot at an increasing rate. The external debt increased in each of the crises except the crisis of 2008. Though it declined, it has the highest figure (14 billion liras) among the three crises. External debt declined from 2008 until 2012 then increased afterward.

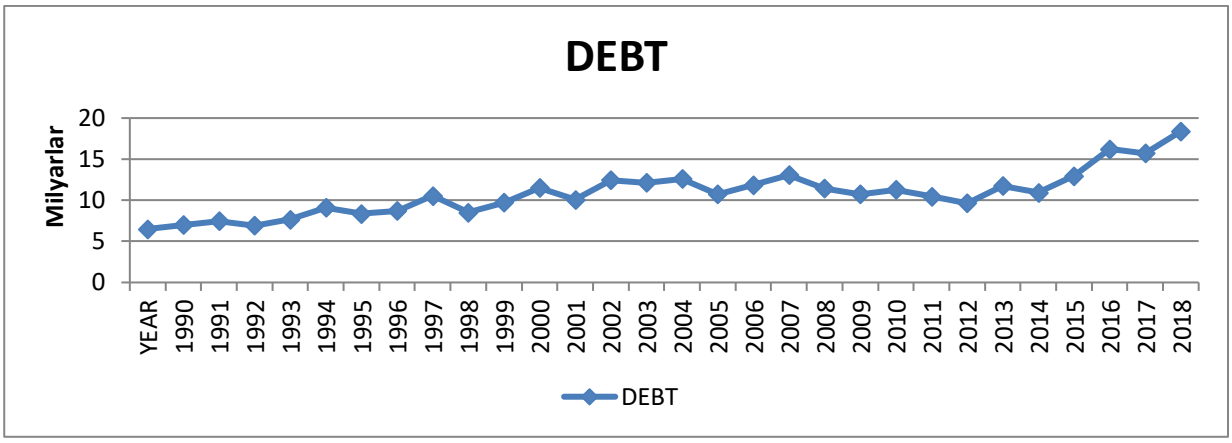


Figure 4.3 External Debts

Note: the external debt is measured in billions of dollar. It measures the total amount of money borrowed by Turkey from foreign countries aside Turkey which also represents the liabilities of Turkey.

Table 4.2 below also shows the summary statistics for the whole sample of the endogenous variables in this study. Labour force participation rate (LFPR) is measured as a rate of total employment while total unemployment (T.UMP), male unemployment (M.UMP), female unemployment (F.UMP), external debt (DEBT), Gross Domestic Product (GDP), and export (EXP) are in the log form. Total unemployment has an average value of 7.71 which is the highest among the dependent variables with female unemployment having the lowest average value of 6.51. It is also the same when it comes to their median, maximum, and minimum values. LFPR has the highest values regarding its average, median, maximum as well as minimum. On the other hand, female unemployment (F.UMP) is the variable with the lowest value in all cases. Also, LFPR deviates from its mean more than the rest of the variables with male unemployment (M.UMP) having the lowest deviation. The null hypothesis for the Jaque-Bera test is that the data is normally distributed against the alternative hypothesis that the data is not normally distributed. From the descriptive analysis table below, at the 5% significance level, none of the indicators are normally distributed. Again, all the series are positively skewed except for export which is negatively skewed.

Table 4.2. Descriptive Analysis

Descriptive statistics							
	Total Unemployment (ln)	Male unemployment (ln)	Female unemployment (ln)	LFPR (%)	External debt (ln)	GDP (ln)	EXPORT (ln)
Mean	7.71	7.34	6.51	50.30	23.07	27.54	25.19
Median	7.71	7.32	6.43	50.54	23.09	27.51	25.36
Maximum	8.39	7.89	7.46	56.82	23.63	28.20	26.24
Minimum	7.31	6.97	5.96	45.06	22.59	26.96	23.72
Std. Dev.	0.28	0.23	0.41	3.34	0.25	0.39	0.86
Skewness	0.49	0.23	0.77	0.12	0.03	0.21	-0.31
Kurtosis	2.48	2.38	2.55	2.11	2.72	1.78	1.65
Jarque-Bera	1.57	0.74	3.25	1.08	0.10	2.08	2.74
Probability	0.45	0.69	0.19	0.58	0.94	0.35	0.25
Sum	231.34	220.32	195.36	1509.11	692.20	826.27	755.77
Sum Sq. Dev.	2.33	1.59	4.98	324.63	1.83	4.57	21.59
Observations	30	30	30	30	30	30	30

Source: Author's compilation

The series is further divided into four periods; 1990-1994, 1995-1999, 2000-2004, and 2005-2009 to analyze it further. Table 4.3 below presents the analysis for all four periods. The unit of measurement is the same as the total variables. Labor force participation rate (LFPR) still stands out as the variable with the highest values by looking at the mean, median, maximum, and minimum while female unemployment has the lowest values. In each of the periods, none of the series is normally distributed as the probabilities of the Jarque-Bera are all rejected at the 5 % significant level. Each series is either distributed platykurtically (having an excess of the kurtosis in the negative leg) or leptokurtically (with a positive excess kurtosis) in one or all the periods.

Table 4.3. Descriptive Analysis for Division

FROM 1990-1994							
	Total unemployment (ln)	Male unemployment (ln)	Female unemployment (ln)	Export (ln)	GDP (ln)	External debt (ln)	LFPR (%)
Mean	7.48	7.15	6.20	23.86	20.87	22.68	54.86
Median	7.50	7.19	6.20	23.85	20.81	22.67	55.44
Maximum	7.54	7.22	6.26	24.05	22.08	22.76	56.82
Minimum	7.39	7.00	6.11	23.73	19.79	22.60	51.56
Std. Dev.	0.06	0.09	0.06	0.13	0.91	0.06	2.14
Skewness	-0.67	-1.22	-0.56	0.41	0.16	-0.12	-0.71
Kurtosis	2.12	2.87	2.19	1.81	1.72	1.74	2.11
Jarque-Bera	0.54	1.25	0.40	0.43	0.37	0.34	0.59
Probability	0.76	0.53	0.82	0.81	0.83	0.84	0.74

Table 4.3 (Continued)

Sum	37.39	35.74	31.00	119.31	104.35	113.42	274.30
Sum Sq. Dev.	0.01	0.03	0.01	0.07	3.28	0.02	18.24
Observations	5	5	5	5	5	5	5
FROM 1995-1999							
	Total unemployment (ln)	Male unemployment (ln)	Female unemployment (ln)	Export (ln)	GDP (ln)	External debt (ln)	LFPR (%)
Mean	7.40	7.07	6.13	24.51	24.13	22.92	52.34
Median	7.38	7.06	6.15	24.57	24.08	22.89	51.84
Maximum	7.52	7.18	6.25	24.77	25.40	23.08	53.47
Minimum	7.32	6.97	5.96	24.24	22.77	22.85	51.69
Std. Dev.	0.08	0.08	0.11	0.20	1.09	0.09	0.83
Skewness	0.45	0.21	-0.60	-0.16	-0.05	1.11	0.52
Kurtosis	1.89	1.77	2.20	1.84	1.53	2.68	1.44
Jarque-Bera	0.43	0.35	0.44	0.30	0.45	1.05	0.73
Probability	0.81	0.84	0.80	0.86	0.80	0.59	0.69
Sum	37.01	35.35	30.67	122.56	120.67	114.61	261.71
Sum Sq. Dev.	0.02	0.03	0.05	0.16	4.72	0.03	2.76
Observations	5	5	5	5	5	5	5

Table 4.3 (Continued)

FROM 2000-2004							
	Total unemployment (ln)	Male unemployment (ln)	Female unemployment (ln)	Export (ln)	GDP (ln)	External debt (ln)	LFPR (%)
Mean	7.66	7.36	6.31	24.91	26.54	23.13	47.71
Median	7.78	7.47	6.43	24.82	26.62	23.17	48.27
Maximum	7.82	7.51	6.50	25.29	27.09	23.25	48.80
Minimum	7.31	7.01	5.96	24.72	25.87	23.00	45.96
Std. Dev.	0.22	0.21	0.23	0.24	0.49	0.11	1.22
Skewness	-0.93	-1.01	-0.70	0.82	-0.28	-0.26	-0.57
Kurtosis	2.27	2.42	1.85	2.17	1.68	1.31	1.68
Jarque-Bera	0.83	0.92	0.69	0.70	0.42	0.65	0.63
Probability	0.66	0.63	0.71	0.70	0.81	0.72	0.73
Sum	38.31	36.82	31.53	124.57	132.69	115.66	238.57
Sum Sq. Dev.	0.19	0.18	0.21	0.23	0.97	0.05	5.95
Observations	5	5	5	5	5	5	5

FROM 2005-2006							
	Total unemployment (ln)	Male unemployment (ln)	Female unemployment (ln)	Export (ln)	GDP (ln)	External debt (ln)	LFPR (%)
Mean	7.74	7.43	6.44	25.68	27.49	23.20	45.72
Median	7.73	7.41	6.43	25.73	27.51	23.20	45.79

Table 4.3 (Continued)

Maximum	8.02	7.70	6.74	25.92	27.64	23.29	46.64
Minimum	7.58	7.26	6.27	25.43	27.25	23.10	45.06
Std. Dev.	0.18	0.17	0.19	0.19	0.17	0.08	0.67
Skewness	0.75	0.73	0.79	-0.03	-0.48	-0.12	0.24
Kurtosis	2.30	2.27	2.34	1.83	1.81	1.73	1.69
Jarque-Bera	0.57	0.55	0.61	0.29	0.49	0.35	0.41
Probability	0.75	0.76	0.74	0.87	0.78	0.84	0.82
Sum	38.72	37.14	32.20	128.38	137.43	116.00	228.60
Sum Sq. Dev.	0.13	0.12	0.14	0.15	0.11	0.02	1.79
Observations	5	5	5	5	5	5	5

4.2. Chow Break Test

A structural break occurs when an event affects the trend of a particular series. It distorts or truncates the movement of that particular series. This difference can be visible between the past and the future movement in the series. A Structural break can be detected exogenously when the date of the break is known or endogenously when the date is unknown.

The 2001 economic crisis marked a turning point for the Turkish economy as it brought together structural reforms that affected the whole economy. These structural reforms changed almost all the macroeconomic indicators in the economy including unemployment. Also during this period, the female participation rate in the labor market increased. This brought about a break in the series (Kara, 2018). Furthermore, in the year 2014 Turkish Statistical Institute made a revision which

resulted in a change in the definition of unemployment and updating the projection of the population registration system. These breaks make the series pre-2001 and pre-2014 not comparable to that of post-2001 and 2014.

Since the dates of these structural breaks are known the right test to detect whether the break affected the unemployment series is the chow test proposed by Chow (1960). The Chow test can be used in two ways; by plotting the series and confirming the results or by using the F-statistics which has a null hypothesis of no break point against the alternative hypothesis of a breakpoint.

H0: $a1 = a2, b1 = b2\ and\ c1 = c2$

Ha:$a1 \neq a2, b1 \neq b2\ and\ c1 \neq c2$

Where a1, b1, and c1 corresponds to values before the break and a2, b2, and c2 values after the break. If the F-stats is not significant, we fail to reject the null hypothesis of no break. The F-stats is obtained after running the initial regression and then performing the Chow test. However, if the null hypothesis is rejected then there is a need to model the break; a new dummy variable is created which takes 0 for all the years without the break and 1 for years with the break. A new series is then generated with the dummy variable for all the regressors in the model. After regression of the second series, the dummy is interpreted just like any other variable.

4.3. Stationarity Test

Data from time series are normally not stationary due to the change of their mean and covariance over time. This implies that a shock to the series will have a permanent or an exponential effect. This calls for the usage of a test that considers structural break. There has been quite a number of unit root test in light of a structural break and unit root in time series. These tests differ in terms of the number of breaks in the data, the null hypothesis to be tested, and lastly, the presence of a trend or not.

Nelson and Plosser (1982) proposed unit root in macroeconomic variables and this has gain momentum since then. Their finding further gained impetus when Perron (1989) emphasized the need to consider structural breaks in the process of testing for a unit root. Standard unit root test Augmented Dickey-Fuller (Dickey & Fuller, 1979) gives bias results toward the non-rejection of the unit root in a series with a break. To

deal with this, Perron (1989) recommended the inclusion of a known or an exogenous structural break in the Augmented Dickey-Fuller (ADF) test. This led to a lot of authors proposing how to determine structural break endogenously (Zivot and Andrews, 1992; Lumsdaine and Papell, 1997). However, there was criticism against these endogenous tests for how they treat the null hypothesis under the breaks.

The traditional (ADF) test is basically in to estimate the coefficient$a$. In this regard, the equation below test for unit root with the null hypothesis of $a = 0$ (non-stationary) against the alternative hypothesis of $a < 0$(stationary).$\Delta y_t = u + \beta t + ay_{t-1} + \sum_{i=1}^{k} c_i \, \Delta y_{t-1} + \varepsilon_t$ (1)

Where $\Delta y_t$is the first difference of the time series in question, t is time trend and k is the amount of lags added to the model in order to make ε_t the residual a white noise meaning it has a constant variance with a zero mean. In determining the lag length (k) the information criteria used are Schwarz Bayesian Criterion (SBC) and Akaike Information Criterion (AIC).

However, Perron (1989) proposed a known exogenous break which was in line with the asymptotic difference theory. He modified the traditional (ADF) to include a dummy to represent the exogenous structural break. To test for unit root he outlined three equations which consider three types of structural break as specified by (Glynn et al, 2007);

$$x_t = a_0 + a_1 DU_t + d(DTB)_t + \beta t + \rho x_{t-1} + \sum_{i=1}^{p} \emptyset_i \, \Delta x_{t-1} + e_t \quad (2)$$

$$x_t = a_0 + \gamma DT_t * + \beta t + \rho x_{t-1} + \sum_{i=1}^{p} \emptyset_i \, \Delta x_{t-1} + e_t \quad (3)$$

$$x_t = a_0 + a_1 DU_t + d(DTB)_t + \gamma DT_t + \beta t + \rho x_{t-1} + \sum_{i=1}^{p} \emptyset_i \, \Delta x_{t-1} + e_t \quad (4)$$

Equation (2) takes into consideration a break in the level or the intercept of the series thus the change in the growth of the model. Equation (3) takes the break in the rate at which the series grows (slope) and lastly equation (4) allows for both impacts at the same time. Each model has a null hypothesis of unit root with a break with an alternative hypothesis of a broken trend stationary process. However, Christiano (1992) criticizes Perron (1989) for proposing a known break as some data do not

have known breaks. This has helped in emerging of different methodologies to determine the date of a break endogenously.

4.4. Cointegration Test

Cointegration shows the long-run relationship between variables and how these variables return to equilibrium following a shock. Cointegration also shows the linear combination of non-identical variables of order 1 becomes stationary at order 0. The error correction model map the I(1) variables into I(0) to reveal the long-run relationship between the variables (Yavuz, 2014). Succeeding the introduction of cointegration in the literature by Granger (1983) and Engle and Granger (1987), it has been an area of serious research. The most used test for cointegration is the residual-based test with the null hypothesis of no cointegration. This includes Engle and Granger (1987), Phillips and Ouliaris (1990), Shin (1994), and the rank cointegration test by Johansen (1988,1991). These results were generalized to include a structural break. Among these tests, the Johansen test is widely used due to its competence and works for both endogenous and exogenous variables.

In finding the cointegration among variables, Johansen (1995) proposed a method that estimates the vector error correction (VEC). VEC is a Vector autoregression (VAR) model which takes into consideration a long9run relation after a shock. To determine the level of cointegration the model automatically selects the minimum lag length order by using Akaike Information Criteria (AIC) for every model. Furthermore, the maximum likelihood of the Johansen method has both maximum eigenvalue statistics and trace value to help determine the cointegration vector which in turn determines the cointegration relation. The null hypothesis for the Johansen test is no cointegration is tested against the alternative.

4.5. Vector Autoregression X (VARX)

The econometric method used for the estimation of the models is vector autoregression X (VARX) as it is a model used in the presence of both endogenous and exogenous variables which was proposed by Pesaran et al (2000). Following (Kahyalar et al, 2020), given a set of x endogenous and y exogenous variables, the VARX model in its general form is formulated in the following form:

$$\Delta\gamma_t = a_0 + a_{1y}t - \Pi_y z_{t-1} + \sum_{i=1}^{\rho-1} \Gamma_{iy}\, \Delta z_{t-1} + \Psi_y w_t + \epsilon_t \qquad (5)$$

Where, a_0 and a_{1y} stand for the intercept and the trend coefficients respectively, Π_y is the matrices for long run coefficient while Γ_{iy} stands for the short run coefficient matrices. Also,$z_t = (\gamma t'\, xt')$, yt is the vector of endogenous variables and x_t is a vector for exogenous variables. Ψ_y represents the coefficient of deterministic or the coefficient of I (0) exogenous variables while $w_t$is a deterministic variable. Π denotes a cointegrating relationship and the number of cointegrating vector is represented by a deficient rank r. If $\Pi = 0$ this means there is no cointegration. In this case only the short run relation can be checked. Contrarily, if $\Pi \neq 0$ then there is a cointegrating relationship. In other words both short and long relation are available and with r cointegrating relationship, π can be expressed as:

$$\Pi = zw' \qquad (6)$$

Where, z and w are a $m \times r$ matrices of full rank and z is an error correction coefficient while w represents the cointegrating coefficient. Fixing of intercept and trends in the analysis of cointegration is important but due to the difficulty in determining whether the variables have a linear trend or not, Pesaran et al. (2015) and Pesaran and

Smith (1999) proposed five different cases;

1. No intercept and no trends,
2. Restricted intercept and no trend,
3. Unrestricted intercept and no trend,
4. Unrestricted intercept and restricted trend,
5. Unrestricted intercept and trend,

The case to be adopted in this thesis is the second one. This is due to the argument of Pesaran and Smith (1999) that case 2 is more pertinent and suitable for unrestricted cases.

The variables of interest are total, female and male unemployment in Turkey. Hence these are the dependent variables in our model. The independent variables comprise both exogenous and endogenous parts. The endogenous components which also

serve as control variables are Gross Domestic Product (GDP), labor force participation rate (LFPR), external debt (DEBT), and exports (EXP). These variables have effects on unemployment and they are different under each of the crises. We will generate three dummies for the economic crises which correspond to 1 in the year there is a crisis and 0 when there is no crisis representing the exogenous component.

VARX models with dummy variables have been previously used in the literature; Fomby et al. (2013) used a dummy to represent events that are related to disaster to examine its effect on economic growth. Kahyalar et al (2020) also used dummy variables to represent an economic crisis to check its impact on the informal sector of Turkey.

The cointegration VARX model above i.e. Equation (1) is used in estimating the following models. Model (1) has total employment as the dependent variable. Model (2) also has male employment while Model (3) has female employment as dependent variables. All the models have external debt, exports, labor force participation rate, and Gross Domestic Product as independent and control variables. Also, dummy variables representing each crisis as well as the dummy for the breaks are added to the independent variables.

CHAPTER V

EMPIRICAL ANALYSIS AND RESULTS

5.1. Break Point Test

Turkey experienced two structural breaks in the years 2001 and 2014 respectively. This calls for a test to check whether the breaks affected the dependent variables (log total unemployment, log male unemployment and log female unemployment). Table 5.1 below provides the summary result of the Chow test for both breaks separately to check the significance of the breaks on the series. From the table, the null hypothesis is rejected at a 1% significant level for all three variables in 2001. However, none of the series is significant in the 2014 structural break. This indicates that the series for the 2001 break must be added to the models. To model the structural breaks, a new dummy is created which has 1s in 2001, and zeros in the remaining years is added to the independent variables. Howbeit, this work models the crisis of 2001 as a dummy with ones in 2001 and 2002. In this regard, the dummy of the structural break is not added to the model as it has high multicollinearity with the 2001 crisis dummy. The presence of multicollinearity in a model reduces the accuracy of the estimated coefficients and p-values cannot be trusted. Due to this the need to drop the structural break dummy arises.

Table 5.1: Breakpoint Test

2001 structural break			
Variable	Wald Test	F-stats	Prob value
log total unemployment	20.48	4.10	0.00***
log male unemployment	18.58	3.72	0.00***
log female unemployment	18.81	3.76	0.00***
2014 structural break			
Variable	Wald Test	F-stats	Prob value

Table 5.1 (Continued)

log total unemployment	3.47	0.69	0.63
log male unemployment	3.92	0.78	0.56
log female unemployment	2.35	0.47	0.80

Note: null hypothesis; no break at specified points. Alternative; there is a break at the specified point.

****represent acceptance at 1% significant level.*

5.2. Stationarity Test

One of the important a priori checks in time series analysis is to check the stationarity of the variables to make analysis and prediction accurate and easy. The diagrams of the series in Chapter IV show a trend in the series or the availability of a deterministic movement that moves the series away from their mean values in the long run.

To use the specified method in this thesis unit root test which takes into consideration the economic breaks is used to check the stationarity of the endogenous variables; Dickey-Fuller T-Test. The summary of the unit root results is presented in Table 5.2 below. These results show that all the variables are stationary in the first difference at a 1% significant level.

Table 5.2: Unit Root Tests

DICKEY-FULLER T-TEST			
VAR	IN LEVEL	IN DIFF	CON.
log total unemployment	-1.84	-5.02***	I(1)
log male unemployment	-3.42	-4.75***	I(1)
log female unemployment	-1.62	-6.64***	I(1)
log GDP	-1.47	-6.18***	I(1)

Table 5.2 (Continued)

LFPR	-2.29	-6.74***	I(1)
LOG debt	-2.45	-7.71***	I(1)
log export	-3.04	-5.48***	I(1)

Source: Author's compilation

*Note: (i) the null hypothesis for the test is unit root and *** represent rejection at 1% significant level (ii) trend and intercept are included in the test*.

5.3. Optimal Lag Length Criteria

In economics, the dependence of a variable, for instance, A on another variable B is rarely instant that is the response often happens within a lapse of time. This lapse is what is termed as a lag. Adding too many lags in a model leads to a loss of a degree of freedom. It can also lead to multicollinearity, serial correlation in the error terms, and misspecification error. This leads to the question of how much lag length is appropriate for a model. The easiest way out is to decide by using information criteria like Schwarz or Akaike and selecting the model that gives the lowest value. The choice of lag length is an empirical issue. The number of lags for annual data is smaller ranging from 1 to 2, the appropriate lag length is from 1 to 8 lags for quarterly data, and for monthly data 6, 12, or 24 lags can be used given adequate data. However, some trial and error are inevitable as the selected lags may not fit the model. This is the case in this work.

Determination of the lag structure of a VARX model before estimation is key. The results in Table 5.3 suggest that a 4-period lag is appropriate for each model. Running a regression with 4 lags in the VARX model needs data with a large sample size. Given the sample size of 30 in this work, the maximum lag length that can be used is 2. Due to this, I used 2 lags to regress all the models. This does not affect the accuracy of the results in any way.

Table 5.3 VAR Lag Order Selection Criteria

MODEL 1						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-18.65	NA	0.00	1.82	2.06	1.89
1	115.36	206.17	0.00	-6.57	-5.11	-6.15
2	136.05	23.87*	0.00	-6.23	-3.57	-5.47
3	174.06	29.24	0.00	-7.24	-3.36	-6.12
4	377.00	78.05	1.28e-14*	-20.92*	-15.84*	-19.45*
MODEL 2						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-18.69	NA	0.00	1.82	2.06	1.89
1	116.42	207.87	0.00	-6.65	-5.20	-6.23
2	139.95	27.15	0.00	-6.53	-3.87	-5.77
3	173.42	25.75	0.00	-7.19	-3.31	-6.07
4	300.52	48.88*	4.61e-12*	-15.04*	-9.95*	-13.57*
MODEL 3						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-19.78	NA	0.00	1.91	2.15	1.98
1	108.35	197.11	0.00	-6.03	-4.57	-5.61
2	124.64	18.80	0.00	-5.36	-2.70	-4.59
3	163.39	29.81	0.00	-6.41	-2.54	-5.30
4	305.67	54.72*	3.10e-12*	-15.43*	-10.355*	-13.97*

Source: Author's Compilation

*Note: * shows the selected lag order chosen by the selection criterion at 5% significant level. FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hannan-Quinn information criterion.*

5.4. Cointegration Test

The next step is to use the cointegration technique of Johansen (1995) to find out whether long-run relationships exist among the variables. The summary of the cointegration results for all three models: total unemployment, male unemployment, and female unemployment are presented below in table 5.4. From the table, the null hypothesis for no cointegration is rejected at a 5% level significant as the trace values of each model are greater than the critical value at this level. Also, the probability values are lower than 0.05 which affirms this result. Furthermore, the second null hypothesis which states the existence of at most 1 cointegrating vector is also rejected at 5% and the trace statistics are greater than the critical values as well. However, we fail to reject the null from near most two to at most 4.

The results then suggest the presence of two cointegration relations in each model which indicates the existence of a long-run relationship between unemployment and the rest of the explanatory variables. Since there is a long-run relationship among the endogenous series then VARX with error correction term (VEC) should be used. This will help in checking the impact of the three crises in both the long run and the short run. We are all set to use our VARX model.

Table 5.4 Result of Cointegration Test (VAR Lag=2)

MODEL 1				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.83	104.75**	69.82	0.00
At most 1 *	0.73	57.10**	47.86	0.01
At most 2	0.41	21.60	29.80	0.32
At most 3	0.24	7.51	15.49	0.52
At most 4	0.00	0.07	3.84	0.79
MODEL 2				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.80	103.84**	69.82	0.00

Table 5.4 (Continued)

At most 1 *	0.73	60.26**	47.86	0.00
At most 2	0.49	24.53	29.80	0.18
At most 3	0.21	6.42	15.49	0.65
At most 4	0.00	0.10	3.84	0.75
MODEL 3				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.84	102.75**	69.82	0.00
At most 1 *	0.73	52.71**	47.86	0.02
At most 2	0.33	17.06	29.80	0.64
At most 3	0.21	6.39	15.49	0.65
At most 4	0.00	0.03	+3.84	0.86

5.5. Results of VARX Analysis

The mathematical representations of the three models are presented below. Π is the coefficient of the long run variables and it shows the speed at which the variables adjust back to equilibrium after a shock . Also, Γ_{iY} is the short run coefficient while Ψ_y is the coefficient for the exogenous variables. The crisis of 1994 actually ended in 1995 that of 2001 also ended in the last quarter of 2002 and that of 2008 ended in 2009. Due to this, the dummy 1994 consist of 1in 1993 and 1994, dummy 2001 contains 2000 and 2001 then 2008 contains 2008 and 2009 with 0 in the rest of the years. Furthermore, the structural break dummy 2001 has 1in 2001 and 0 in the rest of the years. These dummies are exogenous so they are added to the short run results of the VARX model

$$\Delta T.UMP_t = a_0 + a_{1y}t - \Pi GDP_{t-1} + \Pi EXP_{t-1} + \Pi DEBT_{t-1} +$$
$$\Pi LFPR_{t-1} \sum_{i=1}^{2} \Gamma_{iy}\, \Delta GDP_{t-1}\ \sum_{i=1}^{2} \Gamma_{iy}\, \Delta EXP_{t-1} + \sum_{i=1}^{2} \Gamma_{iy}\, \Delta DEBT_{t-1} +$$
$$\sum_{i=1}^{2} \Gamma_{iy}\, \Delta LFPR_{t-1} + \Psi_y 1994_t + \Psi_y 2001_t + \Psi_y 2008_t + \epsilon_t \qquad \text{(Model 1)}$$

$$\Delta M.UMP_t = a_0 + a_{1y}t - \Pi GDP_{t-1} + \Pi EXP_{t-1} + \Pi DEBT_{t-1} +$$
$$\Pi LFPR_{t-1} \sum_{i=1}^{2} \Gamma_{iy}\, \Delta GDP_{t-1}\ \sum_{i=1}^{2} \Gamma_{iy}\, \Delta EXP_{t-1} + \sum_{i=1}^{2} \Gamma_{iy}\, \Delta DEBT_{t-1} +$$
$$\sum_{i=1}^{2} \Gamma_{iy}\, \Delta LFPR_{t-1} + \Psi_y 1994_t + \Psi_y 2001_t + \Psi_y 2008_t + \epsilon_t \qquad \text{(Model 2)}$$

$$\Delta F.UMP_t = a_0 + a_{1y}t - \Pi GDP_{t-1} + \Pi EXP_{t-1} + \Pi DEBT_{t-1} +$$
$$\Pi LFPR_{t-1} \sum_{i=1}^{2} \Gamma_{iy}\, \Delta GDP_{t-1}\ \sum_{i=1}^{2} \Gamma_{iy}\, \Delta EXP_{t-1} + \sum_{i=1}^{2} \Gamma_{iy}\, \Delta DEBT_{t-1} +$$
$$\sum_{i=1}^{2} \Gamma_{iy}\, \Delta LFPR_{t-1} + \Psi_y 1994_t + \Psi_y 2001_t + \Psi_y 2008_t + \epsilon_t \qquad \text{(Model 3)}$$

The result of the study has been divided into three groups generated from the regression of the three explicit models above. The null hypothesis and the alternative hypothesis of the VARX model are given respectively where B represents a coefficient;

H0:$B = 0$ (the coefficient does not affect the independent variable)

H1:$B \neq 0$ (the coefficient has an impact on the independent variable)

The estimation results for the long run for each model are presented in Table 5.5 below while the short run is in Table 5.6. The short-run result presents up to two lags which is the maximum lags the data allows. These results show the summary of the long-run cointegration and short-run relationship between unemployment and the endogenous variables as well as the three economic crises. The long-run results in the VARX model are interpreted with a reversed sign. For instance, a negative coefficient is positive and vice versa.

The main aim of this work is to check the impact of the three crises on the labor market in Turkey concerning unemployment. To achieve this, the answers to these questions were enquired from the results:

- Did the three crises affect unemployment in Turkey during these periods?
- Was there a difference between the degree to which female and male workers were affected by the crisis?

- Which of these crises had more impact on unemployment and why?
- Does economic crisis have any impact on unemployment?

The relationship between unemployment and GDP in the literature is termed as the Okun's law proposed by Arthur Okun (1962). This law shows the existence of a negative relationship between these two variables and it has been confirmed in the Euro zones and some developed and developing countries including Turkey (Altunöz, 2019; Brincikova & Darmo, 2015; Salman & Shukur, 2014 and Dogan 2012). Likewise, in this thesis GDP has a significant impact on total unemployment, male unemployment, and female unemployment in the long run at probability values of 1% significant level. Also, from Table 5.6, a percentage increase in GDP declines total unemployment by 2.25%, male unemployment by 1.6%, and female unemployment by 1.93% in the short run. Bonavetura et al. (2018) associated this difference in the rate of impact to gender to the fact that the females are employed in more sensitive and more flexible jobs than their male counterparts. Okun's law does not hold in the long run in some countries as its effect fades off and gets shadowed by other factors. However, in the case of Turkey, there have been conflicting results. (Şahin, et.al, 2015; Evren and Ayşe, 2019, 2021,) found a negative long-run relationship between unemployment and GDP while Aktar and Ozturk (2009) did not find any relationship. The difference in their findings as stipulated by Evren and Ayşe (2019) is as a result of which of the variables is placed at the right side of the equation as well as whether the fluctuation in the business cycle is considered.

Export and labor force participation have a negative impact on total unemployment as well as male and female unemployment. The labor force participation rate is not significant in the short run for each gender. This relationship is ambiguous and varies from country to country (Fleisher &Rhodes, 1976). The result for the long run in this thesis is contrary to the results found by Tansel and Ozdemir (2018) in Turkey for the period of 2000-2011 except for female labor force participation rate and total unemployment. Their results showed no correlation in the long run. This can be as a result of the differences in the periods considered as well as the methodology used. Our results are the same as the findings of Kakinada and Miyamoto (2012) and Ahn and Hamilton (2019)

By the same token, external debt has a positive impact on unemployment in both the long and short runs. This relation occurs due to the negative impact of the external debt on the macroeconomic variables in the economy (Knapkova et al, 2019). Also, debt significantly increases total unemployment by 4.51% and male unemployment by 4.6% in the long run. There is no impact on female unemployment in the long run rather an increase of 0.54% in the short run. The findings here are confirmed by (Cahyadin & Ratwianingsih, 2020; Kurečić & Kokotović, 2016; and Grotlüschen et al. 2019).

The results in Table 5.6 show that the crisis of 1994 was insignificant but generated a decline in total unemployment by 13%, male unemployment by 15 %, and female unemployment by 8%. in April 1994 the government launched a stabilization program which was backed by IMF to help solve the damages caused by the crisis. Even though the success of this program was short-lived, it increased exports and reduced imports in Turkey which in turn increased the macroeconomic indicators including employment (Collection, 2002). This is the reason why the financial crisis of 1994 did not have any impact on total unemployment as well as male and female unemployment as the impact canceled each other.

The 2001 financial crisis caused an increase of 45% in total unemployment, 37% in male unemployment, and 23 % in female unemployment from table 5.6. The economy of Turkey did not recover fully from the damage of the 1994 crisis before experiencing the crisis of 2001. This condition coupled with the movement of labor from the agriculture sector to the manufacturing sector as well as the halt of support from the international monetary fund further deteriorated the economy before the 2001 crisis. The 2001 financial crisis, in turn, worsens the already deteriorated state of unemployment in Turkey. This impact is more profound in male unemployment than female unemployment and it is in line with findings of Verlagsgesellschaft et al. (2010) and Cömert and Yeldan (2018). However, the quarterly and seasonal analysis of the crisis with a higher impact on unemployment by Cömert and Yeldan, (2018) showed the 2008/09 crisis to be more severe.

Howbeit, the global crisis of 2008 had a lesser impact on unemployment as compared to the financial crisis of 2001. The number of unemployed females rose by 48% due to the effect of this crisis. 2008 crisis increased male unemployment only

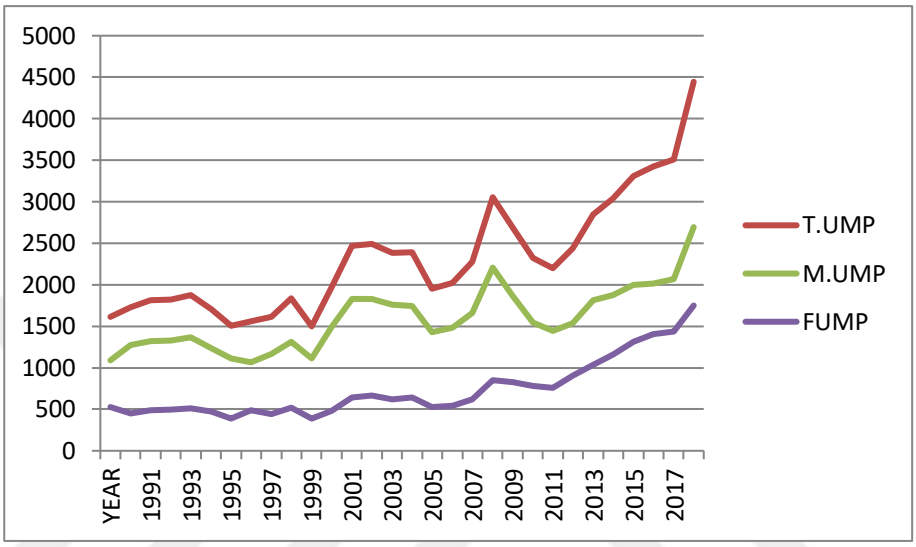
by 21%. Also, total unemployment increased by 27 % which is 18 percentage points lower compared to the impact of the 2001 crisis. This is associated with the condition of the Turkish economy before each of these crises. From figure 5.1, unemployment started increasing from 2000 and peaked at 2001 and stayed at that level till 2003. However, unemployment saw a sharp increase in 2008 following a continuous fall from 2005. The negative impact of unemployment started to decline by early 2009. There was an increase in the labor force participation rate of females after the crisis of 2001 due to the loss of jobs of a lot of males following the crisis and the move of female home production to market production. The participation of females reached 31% in 2013 from 23% in 2005 which was a decline in 1988 from about 32% (Genc & Sengul, 2015). According to Turkstat Labor Force Statistics (2012), within the periods of 2004 and 2012, there was an increase in the movement of female labor from both the informal sector and the agricultural sector to the formal sector but 54% of females are still in the informal sector. However, due to inequality in gender, this movement has not earned better working conditions for females than their male counterparts. Females work in lower-paying or part-time works and experience a lower amount of income although both the labor law and constitution prohibits wage gap in an institution. This is influenced by the level of education as those with a higher degree are employed in higher positions and are affected lesser when there is a shock to the economy than those in the vocational high schools (İnan & Aşık, 2015). That is the reason why female labor was hit most by the 2008 crisis due to the nature of female jobs.

Table 5.5 Long Run Dynamics

VARIABLES	MODEL 1	MODEL 2	MODEL 3
LN GDP	2.68***	3.03***	7.08***
	0.00	0.00	0.00
LN EXP	3.11***	2.57***	3.01***
	0.00	0.00	0.00
LN LFPR	0.09***	0.08***	0.07

Table 5.5 (Continued)

	0.00	0.00	0.23
LN DEBT	-4.51***	-4.60***	-0.99
	0.00	0.00	0.65



Source: Author's compilation

Figure 5.1 Unemployment in Turkey

Table 5.6 Short Run Dynamics

VARIABLES	LAGS	MODEL 1	MODEL 2	MODEL 3
GDP	GDP_{t-1}	-1.09	-1.49	-0.79
		0.24	0.19	0.45
	GDP_{t-2}	-2.25***	-1.60*	-1.93**
		0.00	0.06	0.01
EXP	EXP_{t-1}	-1.33**	-1.44**	0.61
		0.01	0.01	0.15
	EXP_{t-2}	-0.25	-0.21	-0.68*
		0.59	0.68	0.05
LFPR	$LFPR_{t-1}$	0.00	-0.02	-0.01

Table 5.6 (Continued)

		0.98	0.46	0.75
	$LFPR_{t-2}$	-0.05*	0.04	0.00
		0.07	0.17	0.99
DEBT	$DEBT_{t-1}$	-0.27	-0.15	-0.36
		0.26	0.62	0.16
	$DEBT_{t-2}$	0.18	0.15	0.54**
		0.32	0.46	0.01
1994		-0.13	-0.15	-0.08
		0.37	0.35	0.52
2001		0.45***	0.37**	0.23**
		0.00	0.02	0.03
2008		0.27**	0.21**	0.48***
		0.01	0.03	0.00

NOTE:, **, *** represents rejection of the null hypothesis at 10%, 5% and 1% respectively*.

In order to check the combined effect of the crisis on the unemployment series, we placed restrictions on each of the models to achieve so. Table 4.7 summarizes the result for the F-stats for the joint significance of all three crises on each of the dependent variables in each model. The null hypothesis is rejected in each of the models at a 1% significant level except model 2 which is rejected at a 5% significant level. This indicates that economic crisis positively and significantly impacts total unemployment, male unemployment, and female unemployment as well. The result also shows a higher impact on female unemployment (19.66) than male unemployment (11.06).

Table 5.7 Result for Joint impact of Crisis on Unemployment

Model 1 (total unemployment)			
Test Statistic	Value	Df	Probability
F-Statistics	13.68***	3	0.00

Table 5.7 (Continued)

Model 2 (male unemployment)			
Test Statistic	Value	Df	Probability
F-Statistics	11.06**	3	0.01
Model 3 (female unemployment)			
Test Statistic	Value	Df	Probability
F-Statistics	19.66***	3	0.00

*NOTE: Null Hypothesis: 1994 crisis=2001 crisis =2008 crisis=0 Alternative: 1994 crisis≠2001≠2008≠0. *** indicates a rejection at 1% level of significant.*

5.6. Residual Diagnosis

Performing residual diagnosis after using a VARX model is important in affirming the accuracy of a model. To check the soundness and robustness of our models, we run the heteroskedasticity test, serial autocorrelation test, and normality test in that regard.

Firstly, we check for the heteroskedacity of the variance which is very key as time series variables normally have this problem.

H0: Variances are the same (homoskedastic)

Ha: variances are not the same (heteroskedastic)

The prob values for all three models are insignificant at 10% indicating the variances of the variables are the same which is a good thing.

Table 5.8 Breusch-Pagan-Godfrey Heteroskedasticity Test.

Model 1		
Chi-sq	df	Prob.
355.6337	330	0.1589
Model 2		
Chi-sq	df	Prob.

Table 5.8 (Continued)

342.9441	330	0.3004
Model 3		
Chi-sq	df	Prob.
345.8331	330	0.2635

Secondly, we check for the normality of the variables by using the Jarque-Bera test. The result in Table 5.9 shows that all the residuals of the variables in each model are normally distributed. Also, the variables are jointly normally distributed as well.

Table 5.9 Jarque-Bera Test

Model 1			
Component	Jarque-Bera	Df	Prob.
1	4.881295	2	0.0871
2	0.92183	2	0.6307
3	1.408225	2	0.4945
4	1.117758	2	0.5718
5	2.819751	2	0.2442
Joint	11.14886	10	0.346
Model 2			
Component	Jarque-Bera	Df	Prob.
1	0.465184	2	0.7925
2	1.59311	2	0.4509
3	0.945335	2	0.6233
4	1.408136	2	0.4946
5	0.169763	2	0.9186
Joint	4.581528	10	0.9173
Model 3			
Component	Jarque-Bera	Df	Prob.

Table 5.9 (Continued)

1	0.50436	2	0.7771
2	1.318416	2	0.5173
3	3.699354	2	0.1573
4	0.360075	2	0.8352
5	2.307876	2	0.3154
Joint	8.190081	10	0.6103

Lastly, Breusch-Godfrey (LM) test is used to check for the existence of autocorrelation in the residuals.

H0: no serial correlation

Ha: serial correlation

Table 5.10, presents the results of this test. We refuse to reject the null hypothesis in each model in both lag 1 and 2. Therefore, we conclude that the residuals are not serially correlated.

Table 5.10 Breusch-Godfrey Serial Correlation Test

model 1						
Lag	LRE* stat	Df	Prob.	F-stat	Df	Prob.
1	26.14614	25	0.3998	0.927289	(25, 8.9)	0.5884
2	24.74104	25	0.477	0.841919	(25, 8.9)	0.655
model 2						
Lag	LRE* stat	Df	Prob.	F-stat	Df	Prob.
1	17.95865	25	0.8441	0.503172	(25, 8.9)	0.915
2	30.28099	25	0.2139	1.215424	(25, 8.9)	0.3994

Table 5.10 (Continued)

model 3						
Lag	LRE* stat	Df	Prob.	F-stat	Df	Prob.
1	26.34976	25	0.3891	0.940155	(25, 8.9)	0.5787
2	26.81766	25	0.3651	0.970209	(25, 8.9)	0.5564

CHAPTER VI

CONCLUSION

The main aim of the research is to check how the crises of 1994, 2001, and 2008/09 impacted the labor market of Turkey in the context of unemployment with regards to gender. This was done by employing annual data from the period 1994-2019. We made use of the Vector Autoregressive X (VARX) method for the regressions to achieve our aim. In our study, we have four exogenous variables (1994 crisis, 2001 crisis, 2008-2009 crises, and a dummy for the structural break of 2001) which are presented by dummies. Turkey experienced two structural breaks in 2001 and 2014. However, the chow test shows only the break of 2001 having an impact on the variables. We did not model the structural break dummy as it causes multicolinearity in the model. The Augmented Dicker-Fully unit root test with structural breaks confirms the stationarity of all the variables in the first difference i.e I (1). Furthermore, the Johansen cointegration test indicated a 2cointegration relationship for all three models (log total unemployment, log male unemployment and log female unemployment).

The VARX model is finally run with two lags though the information critetria suggested 4 lags due to limited data. The result shows a negative relationship between GDP and unemployment in the short run with no impact in the long run which is termed as Okun's Law. The negative impact is more on female unemployment than male unemployment as found in some countries discussed in this work. Furthermore, export and labor force participation rates impact negatively on unemployment in the long run but not the short run as found in the literature. The decline in unemployment as labor force participation increases was however not experienced in the female unemployment in the crisis of 2008-09. This is due to the employment of female labor in the most flexible jobs in the labor market. Contrary to this, external debt has a positive impact on unemployment in both the long and short runs.

Most importantly, the result shows that the economic crisis of 1994 did not have any impact on unemployment as the stabilization program implemented by the government in the last part of 1994 increased export which in turn increased employment in that period. This helped counter the increase in unemployment experienced at the beginning of the crisis thereby neutralizing the impact.

However, the crises of 2001 and 2008-09 had a positive impact on unemployment in each of the periods. Total unemployment increased more in the 2001 crisis than that in the 2008 crisis. This is due to the reduction in employment as well as the deteriorated state of the economy in 2001. Also, the post-2001 crisis saw an improvement in all sectors of the Turkish economy from the IMF barked policies implemented by the government.

Furthermore, the economic crises of 2001 introduced a new face in the labor market as the participation of females increased with a shift from agriculture, home production as well as informal sector to formal sector experienced. Regardless of this, the disparity between the male and female in terms of the position occupied due to education and other factors placed the female in the flexible part of the formal sector. This can be seen from the results as the financial crisis of 2001 increased the unemployment on males more than females while females severed most in the global crisis of 2008-09. The initial stage of unemployment as well as the policies at each period determines the intensity of the crisis. Again, the economic crisis combined affects the unemployment in Turkey positively with female labor experiencing more of the impact as compared to their male counterpart.

Moreover, the state of unemployment and employment as well as the policy implemented after a crisis is very important in determining the severity of a crisis on unemployment. Therefore policymakers need to implement policies that target the growth of the economy such as export to help maintain any shock to the economy by creating jobs. Education should also be such that it empowers and provides the right experience employers are seeking especially in the female to enable them to be able to occupy higher positions and create jobs.

Lastly, our models perform well in the residual diagnosis proving to be the right methodology for this topic. Our models contain neither heteroskedasticity nor serial correlation and are distributed normally as well.

Regardless of our findings, this paper focused on only the crises of 1994, 2001, and 2008/2009 while Turkey has gone through a lot of crises from the 80s and even from the 90s so the next study can add these crises too. The labor market has a lot of variables like wages, labor force participation rate of different groups, hours of work, etc. which are affected by an economic crisis and they are not studied in this thesis so can be looked at in the future. Lastly, the study used 30 observations due to lack of quarterly data pre to the 2000s, in future studies, the number of observations can be improved upon.

REFERENCES

Ahn, S. K., Hong, H. and Cho, S. (2015) 'Estimation of cointegrated models with exogenous variables', *Journal of Statistical Computation and Simulation*, 85(10), pp. 1945–1962. doi: 10.1080/00949655.2014.910515.

Aktar, I. and Ozturk, L. (2009) 'Can unemployment be cured by economic growth and foreign direct investment in TURKEY?', *International Research Journal of Finance and Economics*, 1(27), pp. 203–211.

Akyüz, Y. and Boratav, K. (2002) 'UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT THE MAKING OF THE TURKISH', (158).

Al-hosban, S. and Edienat, M. (2017) 'The Validity of Okun's Law, Case of Jordan', *European Scientific Journal, ESJ*, 13(28), p. 470. doi: 10.19044/esj.2017.v13n28p470.

Alamro, D. H. and Al-dalaien, Q. F. (2014) 'Modeling the Relationship between GDP and Unemployment for Okun's Law Specific to Jordan', *SSRN Electronic Journal*, 10(10), pp. 71–78. doi: 10.2139/ssrn.2440674.

Altunöz, U. (2019) 'The Relationship between Real Output (Real GDP) and Unemployment Rate: An Analysis of Okun's Law for Eurozone', *Sosyoekonomi*, 27(40), pp. 197–210. doi: 10.17233/sosyoekonomi.2019.02.12.

Altuzarra, A., Gálvez Gálvez, C. and González Flores, A. (2019) 'Unemployment and labour force participation in Spain', *Applied Economics Letters*, 26(5), pp. 345–350. doi: 10.1080/13504851.2018.1470312.

Apergis, N. and Arisoy, I. A. (2017) 'Unemployment and labor force participation across the US States: new evidence from panel data Nicholas', *SPOUDAI Journal of Economics and Business*, 67(4), pp. 45–84.

Appiah, G. K. *et al*. (2020) 'Panel data analysis of employment and unemployment in Sub-Saharan Africa and its impact on annual percentage change in GDP growth', *Open Science Journal*, 5(2), pp. 1–26. doi: 10.23954/osj.v5i2.2394.

Atiyas, I. (1996). Uneven governance and fiscal failure: The adjustment experience in Turkey. In *Governance, leadership and communication: Building constituencies for economic reform* (pp. 285-317). The World Bank.

Berzinskiene, D. and Juozaitiene, L. (2011) 'Impact of labour market measures on unemployment', *Engineering Economics*, 22(2), pp. 186–195. doi: 10.5755/j01.ee.22.2.315.

Bernal-Verdugo, M. L. E., Furceri, D., & Guillaume, M. D. M. (2012). *Crises, labor market policy, and unemployment*. International Monetary Fund.

Board, F. R. *et al*. (2019) 'Divisions of Research & Statistics and Monetary Affairs Measuring Labor-Force Participation and the Incidence and Duration of Unemployment Measuring Labor-Force Participation and the Incidence and Duration of Unemployment'.

Bonaventura, L., Cellini, R. and Sambataro, M. (2018) 'Munich Personal RePEc Archive Gender differences in Okun ' s law across the Italian regions Gender differences in Okun ' s law across the Italian regions', (87557).

Bosna, J. (2013) 'Defining the Unemployment Determinants eu Member Countries', 17, pp. 79–103.

Brincikova, Z. and Darmo, L. (2015) 'The impact of economic growth on gender specific unemployment in the EU', *Analele Stiintifice ale Universitatii Al I Cuza din Iasi - Sectiunea Stiinte Economice*, 62(3), pp. 383–390. doi: 10.1515/aicue-2015-0026.

Bušelić, M., & Bosna, J. (2019). Defining the Unemployment Determinants of the Post-Transition Central European eu Member Countries. *Managing Global Transitions*, *17*(1), 79-103

Cahyadin, M. and Ratwianingsih, L. (2020) 'External Debt, Exchange Rate, and Unemployment in Selected ASEAN Countries', *Jurnal Ekonomi & Studi Pembangunan*, 21(1). doi: 10.18196/jesp.21.1.5029.

Celasun, O. (1999). *The 1994 currency crisis in Turkey*. The World Bank.

Chang, S. C. (2005) 'The dynamic interactions among foreign direct investment, economic growth, exports and unemployment: Evidence from Taiwan', *Economic Change and Restructuring*, 38(3–4), pp. 235–256. doi: 10.1007/s10644-006-9005-x.

Chow, G. C. (1960). Tests of equality between sets of coefficients in two linear regressions. *Econometrica: Journal of the Econometric Society*, 591-605.

Christiano, L. J. (1992). Searching for a Break in GNP. *Journal of Business & Economic Statistics*, *10*(3), 237-250.

Collection, T. (2002) 'The 1994 economic crisis in Turkey Monterey , California'.

Cömert, Hasan and Yeldan, E. (2018) 'A Tale of Three Crises in Turkey : 1994 , 2001 and 2008 – 09'.

Cömert, H. and Çolak, S. (2014) 'The Impacts of the Global Crisis on the Turkish Economy and Policy Responses', (90).

Cömert, H. and Uğurlu, E. N. (2008) *The impacts of the 2008 global financial crisis on developing countries : the case of the 15 most affected countries 1*.

Demirgüç-Kunt, A. and Detragiache, E. (1998) 'The Determinants of Banking Crises in Developing and Developed Countries', *IMF Staff Papers*, 45(1), pp. 81–109. doi: 10.2307/3867330.

Demirhan, B. and Demirhan, E. (2018) 'The Determinants of Female Labor Force Participation', *Gender and Diversity*, pp. 336–354. doi: 10.4018/978-1-5225-6912-1.ch017.

Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American statistical association*, *74*(366a), 427-431.

Doğan, T. T. (2012). Macroeconomic variables and unemployment: The case of Turkey. *International Journal of Economics and Financial Issues*, *2*(1), 71-78.

Engle, R. F., & Granger, C. W. (1987). Co-integration and error correction: representation, estimation, and testing. *Econometrica: journal of the Econometric Society*, 251-276.

Evren, E. C. and Ayşe, A. Y. (2019) 'Is There Asymmetry between GDP and Labor Market Variables in Turkey under Okun ' s Law ?', (September).

Evren, E. C. and Ayşe, A. Y. (2021) 'Okun's law under the demographic dynamics of the Turkish labor market', *Central Bank Review*, 21(2), pp. 59–69. doi: 10.1016/j.cbrev.2021.03.002.

Fomby, T., Ikeda, Y., & Loayza, N. V. (2013). The growth aftermath of natural disasters. *Journal of applied econometrics*, *28*(3), 412-434.

Gaddis, I. and Pieters, J. (2012) 'econstor Participation : Evidence from Brazil'.

Gasparini, L. and Marchionni, M. (2017) 'Deceleration in Female Labor Force Participation in Latin America', *Source: Economía*, 18(1), pp. 197–224. Available at: https://www.jstor.org/stable/90017439.

Genc, S. and Sengul, G. (2015) 'On the Future of Female Employment in Turkey ∗', pp. 1–26.

Gil-Alana, L. A. (2010) *A seasonal fractional multivariate model*. *A testing procedure and impulse responses for the analysis of GDP and unemployment dynamics*, *Empirical Economics*. doi: 10.1007/s00181-009-0276-8.

Glynn, J., Perera, N. and Verma, R. (2007) 'Unit root tests and structural breaks: A survey with applications', *Revista de Metodos Cuantitativos para la Economia y la Empresa*, 3(June), pp. 63–79.

Granger, C. W. (1983). *Co-integrated variables and error-correcting models* (Doctoral dissertation, Discussion Paper 83-13. Department of Economics, University of California at San Diego).

Grekousis, G. (2018) 'Further widening or bridging the gap? A cross-regional study of unemployment across the EU Amid Economic crisis', *Sustainability (Switzerland)*, 10(6). doi: 10.3390/su10061702.

Grotlüschen, A. *et al*. (2019) 'Vulnerable Subgroups and Numeracy Practices: How Poverty, Debt, and Unemployment Relate to Everyday Numeracy Practices', *Adult Education Quarterly*, 69(4), pp. 251–270. doi: 10.1177/0741713619841132.

Hatti, N. and Larsen, M. (2004) 'Lund Papers in Economic History Lives at Risk Lund Papers in Economic History', (93).

Hornstein, B. A. and Rhodes, K. (2013) 'Will a Surge in Labor Force Participation Impede Unemployment Rate Improvement ?', (August), pp. 1–5.

Hutengs, O. and Stadtmann, G. (2014) 'Age-and gender-specific unemployment in scandinavian countries: An analysis based on okun's law', *Comparative Economic Studies*, 56(4), pp. 567–580. doi: 10.1057/ces.2014.22.

Investopedia (2021). Why does unemployment tend to rise during recession? https://www.investopedia.com/ask/answers/032515/why-does-unemployment-tend-rise-during-recession.asp

İnan, F. and Aşık, G. (2015) 'Making Economies Work for Women: Female Labour Force Participation in Turkey'. Available at: https://www.tepav.org.tr/upload/files/1436539353-9.Making_Economies_Work_for_Women___Female_Labour_Force_Participation_in_Turkey.pdf.

Janeba, E. (2009) 'Exports , unemployment , and the welfare state', 42(3).

JIANU, I. (2019) 'The Relationship between the Economic and Financial Crises and Unemployment Rate in the European Union: How Institutions Affected Their Linkage?', *Journal of Eastern Europe Research in Business and Economics*, 2019, pp. 1–16. doi: 10.5171/2019.403548.

Johansen, S. (1988). Statistical analysis of cointegration vectors. *Journal of economic dynamics and control*, *12*(2-3), 231-254.

Johansen, S. (1991). Estimation and hypothesis testing of cointegration vectors in Gaussian vector autoregressive models. *Econometrica: journal of the Econometric Society*, 1551-1580.1

Johansen, S. (1995). *Likelihood-based inference in cointegrated vector autoregressive models*. Oxford University Press on Demand.

Kaas, L., & von Thadden, L. (2004). Budgetary policy and unemployment dynamics in an OLG model with collective bargaining. *The Economic Journal*, *114*(498), 867-889.

Kahyalar, B. N., Ouattara, B. and Fethi, S. (2020) 'The Impact of Financial Crises on the Informal Economy : The Turkish Case', 6(2), pp. 145–172.

Kara, S. (2018) 'Analysis Of Structural Transformation In The Turkey's Economy After 2001 Crisis: Testing With 2008 Economic Crisis And European Unıon Relations', *Hitit University Journal of Social Sciences Institute, Year*, 11.

KILINÇ SAVRUL Araş Gör, B. *et al*. (2013) 'Osmanlı'nın Son Döneminden Günümüze Türkiye'de Dış Ticaretin Gelişimi OSMANLI'NIN SON DÖNEMİNDEN GÜNÜMÜZE TÜRKİYE'DE DIŞ TİCARETİN GELİŞİMİ', *Journal of Entrepreneurship and Development*, 8(1), pp. 55–78.

Krueger, A. O., & Aktan, O. H. (1992). *Swimming against the tide: Turkish trade reform in the 1980s*. Ics Press.

Knapková, M., Kiaba, M., & Hudec, S. (2019). Impact of macroeconomic indicators on public debt of Slovak Republic. *Journal of Business Economics and Management*, *20*(4), 734-753.

Kurečić, P., & Kokotović, F. (2016). Relevance of public debt-to-GDP ratio correlation with significant macroeconomic indicators.

Kakinaka, M., & Miyamoto, H. (2012). Unemployment and labour force participation in Japan. *Applied Economics Letters*, *19*(11), 1039-1043.

Loayza, N. (2009) 'e Growth Aftermath of Natural Disasters', (July).

Lumsdaine, R. L. and Papell, D. H. (1997) 'Multiple trend breaks and the unit-root hypothesis', *Review of Economics and Statistics*, 79(2), pp. 212–218. doi: 10.1162/003465397556791.

Mansoor, H., Khan, D., & Khan, F. A. Structural Stability of Okun's Law in Pakistan: An Econometric Analysis.

Meier, A. K. and K. (2011) 'Labor Markets and the Financial Crisis Evidence from Tajikistan', *Deutsches Institut für Wirtschaftsforschung*.

Mohino, I. and Ureña, J. M. (2020) 'Mobility, housing and labour markets in times of economic crises', *Regional Studies*, 54(4), pp. 443–449. doi: 10.1080/00343404.2020.1711879.

Moller, B. G. (1938) 'The Unemployment Policy Author (s): Gustav Möller Source : The Annals of the American Academy of Political and Social Science , May , 1938 , Vol . 197 , Social Problems and Policies in Sweden (May , 1938), pp . 47-71 Published by : Sage Publications ', 197, pp. 47–71.

Nambiar, R. G. (1979) 'Employment Through Exports : a Study of India', 15(1), pp. 1–18. Available at: https://about.jstor.org/terms.

Nelson, C. R., & Plosser, C. R. (1982). Trends and random walks in macroeconmic time series: some evidence and implications. *Journal of monetary economics*, *10*(2), 139-162.

Okun, A., & Potential, G. N. P. (1962). Its Measurement and Significance, American Statistical Association. In *Proceedings of the Business and Economics Statistics Section* (pp. 98-104).

Onis, Z., & Riedel, J. (1993). Economic crises and long-term growth in Turkey.

Perron, P. (1989) 'The Great Crash, the Oil Price Shock, and the Unit Root Hypothesis', *Econometrica*, 57(6), p. 1361. doi: 10.2307/1913712.

Pesaran, M. H. and Smith, R. J. (1999) 'Discussion Paper Series Number 38 Structural analysis of vector error correction models with exogenous I(1) variables', 44(38). Available at: http://www.ed.ac.uk/schools-departments/economics.

Porto, G. G. (2008) 'Agro-manufactured export prices, wages and unemployment', *American Journal of Agricultural Economics*, 90(3), pp. 748–764. doi: 10.1111/j.1467-8276.2007.01129.x.

Phillips, P. C., & Ouliaris, S. (1990). Asymptotic properties of residual based tests for cointegration. *Econometrica: journal of the Econometric Society*, 165-193.

Qerimi, Q. and Sergi, Bruno S. (2017) 'The nature and the scope of the global economic crisis' impact on employment trends and policies in south east Europe', *Journal of International Studies*, 10(4), pp. 143–153. doi: 10.14254/2071-8330.2017/10-4/11.

Riboud, M. (1985). An analysis of women's labor force participation in France: Cross-section estimates and time-series evidence. *Journal of Labor Economics*, *3*(1, Part 2), S177-S200.

Şahin, A., Tansel, A. and Berument, M. H. (2015) 'Output-employment relationship across sectors: A long- versus short-run perspective', *Bulletin of Economic Research*, 67(3), pp. 265–288. doi: 10.1111/boer.12017.

Salman, A. K. and Shukur, G. (2014) 'Investigating Causal Relations between the GDP Cycle and Unemployment: Data from Finland', *International Journal of Economics and Finance*, 6(4), pp. 118–134. doi: 10.5539/ijef.v6n4p118.

Savulea, D. (2008). Particularities of the Correlation Between the Unemployment Rate and the GDP in the Dynamics of the Romanian Economy.

Shin, Y. (1994). A residual-based test of the null of cointegration against the alternative of no cointegration. *Econometric theory*, *10*(1), 91-115.

Sögner, L. (2001) 'Okun's Law: Does the Austrian unemployment-GDP relationship exhibit structural breaks?', *Empirical Economics*, 26(3), pp. 553–564. doi: 10.1007/s001810000070.

Sudhaman, P. and Thangavel, C. (2015) 'Efficiency analysis of ERP projects—software quality perspective', *International Journal of Project Management*, 33(4), pp. 961–970. doi: 10.1016/j.ijproman.2014.10.011.

Sundaram, J. K., & Chowdhury, A. (2013). Reducing Unemployment in the Face of Growing Public Debt. *Economic and Political Weekly*, 34-38.

Tambunan, T. T. H. (2010) 'The Indonesian Experience with Two Big Economic Crises', *Modern Economy*, 01(03), pp. 156–167. doi: 10.4236/me.2010.13018.

Tansel, A. and Ozdemir, Z. A. (2018) 'Unemployment invariance hypothesis, added and discouraged worker effects in Canada', *International Journal of Manpower*, 39(7), pp. 929–936. doi: 10.1108/IJM-04-2017-0059.

Taşseven, Ö., Altaş, D., & Turgut, Ü. N. (2016). The determinants of female labor force participation for OECD countries. *Uluslararası Ekonomik Araştırmalar Dergisi*, *2*(2), 27-38.

Taylor, J. E., Basu, B. and McLean, S. (2011) 'Net exports and the avoidance of high unemployment during reconversion, 1945-1947', *Journal of Economic History*,

71(2), pp. 444–454. doi: 10.1017/S0022050711001598.

Tomić, I. (2018). What drives youth unemployment in Europe? Economic vs non-economic determinants. *International Labour Review*, *157*(3), 379-408.

Tru, N. A. (2019) 'The Relationship between Education , Economic Growth and Unemployment : Evidence in Eastern Europe', 4(1), pp. 55–72.

Verlagsgesellschaft, N., Affairs, S. and Europe, E. (2010) 'Impacts of 2001 internal and recent global economic crises on youth unemployment in Turkey Author (s): Seyit Köse and Serap Durusoy Source : SEER : Journal for Labour and Social Affairs in Eastern Europe , 2010 , Vol . 13 , No . 4 , Varieties of Capital', 13(4), pp. 515–537.

Veysel, K. M., Ibrahim, A. and Serhat, Y. S. (2018) 'Income, Unemployment and Crime in Turkey: An Analysis of Causality', *Annals of Dunarea de Jos University. Fascicle I : Economics and Applied Informatics*, 24(1), pp. 85–90.

von Thadden, L. and Kaas, L. (2005) 'Budgetary Policy and Unemployment Dynamics', *SSRN Electronic Journal*, (March). doi: 10.2139/ssrn.271267.

WEBER, C. E. (1995) 'Cyclical Output , Cyclical Unemployment , and Okun ' s Coefficient : A New Approach Author (s): Christian E . Weber Published by : Wiley Stable URL : https://www.jstor.org/stable/2285056 CYCLICAL OUTPUT , CYCLICAL UNEMPLOYMENT , AND OKUN ' S COEFFICIENT', 10(4), pp. 433–445.

Weekly, P. (2013) 'Face of Growing Public Debt economic', 48(41), pp. 34–38.

Wiesböck, L. *et al*. (2016) 'The economic crisis as a driver of cross-border labour mobility? A multi-method perspective on the case of the Central European Region', *Journal of Ethnic and Migration Studies*, 42(10), pp. 1711–1727. doi: 10.1080/1369183X.2016.1162354.

Yabuuchi, S. (no date) 'Export Processing Zones , Backward Linkages and Unemployment Author (s): Shigemi Yabuuchi Export Processing Zones , Backward Unemployment and', *Journal of Economic Integration*, 18(2), pp. 360–371.

Yavuz, N. Ç. (2014) 'CO2 Emission, energy consumption, and economic growth for Turkey: Evidence from a cointegration test with a structural break', *Energy Sources, Part B: Economics, Planning and Policy*, 9(3), pp. 229–235. doi: 10.1080/15567249.2011.567222.

yongcheol Shin (1994) 'A Residual-Based Test of the Null of Cointegration against the Alternative of No Cointegration Author (s): Yongcheol Shin Published by : Cambridge University Press Stable URL : https://www.jstor.org/stable/3532656 A RESIDUAL-BASED TEST OF THE NULL OF CO', 10(1), pp. 91–115.

Zivot, E. and Andrews, D. W. K. (1992) 'Further evidence on the great crash, the oil-price shock, and the unit-root hypothesis', *Journal of Business and Economic Statistics*, 10(3), pp. 251–270. doi: 10.1080/07350015.1992.10509904.

APPENDIXES

APPANDIX A

Table A.1: Chow Breakpoint Test Output

Chow Breakpoint Test: 2001
Null Hypothesis: No breaks at specified breakpoints
Varying regressors: All equation variables
Equation Sample: 1990 2019

F-statistic	4.095441	Prob. F(5,20)	0.0101
Log likelihood ratio	21.1502	Prob. Chi-Square(5)	0.0008
Wald Statistic	20.47721	Prob. Chi-Square(5)	0.001

Chow Breakpoint Test: 2014
Null Hypothesis: No breaks at specified breakpoints
Varying regressors: All equation variables
Equation Sample: 1990 2019

F-statistic	0.694948	Prob. F(5,20)	0.6333
Log likelihood ratio	4.805783	Prob. Chi-Square(5)	0.44
Wald Statistic	3.474742	Prob. Chi-Square(5)	0.6272

Chow Breakpoint Test: 2001
Null Hypothesis: No breaks at specified breakpoints
Varying regressors: All equation variables
Equation Sample: 1990 2019

F-statistic	3.715846	Prob. F(5,20)	0.0153
Log likelihood ratio	19.70945	Prob. Chi-Square(5)	0.0014
Wald Statistic	18.57923	Prob. Chi-Square(5)	0.0023

Chow Breakpoint Test: 2014
Null Hypothesis: No breaks at specified breakpoints
Varying regressors: All equation variables
Equation Sample: 1990 2019

F-statistic	0.783984	Prob. F(5,20)	0.5732
Log likelihood ratio	5.369377	Prob. Chi-Square(5)	0.3725
Wald Statistic	3.919918	Prob. Chi-Square(5)	0.561

Chow Breakpoint Test: 2001
Null Hypothesis: No breaks at specified breakpoints

Varying regressors: All equation variables

Equation Sample: 1990 2019

F-statistic	3.761313	Prob. F(5,20)	0.0146
Log likelihood ratio	19.88571	Prob. Chi-Square(5)	0.0013
Wald Statistic	18.80656	Prob. Chi-Square(5)	0.0021

Chow Breakpoint Test: 2014

Null Hypothesis: No breaks at specified breakpoints

Varying regressors: All equation variables

Equation Sample: 1990 2019

F-statistic	0.470168	Prob. F(5,20)	0.794
Log likelihood ratio	3.333952	Prob. Chi-Square(5)	0.6486
Wald Statistic	2.350842	Prob. Chi-Square(5)	0.7988

APPENDIX B

Table B1. Stationarity Test Output

Null Hypothesis: DEBT has a unit root
Trend Specification: Intercept only
Break Specification: Intercept only
Break Type: Innovational outlier

Break Date: 2016
Break Selection: Minimize Dickey-Fuller t-statistic
Lag Length: 2 (Automatic - based on Schwarz information criterion, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.447578	0.9155
Test critical values:	1% level	-4.949133	
	5% level	-4.443649	
	10% level	-4.193627	

*Vogelsang (1993) asymptotic one-sided p-values.

Null Hypothesis: D(DEBT) has a unit root
Trend Specification: Intercept only
Break Specification: Intercept only
Break Type: Innovational outlier

Break Date: 2001
Break Selection: Minimize Dickey-Fuller t-statistic
Lag Length: 0 (Automatic - based on Schwarz information criterion, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.710233	< 0.01
Test critical values:	1% level	-4.949133	
	5% level	-4.443649	
	10% level	-4.193627	

*Vogelsang (1993) asymptotic one-sided p-values.

Null Hypothesis: GDP has a unit root
Trend Specification: Intercept only
Break Specification: Intercept only
Break Type: Innovational outlier

Break Date: 2002
Break Selection: Minimize Dickey-Fuller t-statistic
Lag Length: 0 (Automatic - based on Schwarz information criterion, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.467636	> 0.99
Test critical values:	1% level	-4.949133	
	5% level	-4.443649	
	10% level	-4.193627	

*Vogelsang (1993) asymptotic one-sided p-values.

Null Hypothesis: D(GDP) has a unit root
Trend Specification: Intercept only
Break Specification: Intercept only
Break Type: Innovational outlier

Break Date: 2009
Break Selection: Minimize Dickey-Fuller t-statistic
Lag Length: 0 (Automatic - based on Schwarz information criterion, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.182667	< 0.01
Test critical values:	1% level	-4.949133	
	5% level	-4.443649	
	10% level	-4.193627	

*Vogelsang (1993) asymptotic one-sided p-values.

Null Hypothesis: LFPR has a unit root
Trend Specification: Intercept only
Break Specification: Intercept only
Break Type: Innovational outlier

Break Date: 2014
Break Selection: Minimize Dickey-Fuller t-statistic
Lag Length: 0 (Automatic - based on Schwarz information criterion, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.292461	0.9479
Test critical values:	1% level	-4.949133	
	5% level	-4.443649	
	10% level	-4.193627	

*Vogelsang (1993) asymptotic one-sided p-values.

Null Hypothesis: D(LFPR) has a unit root
Trend Specification: Intercept only
Break Specification: Intercept only
Break Type: Innovational outlier

Break Date: 2005
Break Selection: Minimize Dickey-Fuller t-statistic
Lag Length: 0 (Automatic - based on Schwarz information criterion, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.745403	< 0.01
Test critical values:	1% level	-4.949133	
	5% level	-4.443649	
	10% level	-4.193627	

*Vogelsang (1993) asymptotic one-sided p-values.

Null Hypothesis: LOGM has a unit root
Trend Specification: Intercept only
Break Specification: Intercept only
Break Type: Innovational outlier

Break Date: 2000
Break Selection: Minimize Dickey-Fuller t-statistic
Lag Length: 1 (Automatic - based on Schwarz information criterion, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.419685	0.4302
Test critical values:	1% level	-4.949133	
	5% level	-4.443649	
	10% level	-4.193627	

*Vogelsang (1993) asymptotic one-sided p-values.

Null Hypothesis: D(LOGM) has a unit root
Trend Specification: Intercept only
Break Specification: Intercept only
Break Type: Innovational outlier

Break Date: 2009
Break Selection: Minimize Dickey-Fuller t-statistic
Lag Length: 0 (Automatic - based on Schwarz information criterion, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.745368	0.0210
Test critical values:	1% level	-4.949133	
	5% level	-4.443649	
	10% level	-4.193627	

*Vogelsang (1993) asymptotic one-sided p-values.

Null Hypothesis: LOGF has a unit root
Trend Specification: Intercept only
Break Specification: Intercept only
Break Type: Innovational outlier

Break Date: 2008
Break Selection: Minimize Dickey-Fuller t-statistic
Lag Length: 0 (Automatic - based on Schwarz information criterion, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.617688	> 0.99
Test critical values:	1% level	-4.949133	
	5% level	-4.443649	
	10% level	-4.193627	

*Vogelsang (1993) asymptotic one-sided p-values.

Null Hypothesis: D(LOGF) has a unit root
Trend Specification: Intercept only
Break Specification: Intercept only
Break Type: Innovational outlier

Break Date: 2009
Break Selection: Minimize Dickey-Fuller t-statistic
Lag Length: 0 (Automatic - based on Schwarz information criterion, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.642799	< 0.01
Test critical values:	1% level	-4.949133	
	5% level	-4.443649	
	10% level	-4.193627	

*Vogelsang (1993) asymptotic one-sided p-values.

Null Hypothesis: EXPORT has a unit root
Trend Specification: Intercept only
Break Specification: Intercept only
Break Type: Innovational outlier

Break Date: 2002
Break Selection: Minimize Dickey-Fuller t-statistic
Lag Length: 0 (Automatic - based on Schwarz information criterion, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.035002	0.6658
Test critical values:	1% level	-4.949133	
	5% level	-4.443649	
	10% level	-4.193627	

*Vogelsang (1993) asymptotic one-sided p-values.

Null Hypothesis: D(EXPORT) has a unit root
Trend Specification: Intercept only
Break Specification: Intercept only
Break Type: Innovational outlier

Break Date: 2008
Break Selection: Minimize Dickey-Fuller t-statistic
Lag Length: 0 (Automatic - based on Schwarz information criterion, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.482156	< 0.01
Test critical values:	1% level	-4.949133	
	5% level	-4.443649	
	10% level	-4.193627	

*Vogelsang (1993) asymptotic one-sided p-values.

Null Hypothesis: LOGT has a unit root
Trend Specification: Intercept only
Break Specification: Intercept only
Break Type: Innovational outlier

Break Date: 2013
Break Selection: Minimize Dickey-Fuller t-statistic
Lag Length: 0 (Automatic - based on Schwarz information criterion, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.839844	> 0.99
Test critical values:	1% level	-4.949133	
	5% level	-4.443649	
	10% level	-4.193627	

*Vogelsang (1993) asymptotic one-sided p-values.

Null Hypothesis: D(LOGT) has a unit root
Trend Specification: Intercept only
Break Specification: Intercept only
Break Type: Innovational outlier

Break Date: 2009
Break Selection: Minimize Dickey-Fuller t-statistic
Lag Length: 0 (Automatic - based on Schwarz information criterion, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.019084	< 0.01
Test critical values:	1% level	-4.949133	
	5% level	-4.443649	
	10% level	-4.193627	

*Vogelsang (1993) asymptotic one-sided p-values.

APPENDIX C

Table C1. Cointegration Test Output.

Date: 06/22/21 Time: 00:26
Sample (adjusted): 1993 2019
Included observations: 27 after adjustments
Trend assumption: Linear deterministic trend
Series: LOGT DEBT EXPORT GDP LFPR
Lags interval (in first differences): 1 to 2
Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.828796	104.7514	69.81889	0
At most 1 *	0.731492	57.09914	47.85613	0.0053
At most 2	0.406478	21.59754	29.79707	0.3214
At most 3	0.240861	7.512169	15.49471	0.5189
At most 4	0.002654	0.071764	3.841466	0.7888

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.828796	47.65229	33.87687	0.0006
At most 1 *	0.731492	35.50159	27.58434	0.0039
At most 2	0.406478	14.08537	21.13162	0.3581
At most 3	0.240861	7.440405	14.2646	0.4384
At most 4	0.002654	0.071764	3.841466	0.7888

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Date: 06/22/21 Time: 00:28
Sample (adjusted): 1993 2019
Included observations: 27 after adjustments
Trend assumption: Linear deterministic trend
Series: LOGM DEBT EXPORT GDP LFPR
Lags interval (in first differences): 1 to 2
Unrestricted Cointegration Rank Test (Trace)

Hypothesized	Trace	0.05

No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.800929	103.8398	69.81889	0
At most 1 *	0.73375	60.25927	47.85613	0.0023
At most 2	0.488672	24.52966	29.79707	0.179
At most 3	0.208549	6.419545	15.49471	0.6459
At most 4	0.003866	0.104579	3.841466	0.7464

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.800929	43.58056	33.87687	0.0026
At most 1 *	0.73375	35.72961	27.58434	0.0036
At most 2	0.488672	18.11011	21.13162	0.1258
At most 3	0.208549	6.314966	14.2646	0.5731
At most 4	0.003866	0.104579	3.841466	0.7464

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

Date: 06/22/21 Time: 00:28

Sample (adjusted): 1993 2019

Included observations: 27 after adjustments

Trend assumption: Linear deterministic trend

Series: LOGF DEBT EXPORT GDP LFPR

Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.843287	102.7535	69.81889	0
At most 1 *	0.732985	52.71338	47.85613	0.0163
At most 2	0.326448	17.06122	29.79707	0.6356
At most 3	0.20987	6.391107	15.49471	0.6493
At most 4	0.001149	0.031044	3.841466	0.8601

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized		Max-Eigen	0.05

No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.843287	50.04015	33.87687	0.0003
At most 1 *	0.732985	35.65216	27.58434	0.0037
At most 2	0.326448	10.67011	21.13162	0.6801
At most 3	0.20987	6.360063	14.2646	0.5675
At most 4	0.001149	0.031044	3.841466	0.8601

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

APPENDIX D

Table D1: VARX Long-run And short-run Estimation

Vector Error Correction Estimates					
Date: 06/21/21 Time: 00:41					
Sample (adjusted): 1993 2019					
Included observations: 27 after adjustments					
Standard errors in ( ) & t-statistics in [ ]					
Cointegrating Eq:	CointEq1				
LOGT(-1)	1				
DEBT(-1)	4.841799				
	-0.5489				
	[-8.82086]				
EXPORT(-1)	-1.382838				
	-0.57138				
	[-2.42016]				
GDP(-1)	3.85653				
	0.597845				
	[0.86754]				
LFPR(-1)					
	-0.05554				
	[1.38077]				
C	28.8958				
Error Correction:	D(LOGT)	D(DEBT)	D(EXPORT)	D(GDP)	D(LFPR)
CointEq1	0.099074	0.064182	-0.021305	0.02241	-1.40727
	-0.04978	-0.08644	-0.06863	-0.02591	-0.72148
	[1.99026]	[0.74249]	[-0.31044]	[0.86481]	[-1.95052]
D(LOGT(-1))	0.568497	-0.01111	-0.556496	-0.2172	7.405919
	-0.28147	-0.48877	-0.38804	-0.14652	-4.07949
	[2.01974]	[-0.02272]	[-1.43411]	[-1.48240]	[1.81540]
D(LOGT(-2))	0.544784	-0.17407	-1.036122	-0.23942	-0.52163
	-0.26059	-0.45251	-0.35926	-0.13565	-3.77691
	[2.09056]	[-0.38468]	[-2.88403]	[-1.76497]	[-0.13811]
D(DEBT(-1))	-0.455226	-0.43639	0.285757	0.154003	-4.55813
	-0.24788	-0.43044	-0.34174	-0.12904	-3.59267
	[-1.83647]	[-1.01382]	[0.83619]	[1.19349]	[-1.26873]
D(DEBT(-2))	0.183356	-0.09875	-0.128575	-0.04422	-0.54459
	-0.15066	-0.26163	-0.20771	-0.07843	-2.18366
	[1.21698]	[-0.37746]	[-0.61901]	[-0.56379]	[-0.24939]

D(EXPORT(-1))	1.316419	0.057211	-0.408439	-0.05714	-0.20516
	-0.34229	-0.59438	-0.47189	-0.17818	-4.961
	[3.84591]	[0.09625]	[-0.86553]	[-0.32069]	[-0.04136]
D(EXPORT(-2))	-0.381755	-0.64494	-0.213409	0.129463	-7.73751
	-0.35259	-0.61226	-0.48609	-0.18354	-5.11026
	[-1.08272]	[-1.05337]	[-0.43903]	[0.70536]	[-1.51411]
D(GDP(-1))	-0.611308	-0.46441	-1.52997	-0.83228	19.88347
	-0.94234	-1.63635	-1.29914	-0.49054	-13.6578
	[-0.64872]	[-0.28381]	[-1.17768]	[-1.69665]	[1.45583]
D(GDP(-2))	-3.001312	-0.18006	-3.054763	-1.02713	20.39382
	-0.85668	-1.48761	-1.18105	-0.44595	-12.4164
	[3.50341]	[-0.12104]	[-2.58648]	[-2.30321]	[1.64250]
D(LFPR(-1))	0.007687	-0.02236	-0.071643	-0.00812	0.257726
	-0.02239	-0.03887	-0.03086	-0.01165	-0.32444
	[0.34340]	[-0.57533]	[-2.32145]	[-0.69665]	[0.79437]
D(LFPR(-2))	0.061989	-0.03498	-0.084387	-0.02747	0.976411
	-0.02783	-0.04832	-0.03836	-0.01449	-0.4033
	[2.22768]	[-0.72392]	[-2.19973]	[-1.89619]	[2.42103]
C	-0.23971	0.075834	0.305323	0.082494	-0.61834
	-0.07931	-0.13772	-0.10934	-0.04129	-1.14949
	[-3.02241]	[0.55063]	[2.79240]	[1.99813]	[-0.53793]
NUM1994	-0.104455	-0.07437	-0.066866	-0.10349	5.692855
	-0.11017	-0.19131	-0.15189	-0.05735	-1.5968
	[-0.94810]	[-0.38871]	[-0.44023]	[-1.80452]	[3.56517]
NUM2001	0.57284	-0.16015	-0.691896	-0.22963	2.70755
	-0.1679	-0.29155	-0.23147	-0.0874	-2.43344
	[3.41182]	[-0.54931]	[-2.98913]	[-2.62730]	[1.11264]
NUM2008	0.304257	0.030014	-0.284114	-0.13459	0.497587
	-0.08147	-0.14146	-0.11231	-0.04241	-1.18072
	[3.73480]	[0.21217]	[-2.52970]	[-3.17370]	[0.42143]
BRE_2001	0.01727	0.09535	0.196858	0.109296	-1.5273
	-0.1089	-0.1891	-0.15013	-0.05669	-1.57831
	[0.15859]	[0.50423]	[1.31126]	[1.92806]	[-0.96768]
R-squared	0.858783	0.558051	0.613542	0.667692	0.670963
Adj. R-squared	0.666213	-0.04461	0.086553	0.214544	0.222277
Sum sq. resids	0.066214	0.199659	0.125848	0.017943	13.90904
S.E. equation	0.077585	0.134725	0.106961	0.040387	1.124481
F-statistic	4.459604	0.925985	1.164241	1.473452	1.495395
Log likelihood	42.83313	27.93291	34.16364	60.46022	-29.3568
Akaike AIC	-1.98764	-0.88392	-1.345455	-3.29335	3.359764
Schwarz SC	-1.219736	-0.11602	-0.577552	-2.52545	4.127667
Mean dependent	0.033273	0.033394	0.08858	0.04383	-0.09667
S.D. dependent	0.13429	0.131817	0.111914	0.045571	1.275087

Determinant	resid	7.15E-11

covariance (dof adj.)	
Determinant resid covariance	8.02E-13
Log likelihood	184.4385
Akaike information criterion	-7.36582
Schwarz criterion	-3.28633
Number of coefficients	85

Determinant resid covariance (dof adj.)	1.92E-42
Determinant resid covariance	4.95E-45
Log likelihood	1165.735
Akaike information criterion	-78.3508
Schwarz criterion	-73.1674
Number of coefficients	108

Vector Error Correction Estimates
Date: 06/21/21 Time: 00:53
Sample (adjusted): 1993 2019
Included observations: 27 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1
LOGM(-1)	1
DEBT(-1)	-2.55109
	-0.16617
	[-15.3521]
EXPORT(-1)	-0.57978
	-0.17284
	[-3.35438]
GDP(-1)	2.380223
	-1.538
	[0.177]
LFPR(-1)	-0.04371
	-0.01738
	[-2.51510]
C	2.768826

Error Correction:	D(LOGM)	D(DEBT)	D(EXPORT)	D(GDP)	D(LFPR)
CointEq1	0.276673	0.138034	-0.10883	0.092745	-0.88349
	-0.18963	-0.27557	-0.22058	-0.08481	-2.52068
	[1.45904]	[0.50091]	[-0.49340]	[1.09354]	[-0.35049]
D(LOGM(-1))	0.591407	-0.114	-0.6932	-0.29063	4.159717
	-0.40069	-0.58228	-0.46608	-0.17921	-5.32628

	[1.47598]	[-0.19578]	[-1.48729]	[-1.62173]	[0.78098]
D(LOGM(-2))	0.332539	-0.2245	-0.84633	-0.1551	-3.21209
	-0.31835	-0.46263	-0.3703	-0.14238	-4.23174
	[1.04458]	[-0.48528]	[-2.28550]	[-1.08929]	[-0.75905]
D(DEBT(-1))	-0.30038	-0.33472	0.264266	0.223046	-2.01247
	-0.38118	-0.55393	-0.44339	-0.17048	-5.06691
	[-0.78804]	[-0.60427]	[0.59602]	[1.30832]	[-0.39718]
D(DEBT(-2))	0.187318	-0.02276	-0.06839	-0.00085	-1.06618
	-0.19623	-0.28517	-0.22826	-0.08777	-2.60852
	[0.95456]	[-0.07980]	[-0.29962]	[-0.00970]	[-0.40873]
D(EXPORT(-1))	-1.58573	-0.00356	-0.7596	0.007019	0.138637
	-0.49232	-0.71544	-0.57267	-0.22019	-6.54429
	[3.22095]	[-0.00497]	[-1.32643]	[0.03188]	[0.02118]
D(EXPORT(-2))	-0.45949	-0.68491	-0.11701	0.21945	-3.57859
	-0.44449	-0.64594	-0.51704	-0.1988	-5.90854
	[-1.03375]	[-1.06033]	[-0.22632]	[1.10387]	[-0.60566]
D(GDP(-1))	-1.04171	-0.55152	-1.16174	-1.02156	7.501448
	-1.4046	-2.04118	-1.63384	-0.62821	-18.6711
	[-0.74164]	[-0.27020]	[-0.71105]	[-1.62613]	[0.40177]
D(GDP(-2))	-2.44952	-0.46721	-2.94594	-1.091	6.327734
	-1.23753	-1.7984	-1.43951	-0.55349	-16.4504
	[1.97935]	[-0.25979]	[-2.04648]	[-1.97111]	[0.38466]
D(LFPR(-1))	-0.00151	-0.02618	-0.07109	-0.0092	-0.0029
	-0.03028	-0.04401	-0.03523	-0.01354	-0.40255
	[-0.04982]	[-0.59481]	[-2.01825]	[-0.67922]	[-0.00720]
D(LFPR(-2))	0.062671	-0.04606	-0.09855	-0.0334	0.636459
	-0.03944	-0.05732	-0.04588	-0.01764	-0.52429
	[1.58895]	[-0.80359]	[-2.14803]	[-1.89343]	[1.21393]
C	-0.08917	0.172683	0.2719	0.108993	-1.5385
	-0.08498	-0.12349	-0.09885	-0.03801	-1.1296
	[-1.04931]	[1.39834]	[2.75071]	[2.86770]	[-1.36199]
NUM1994	-0.13731	-0.09574	-0.0692	-0.14123	4.100677
	-0.16819	-0.24441	-0.19564	-0.07522	-2.23568
	[-0.81639]	[-0.39172]	[-0.35371]	[-1.87755]	[1.83419]
NUM2001	0.580464	-0.14663	-0.66667	-0.17702	0.165293
	-0.1998	-0.29035	-0.23241	-0.08936	-2.65589
	[2.90524]	[-0.50502]	[-2.86852]	[-1.98092]	[0.06224]

NUM2008	0.210351	0.008585	-0.2058	-0.1276	0.544037
	-0.09452	-0.13736	-0.10995	-0.04228	-1.25648
	[2.22540]	[0.06250]	[-1.87179]	[-3.01824]	[0.43299]
BRE_2001	-0.14777	-0.01081	0.214564	0.054175	1.371149
	-0.07913	-0.115	-0.09205	-0.03539	-1.05189
	[-1.86739]	[-0.09396]	[2.33102]	[1.53071]	[1.30352]
R-squared	0.800402	0.537733	0.58911	0.633631	0.586634
Adj. R-squared	0.528224	-0.09263	0.028806	0.134036	0.022952
Sum sq. resids	0.09889	0.208838	0.133804	0.019782	17.47383
S.E. equation	0.094815	0.137787	0.110291	0.042407	1.260369
F-statistic	2.940723	0.853053	1.051411	1.26829	1.040718
Log likelihood	37.41809	27.32611	33.33608	59.14291	-32.4371
Akaike AIC	-1.58653	-0.83897	-1.28415	-3.19577	3.587929
Schwarz SC	-0.81862	-0.07107	-0.51625	-2.42787	4.355833
Mean dependent	0.026343	0.033394	0.08858	0.04383	-0.09667
S.D. dependent	0.138042	0.131817	0.111914	0.045571	1.275087

Determinant resid covariance (dof adj.)	5.54E-11
Determinant resid covariance	6.22E-13
Log likelihood	187.8677
Akaike information criterion	-7.61983
Schwarz criterion	-3.54035
Number of coefficients	85

Vector Error Correction Estimates
Date: 06/21/21 Time: 00:35
Sample (adjusted): 1993 2019
Included observations: 27 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1
LOGF(-1)	1
DEBT(-1)	-0.01397
	-0.34621
	[-0.04034]
EXPORT(-1)	-7.84458
	1.76458
	-4.44568
GDP(-1)	0.810161
	-0.81073
	[0.99930]
LFPR(-1)	-0.25183
	-0.0333
	[-7.56149]

C	-10.6913				
Error Correction:	D(LOGF)	D(DEBT)	D(EXPORT)	D(GDP)	D(LFPR)
CointEq1	-0.2444	-0.04273	0.072817	0.002331	2.565007
	-0.1053	-0.13924	-0.10961	-0.03689	-0.92104
	[-2.32100]	[-0.30690]	[0.66436]	[0.06319]	[2.78491]
D(LOGF(-1))	0.374928	0.189755	-0.31521	-0.12419	3.514798
	-0.2383	-0.3151	-0.24805	-0.08348	-2.08438
	[1.57337]	[0.60220]	[-1.27075]	[-1.48769]	[1.68626]
D(LOGF(-2))	0.732705	-0.05761	-0.80852	-0.25755	3.146945
	-0.25808	-0.34127	-0.26864	-0.09041	-2.25746
	[2.83902]	[-0.16881]	[-3.00963]	[-2.84880]	[1.39402]
D(DEBT(-1))	0.623682	-0.60864	0.15895	0.092234	-1.23078
	-0.26977	-0.35672	-0.28081	-0.0945	-2.35971
	[-2.31187]	[-1.70619]	[0.56603]	[0.97600]	[-0.52158]
D(DEBT(-2))	0.312663	-0.10195	-0.24992	-0.08169	1.77844
	-0.20672	-0.27334	-0.21518	-0.07241	-1.80816
	[1.51251]	[-0.37297]	[-1.16146]	[-1.12811]	[0.98356]
D(EXPORT(-1))	0.368039	-0.02745	0.193309	0.0047	3.48977
	-0.39684	-0.52474	-0.41308	-0.13901	-3.47114
	[0.92743]	[-0.05230]	[0.46797]	[0.03381]	[1.00537]
D(EXPORT(-2))	-0.37084	-0.84746	-0.2436	0.008115	-3.38098
	-0.36307	-0.48009	-0.37793	-0.12718	-3.1758
	[-1.02138]	[-1.76520]	[-0.64456]	[0.06381]	[-1.06461]
D(GDP(-1))	0.490995	0.235719	-1.51581	-0.64396	9.930879
	-1.01909	-1.34755	-1.06079	-0.35699	-8.914
	[0.48180]	[0.17492]	[-1.42895]	[-1.80388]	[1.11408]
D(GDP(-2))	-3.31626	0.600472	-1.99929	-0.72374	16.07917
	-0.84686	-1.11981	-0.88151	-0.29666	-7.40749
	[3.91594]	[0.53623]	[-2.26802]	[-2.43965]	[2.17067]
D(LFPR(-1))	0.004993	-0.01275	-0.04553	-0.00187	0.360776
	-0.02587	-0.0342	-0.02693	-0.00906	-0.22626
	[0.19302]	[-0.37283]	[-1.69109]	[-0.20599]	[1.59454]
D(LFPR(-2))	0.021726	-0.01671	-0.03696	-0.0126	0.721836
	-0.02965	-0.03921	-0.03086	-0.01039	-0.25934
	[0.73277]	[-0.42631]	[-1.19759]	[-1.21351]	[2.78333]
C	-0.43764	0.052669	0.294329	0.093656	1.127922
	-0.16107	-0.21298	-0.16766	-0.05642	-1.40887
	[-2.71708]	[0.24729]	[1.75552]	[1.65990]	[0.80059]

NUM1994	-0.06289	0.025427	0.008714	-0.04492	3.487196
	-0.11271	-0.14904	-0.11733	-0.03948	-0.98591
	[-0.55799]	[0.17060]	[0.07427]	[-1.13759]	[3.53704]
NUM2001	0.425697	-0.0774	-0.50587	-0.21569	5.621608
	-0.20903	-0.2764	-0.21758	-0.07322	-1.82837
	[2.03655]	[-0.28001]	[-2.32496]	[-2.94569]	[3.07465]
NUM2008	0.46376	0.042959	-0.33736	-0.16455	0.94577
	-0.1175	-0.15537	-0.1223	-0.04116	-1.02774
	[3.94702]	[0.27650]	[-2.75839]	[-3.99784]	[0.92024]
BRE_2001	0.316541	0.047381	0.07513	0.077342	-4.6598
	-0.20945	-0.27695	-0.21801	-0.07337	-1.83202
	[1.51133]	[0.17108]	[0.34461]	[1.05415]	[-2.54354]
R-squared	0.796771	0.54841	0.611775	0.734826	0.788816
Adj. R-squared	0.519641	-0.06739	0.082378	0.373226	0.500838
Sum sq. resids	0.11668	0.204015	0.126423	0.014318	8.927162
S.E. equation	0.102991	0.136187	0.107205	0.036078	0.900866
F-statistic	2.875081	0.890559	1.155608	2.032149	2.739155
Log likelihood	35.18481	27.64157	34.10208	63.50688	-23.3704
Akaike AIC	-1.4211	-0.86234	-1.3409	-3.51903	2.916324
Schwarz SC	-0.65319	-0.09444	-0.57299	-2.75112	3.684227
Mean dependent	0.047381	0.033394	0.08858	0.04383	-0.09667
S.D. dependent	0.1486	0.131817	0.111914	0.045571	1.275087

Determinant resid covariance (dof adj.)	1.84E-10
Determinant resid covariance	2.06E-12
Log likelihood	171.6803
Akaike information criterion	-6.42076
Schwarz criterion	-2.34128
Number of coefficients	85

APPENDIX E

Table E1. Coefficient Diagnosis Test

VEC Residual Heteroskedasticity Tests (Levels and Squares)
Sample: 1990 2019
Included observations: 27

Joint test:

Chi-sq	df	Prob.
355.6337	330	0.1589

Individual components:

Dependent	R-squared	F(22,4)	Prob.	Chi-sq(22)	Prob.
res1*res1	0.951539	3.569997	0.1123	25.69154	0.2652
res2*res2	0.945607	3.160874	0.1361	25.5314	0.2723
res3*res3	0.965149	5.035182	0.0636	26.05902	0.2492
res4*res4	0.927164	2.314464	0.2161	25.03344	0.2955
res5*res5	0.829099	0.88206	0.6335	22.38566	0.4371
res2*res1	0.845595	0.995726	0.5735	22.83108	0.4113
res3*res1	0.854397	1.066905	0.5392	23.06871	0.3979
res3*res2	0.938988	2.798213	0.1639	25.35267	0.2805
res4*res1	0.932418	2.508519	0.1926	25.17529	0.2888
res4*res2	0.923669	2.200166	0.2319	24.93907	0.3
res4*res3	0.791409	0.689833	0.7487	21.36805	0.4981
res5*res1	0.90105	1.655661	0.3362	24.32836	0.3303
res5*res2	0.901369	1.661599	0.3347	24.33696	0.3298
res5*res3	0.766032	0.595289	0.8095	20.68287	0.5404
res5*res4	0.917854	2.031549	0.2585	24.78207	0.3076

VEC Residual Heteroskedasticity Tests (Levels and Squares)
Sample: 1990 2019
Included observations: 27

Joint test:

Chi-sq	df	Prob.
342.9441	330	0.3004

Individual components:

Dependent	R-squared	F(22,4)	Prob.	Chi-sq(22)	Prob.
res1*res1	0.872915	1.248868	0.4623	23.56872	0.3702
res2*res2	0.766187	0.595805	0.8092	20.68706	0.5401
res3*res3	0.867772	1.193215	0.4843	23.42984	0.3778
res4*res4	0.93339	2.547756	0.1883	25.20152	0.2875
res5*res5	0.782431	0.653864	0.7717	21.12565	0.513
res2*res1	0.70994	0.445012	0.9032	19.16838	0.6349

res3*res1	0.701236	0.42675	0.9136	18.93337	0.6494
res3*res2	0.836633	0.931123	0.6068	22.58908	0.4252
res4*res1	0.95024	3.472102	0.1174	25.65649	0.2667
res4*res2	0.949273	3.402449	0.1212	25.63038	0.2679
res4*res3	0.745252	0.531899	0.8502	20.1218	0.5754
res5*res1	0.851672	1.043962	0.55	22.99513	0.402
res5*res2	0.854902	1.071252	0.5372	23.08235	0.3971
res5*res3	0.69997	0.424181	0.915	18.89919	0.6515
res5*res4	0.958267	4.174918	0.0871	25.87322	0.2572

VEC Residual Heteroskedasticity Tests (Levels and Squares)
Sample: 1990 2019
Included observations: 27

Joint test:

Chi-sq	df	Prob.
345.8331	330	0.2635

Individual components:

Dependent	R-squared	F(22,4)	Prob.	Chi-sq(22)	Prob.
res1*res1	0.824293	0.852964	0.6499	22.25592	0.4447
res2*res2	0.930841	2.447182	0.1996	25.13272	0.2908
res3*res3	0.930773	2.444599	0.1999	25.13088	0.2909
res4*res4	0.922642	2.168532	0.2366	24.91134	0.3013
res5*res5	0.91323	1.913588	0.2799	24.65721	0.3137
res2*res1	0.825464	0.859903	0.646	22.28752	0.4428
res3*res1	0.761874	0.581721	0.8183	20.57061	0.5474
res3*res2	0.97301	6.55456	0.0402	26.27126	0.2402
res4*res1	0.968309	5.555442	0.0537	26.14435	0.2455
res4*res2	0.867565	1.19107	0.4851	23.42426	0.3781
res4*res3	0.672795	0.373853	0.9412	18.16547	0.6961
res5*res1	0.953409	3.720596	0.1051	25.74204	0.2629
res5*res2	0.932336	2.50524	0.1929	25.17306	0.2889
res5*res3	0.815475	0.803515	0.6787	22.01783	0.4588
res5*res4	0.91331	1.915521	0.2795	24.65937	0.3136

APPENDIX F

Table F1. Serial Correlation Test

VEC Residual Serial Correlation LM Tests
Date: 06/21/21 Time: 00:42
Sample: 1990 2019
Included observations: 27
Null hypothesis: No serial correlation at lag h

Lag	LRE* stat	df	Prob.	Rao F-stat	Df	Prob.
1	26.14614	25	0.3998	0.927289	(25, 8.9)	0.5884
2	24.74104	25	0.477	0.841919	(25, 8.9)	0.655

Null hypothesis: No serial correlation at lags 1 to h

Lag	LRE* stat	df	Prob.	Rao F-stat	Df	Prob.
1	26.14614	25	0.3998	0.927289	(25, 8.9)	0.5884
2	457.9164	50	0	NA	(50, NA)	NA

*Edgeworth expansion corrected likelihood ratio statistic.

VEC Residual Serial Correlation LM Tests
Date: 06/21/21 Time: 00:33
Sample: 1990 2019
Included observations: 27
Null hypothesis: No serial correlation at lag h

Lag	LRE* stat	df	Prob.	Rao F-stat	Df	Prob.
1	17.95865	25	0.8441	0.503172	(25, 8.9)	0.915
2	30.28099	25	0.2139	1.215424	(25, 8.9)	0.3994

Null hypothesis: No serial correlation at lags 1 to h

Lag	LRE* stat	df	Prob.	Rao F-stat	Df	Prob.
1	17.95865	25	0.8441	0.503172	(25, 8.9)	0.915
2	NA	50	NA	NA	(50, NA)	NA

*Edgeworth expansion corrected likelihood ratio statistic.

VEC Residual Serial Correlation LM Tests
Date: 06/21/21 Time:

00:37

Sample: 1990 2019

Included observations: 27

Null hypothesis: No serial correlation at lag h

Lag	LRE* stat	df	Prob.	Rao F-stat	Df	Prob.
1	26.34976	25	0.3891	0.940155	(25, 8.9)	0.5787
2	26.81766	25	0.3651	0.970209	(25, 8.9)	0.5564

Null hypothesis: No serial correlation at lags 1 to h

Lag	LRE* stat	df	Prob.	Rao F-stat	Df	Prob.
1	26.34976	25	0.3891	0.940155	(25, 8.9)	0.5787
2	NA	50	NA	NA	(50, NA)	NA

*Edgeworth expansion corrected likelihood ratio statistic.

APPENDIX G

Table G1. Normality Test

VEC Residual Normality Tests
Orthogonalization: Cholesky (Lutkepohl)
Null Hypothesis: Residuals are multivariate normal
Date: 06/21/21 Time: 00:43
Sample: 1990 2019
Included observations: 27

Component	Skewness	Chi-sq	Df	Prob.*
1	0.975459	4.281837	1	0.0385
2	-0.40338	0.732214	1	0.3922
3	0.288594	0.374789	1	0.5404
4	0.065303	0.01919	1	0.8898
5	0.723795	2.357458	1	0.1247
Joint		7.765489	5	0.1696
Component	Kurtosis	Chi-sq	Df	Prob.
1	3.729967	0.599458	1	0.4388
2	2.589455	0.189616	1	0.6632
3	3.958441	1.033435	1	0.3094
4	2.011817	1.098568	1	0.2946
5	3.641036	0.462294	1	0.4966
Joint		3.38337	5	0.6411
Component	Jarque-Bera	df	Prob.	
1	4.881295	2	0.0871	
2	0.92183	2	0.6307	
3	1.408225	2	0.4945	
4	1.117758	2	0.5718	
5	2.819751	2	0.2442	
Joint	11.14886	10	0.346	

*Approximate p-values do not account for coefficient estimation

VEC Residual Normality Tests
Orthogonalization: Cholesky (Lutkepohl)
Null Hypothesis: Residuals are multivariate normal
Date: 06/21/21 Time: 00:32
Sample: 1990 2019
Included observations: 27

Component	Skewness	Chi-sq	Df	Prob.*
1	0.234699	0.247877	1	0.6186
2	-0.56495	1.43624	1	0.2307
3	-0.42109	0.797928	1	0.3717
4	-0.00348	5.45E-05	1	0.9941

5	0.173143	0.134903	1	0.7134
Joint		2.617002	5	0.7588
Component	Kurtosis	Chi-sq	Df	Prob.
1	2.560498	0.217307	1	0.6411
2	2.626583	0.15687	1	0.6921
3	3.361978	0.147407	1	0.701
4	1.881238	1.408082	1	0.2354
5	2.823968	0.03486	1	0.8519
Joint		1.964527	5	0.854
Component	Jarque-Bera	Df	Prob.	
1	0.465184	2	0.7925	
2	1.59311	2	0.4509	
3	0.945335	2	0.6233	
4	1.408136	2	0.4946	
5	0.169763	2	0.9186	
Joint	4.581528	10	0.9173	

VEC Residual Normality Tests

VEC Residual Normality Tests

Orthogonalization: Cholesky (Lutkepohl)

Null Hypothesis: Residuals are multivariate normal

Date: 06/21/21 Time: 00:38

Sample: 1990 2019

Included observations: 27

Component	Skewness	Chi-sq	Df	Prob.*
1	-0.33338	0.500136	1	0.4794
2	-0.35091	0.554131	1	0.4566
3	0.838856	3.166556	1	0.0752
4	0.100369	0.045332	1	0.8314
5	0.689059	2.136613	1	0.1438
Joint		6.402768	5	0.269
Component	Kurtosis	Chi-sq	Df	Prob.
1	3.061277	0.004224	1	0.9482
2	2.175764	0.764285	1	0.382
3	3.688185	0.532798	1	0.4654
4	2.471066	0.314743	1	0.5748
5	3.390171	0.171263	1	0.679
Joint		1.787312	5	0.8777
Component	Jarque-Bera	df	Prob.	
1	0.50436	2	0.7771	
2	1.318416	2	0.5173	
3	3.699354	2	0.1573	
4	0.360075	2	0.8352	
5	2.307876	2	0.3154	
Joint	8.190081	10	0.6103	

*Approximate p-values do not account for coefficient estimation

APPENDIX H

Table H1:Probability Values For The Models

System: UNTITLED
Estimation Method: Least Squares
Date: 06/21/21 Time: 00:44
Sample: 1993 2019
Included observations: 27
Total system (balanced) observations 135

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.099074	0.04978	1.990259	0.0515
C(2)	0.568497	0.28147	2.019745	0.0483
C(3)	0.544784	0.260593	2.090557	0.0412
C(4)	-0.45523	0.247881	-1.83647	0.0717
C(5)	0.183356	0.150665	1.216981	0.2288
C(6)	1.316419	0.342291	3.845906	0.0003
C(7)	-0.38176	0.352589	-1.08272	0.2837
C(8)	-0.61131	0.942337	-0.64872	0.5192
C(9)	3.001312	0.856683	3.503408	0.0009
C(10)	0.007687	0.022385	0.343396	0.7326
C(11)	0.061989	0.027826	2.227683	0.03
C(12)	-0.23971	0.079311	-3.02241	0.0038
C(13)	-0.10446	0.110173	-0.9481	0.3472
C(14)	0.57284	0.167899	3.41182	0.0012
C(15)	0.304257	0.081466	3.734799	0.0004
C(16)	0.01727	0.108897	0.158593	0.8746
C(17)	0.064182	0.086441	0.742491	0.4609
C(18)	-0.01111	0.488767	-0.02272	0.982
C(19)	-0.17407	0.452514	-0.38468	0.702
C(20)	-0.43639	0.430441	-1.01382	0.3151
C(21)	-0.09875	0.261626	-0.37746	0.7073
C(22)	0.057211	0.594382	0.096252	0.9237
C(23)	-0.64494	0.612264	-1.05337	0.2968
C(24)	-0.46441	1.636349	-0.28381	0.7776
C(25)	-0.18006	1.487614	-0.12104	0.9041
C(26)	-0.02236	0.038872	-0.57533	0.5674
C(27)	-0.03498	0.04832	-0.72392	0.4722
C(28)	0.075834	0.137722	0.550634	0.5841
C(29)	-0.07437	0.191313	-0.38871	0.699
C(30)	-0.16015	0.291553	-0.54931	0.585
C(31)	0.030014	0.141463	0.212165	0.8328
C(32)	0.09535	0.189098	0.504234	0.6161
C(33)	-0.02131	0.068628	-0.31045	0.7574

C(34)	-0.5565	0.388044	-1.43411	0.1572
C(35)	-1.03612	0.359262	-2.88403	0.0056
C(36)	0.285757	0.341737	0.836191	0.4067
C(37)	-0.12858	0.207711	-0.61901	0.5385
C(38)	-0.40844	0.471894	-0.86553	0.3905
C(39)	-0.21341	0.486091	-0.43903	0.6624
C(40)	-1.52997	1.299137	-1.17768	0.244
C(41)	-3.05476	1.181052	-2.58648	0.0124
C(42)	-0.07164	0.030861	-2.32145	0.024
C(43)	-0.08439	0.038363	-2.19973	0.032
C(44)	0.305323	0.10934	2.792404	0.0072
C(45)	-0.06687	0.151888	-0.44023	0.6615
C(46)	-0.6919	0.231471	-2.98913	0.0042
C(47)	-0.28411	0.112311	-2.5297	0.0143
C(48)	0.196858	0.150129	1.311255	0.1952
C(49)	0.02241	0.025913	0.864805	0.3909
C(50)	-0.2172	0.146521	-1.4824	0.1439
C(51)	-0.23942	0.135654	-1.76497	0.0831
C(52)	0.154003	0.129036	1.193486	0.2378
C(53)	-0.04422	0.07843	-0.56379	0.5752
C(54)	-0.05714	0.178182	-0.32069	0.7497
C(55)	0.129463	0.183543	0.705358	0.4836
C(56)	-0.83228	0.490541	-1.69665	0.0954
C(57)	-1.02713	0.445953	-2.30321	0.0251
C(58)	-0.00812	0.011653	-0.69665	0.489
C(59)	-0.02747	0.014485	-1.89619	0.0632
C(60)	0.082494	0.041286	1.998126	0.0507
C(61)	-0.10349	0.057351	-1.80452	0.0766
C(62)	-0.22963	0.087401	-2.6273	0.0111
C(63)	-0.13459	0.042407	-3.1737	0.0025
C(64)	0.109296	0.056687	1.928057	0.059
C(65)	-1.40727	0.721483	-1.95052	0.0562
C(66)	7.405919	4.079489	1.815403	0.0749
C(67)	-0.52163	3.776908	-0.13811	0.8907
C(68)	-4.55813	3.59267	-1.26873	0.2099
C(69)	-0.54459	2.183663	-0.24939	0.804
C(70)	-0.20516	4.961003	-0.04136	0.9672
C(71)	-7.73751	5.11026	-1.51411	0.1357
C(72)	19.88347	13.65778	1.455834	0.1511
C(73)	20.39382	12.41636	1.642496	0.1062
C(74)	0.257726	0.324442	0.794367	0.4304
C(75)	0.976411	0.403304	2.421031	0.0188
C(76)	-0.61834	1.149493	-0.53793	0.5928
C(77)	5.692855	1.596796	3.565173	0.0008
C(78)	2.70755	2.433444	1.112641	0.2707
C(79)	0.497587	1.180723	0.421425	0.6751

C(80)	-1.5273	1.578306	-0.96768	0.3374

Determinant residual covariance	8.02E-13

Equation: D(LOGT) = C(1)*(LOGT(-1) - 4.84179862311*DEBT(-1) - 1.38283837312*EXPORT(-1) + 3.85652991511*GDP(-1) + 0.0766849844352*LFPR(-1) + 28.8957994533) + C(2)*D(LOGT(-1)) + C(3)*D(LOGT(-2)) + C(4)*D(DEBT(-1)) + C(5)*D(DEBT(-2)) + C(6) *D(EXPORT(-1)) + C(7)*D(EXPORT(-2)) + C(8)*D(GDP(-1)) + C(9) *D(GDP(-2)) + C(10)*D(LFPR(-1)) + C(11)*D(LFPR(-2)) + C(12) + C(13) *NUM1994 + C(14)*NUM2001 + C(15)*NUM2008 + C(16)*BRE_2001

System: UNTITLED

Estimation Method: Least Squares

Date: 06/21/21 Time: 00:45

Sample: 1993 2019

Included observations: 27

Total system (balanced) observations 135

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.276673	0.189627	1.459043	0.1502
C(2)	0.591407	0.400687	1.475981	0.1457
C(3)	0.332539	0.318347	1.044581	0.3008
C(4)	-0.30038	0.381175	-0.78804	0.4341
C(5)	0.187318	0.196235	0.954561	0.344
C(6)	1.585725	0.492316	3.220946	0.0021
C(7)	-0.45949	0.444489	-1.03375	0.3058
C(8)	-1.04171	1.404596	-0.74164	0.4615
C(9)	2.449518	1.237533	1.979355	0.0528
C(10)	-0.00151	0.030283	-0.04982	0.9604
C(11)	0.062671	0.039442	1.58895	0.1178
C(12)	-0.08917	0.084978	-1.04931	0.2986
C(13)	-0.13731	0.168187	-0.81639	0.4178
C(14)	0.580464	0.199799	2.905244	0.0053
C(15)	0.210351	0.094523	2.225404	0.0302
C(16)	-0.14777	0.079132	-1.86739	0.0672
C(17)	0.138034	0.275568	0.500909	0.6184
C(18)	-0.114	0.582284	-0.19578	0.8455
C(19)	-0.2245	0.462625	-0.48528	0.6294
C(20)	-0.33472	0.553929	-0.60427	0.5481
C(21)	-0.02276	0.285171	-0.0798	0.9367

C(22)	-0.00356	0.715441	-0.00497	0.996
C(23)	-0.68491	0.645938	-1.06033	0.2936
C(24)	-0.55152	2.041177	-0.2702	0.788
C(25)	-0.46721	1.798399	-0.25979	0.796
C(26)	-0.02618	0.044008	-0.59481	0.5544
C(27)	-0.04606	0.057317	-0.80359	0.4251
C(28)	0.172683	0.123491	1.398342	0.1676
C(29)	-0.09574	0.244411	-0.39172	0.6968
C(30)	-0.14663	0.29035	-0.50502	0.6156
C(31)	0.008585	0.137362	0.062499	0.9504
C(32)	-0.01081	0.114995	-0.09396	0.9255
C(33)	-0.10883	0.220576	-0.4934	0.6237
C(34)	-0.6932	0.466085	-1.48729	0.1426
C(35)	-0.84633	0.370305	-2.2855	0.0262
C(36)	0.264266	0.443388	0.596016	0.5536
C(37)	-0.06839	0.228262	-0.29962	0.7656
C(38)	-0.7596	0.572669	-1.32643	0.1902
C(39)	-0.11701	0.517036	-0.22632	0.8218
C(40)	-1.16174	1.633844	-0.71105	0.4801
C(41)	-2.94594	1.439514	-2.04648	0.0455
C(42)	-0.07109	0.035226	-2.01825	0.0485
C(43)	-0.09855	0.045879	-2.14803	0.0361
C(44)	0.2719	0.098847	2.750709	0.008
C(45)	-0.0692	0.195637	-0.35371	0.7249
C(46)	-0.66667	0.232408	-2.86852	0.0058
C(47)	-0.2058	0.10995	-1.87179	0.0666
C(48)	0.214564	0.092047	2.331025	0.0234
C(49)	0.092745	0.084812	1.093539	0.2789
C(50)	-0.29063	0.17921	-1.62173	0.1106
C(51)	-0.1551	0.142383	-1.08929	0.2808
C(52)	0.223046	0.170483	1.308318	0.1962
C(53)	-0.00085	0.087767	-0.0097	0.9923
C(54)	0.007019	0.220192	0.031878	0.9747
C(55)	0.21945	0.198801	1.103872	0.2745
C(56)	-1.02156	0.628215	-1.62613	0.1096
C(57)	-1.091	0.553495	-1.97111	0.0538
C(58)	-0.0092	0.013544	-0.67922	0.4998
C(59)	-0.0334	0.017641	-1.89343	0.0636
C(60)	0.108993	0.038007	2.867703	0.0059
C(61)	-0.14123	0.075223	-1.87755	0.0657
C(62)	-0.17702	0.089361	-1.98092	0.0526
C(63)	-0.1276	0.042276	-3.01824	0.0038
C(64)	0.054175	0.035392	1.530714	0.1316
C(65)	-0.88349	2.520681	-0.3505	0.7273
C(66)	4.159717	5.326282	0.78098	0.4382
C(67)	-3.21209	4.231736	-0.75905	0.4511

C(68)	-2.01247	5.06691	-0.39718	0.6928
C(69)	-1.06618	2.608519	-0.40873	0.6843
C(70)	0.138637	6.544295	0.021184	0.9832
C(71)	-3.57859	5.908536	-0.60567	0.5472
C(72)	7.501448	18.6711	0.401768	0.6894
C(73)	6.327734	16.45036	0.384656	0.702
C(74)	-0.0029	0.402549	-0.0072	0.9943
C(75)	0.636459	0.524294	1.213935	0.23
C(76)	-1.5385	1.1296	-1.36199	0.1788
C(77)	4.100677	2.235682	1.834195	0.072
C(78)	0.165293	2.655895	0.062236	0.9506
C(79)	0.544037	1.256479	0.432985	0.6667
C(80)	1.371149	1.051886	1.303516	0.1978

Determinant residual covariance		6.22E-13

Equation: D(LOGM) = C(1)*(LOGM(-1) - 2.55109385348*DEBT(-1) - 0.579776813941*EXPORT(-1) + 2.38022308649*GDP(-1) - 0.0437102921677*LFPR(-1) + 2.76882578356) + C(2)*D(LOGM(-1)) + C(3)*D(LOGM(-2)) + C(4)*D(DEBT(-1)) + C(5)*D(DEBT(-2)) + C(6) *D(EXPORT(-1)) + C(7)*D(EXPORT(-2)) + C(8)*D(GDP(-1)) + C(9) *D(GDP(-2)) + C(10)*D(LFPR(-1)) + C(11)*D(LFPR(-2)) + C(12) + C(13) *NUM1994 + C(14)*NUM2001 + C(15)*NUM2008 + C(16)*BRE_2001

System:
UNTITLED

Estimation Method: Least Squares
Date: 06/21/21 Time: 00:46
Sample: 1993 2019
Included observations: 27
Total system (balanced) observations 135

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.2444	0.105297	-2.321	0.024
C(2)	0.374928	0.238297	1.573366	0.1214
C(3)	0.732705	0.258084	2.839018	0.0063
C(4)	-0.62368	0.269774	-2.31187	0.0246
C(5)	0.312663	0.206718	1.512513	0.1361
C(6)	0.368039	0.396838	0.927427	0.3578
C(7)	-0.37084	0.363073	-1.02138	0.3115
C(8)	0.490995	1.019092	0.481796	0.6319
C(9)	3.316256	0.846861	3.91594	0.0003
C(10)	0.004993	0.025867	0.193025	0.8477
C(11)	0.021726	0.029649	0.732766	0.4668
C(12)	-0.43764	0.161069	-2.71708	0.0088
C(13)	-0.06289	0.112714	-0.55799	0.5791
C(14)	0.425697	0.209028	2.03655	0.0465
C(15)	0.46376	0.117496	3.947018	0.0002
C(16)	0.316541	0.209445	1.51133	0.1364
C(17)	-0.04273	0.139236	-0.3069	0.7601

Chow Breakpoint Test: 2001
Null Hypothesis: No breaks at specified breakpoints
Varying regressors: All equation variables
Equation Sample: 1990 2019

F-statistic

Wald Statistic

Chow Breakpoint Test: 2014
Null Hypothesis: No breaks at specified breakpoints
Varying regressors: All equation variables
Equation Sample: 1990 2019

F-statistic
Log likelihood ratio
Wald Statistic

C(18)	0.189755	0.315102	0.602203	0.5495
C(19)	-0.05761	0.341267	-0.16881	0.8666
C(20)	-0.60864	0.356725	-1.70619	0.0936
C(21)	-0.10195	0.273345	-0.37297	0.7106
C(22)	-0.02745	0.524743	-0.0523	0.9585
C(23)	-0.84746	0.480095	-1.7652	0.0831
C(24)	0.235719	1.347555	0.174924	0.8618
C(25)	0.600472	1.119811	0.536226	0.594
C(26)	-0.01275	0.034204	-0.37283	0.7107
C(27)	-0.01671	0.039206	-0.42631	0.6715
C(28)	0.052669	0.212983	0.24729	0.8056
C(29)	0.025427	0.149043	0.1706	0.8652
C(30)	-0.0774	0.2764	-0.28001	0.7805
C(31)	0.042959	0.155366	0.276504	0.7832
C(32)	0.047381	0.276951	0.17108	0.8648
C(33)	0.072817	0.109606	0.664357	0.5092
C(34)	-0.31521	0.248047	-1.27076	0.2092
C(35)	-0.80852	0.268644	-3.00963	0.0039
C(36)	0.15895	0.280812	0.566035	0.5737
C(37)	-0.24992	0.215176	-1.16146	0.2505
C(38)	0.193309	0.413075	0.467975	0.6417
C(39)	-0.2436	0.377929	-0.64456	0.5219
C(40)	-1.51581	1.060789	-1.42895	0.1587
C(41)	-1.99929	0.881511	-2.26802	0.0273
C(42)	-0.04553	0.026925	-1.69109	0.0965
C(43)	-0.03696	0.030862	-1.19759	0.2362
C(44)	0.294329	0.167659	1.755519	0.0847

C(45)	0.008714	0.117326	0.074268	0.9411
C(46)	-0.50587	0.217581	-2.32496	0.0238
C(47)	-0.33736	0.122304	-2.75839	0.0079
C(48)	0.07513	0.218015	0.344612	0.7317
C(49)	0.002331	0.036886	0.063189	0.9498
C(50)	-0.12419	0.083475	-1.48769	0.1425
C(51)	-0.25755	0.090407	-2.8488	0.0062
C(52)	0.092234	0.094502	0.975997	0.3333
C(53)	-0.08169	0.072413	-1.12811	0.2642
C(54)	0.0047	0.139012	0.033808	0.9732
C(55)	0.008115	0.127185	0.063808	0.9494
C(56)	-0.64396	0.356988	-1.80388	0.0767
C(57)	-0.72374	0.296655	-2.43965	0.018
C(58)	-0.00187	0.009061	-0.20599	0.8376
C(59)	-0.0126	0.010386	-1.21351	0.2301
C(60)	0.093656	0.056422	1.659901	0.1026
C(61)	-0.04492	0.039484	-1.13759	0.2602
C(62)	-0.21569	0.073223	-2.94569	0.0047
C(63)	-0.16455	0.041159	-3.99784	0.0002
C(64)	0.077342	0.073369	1.054151	0.2964
C(65)	2.565007	0.921036	2.784915	0.0073
C(66)	3.514798	2.084379	1.686257	0.0974
C(67)	3.146945	2.257461	1.39402	0.1689
C(68)	-1.23078	2.359715	-0.52158	0.6041
C(69)	1.77844	1.808159	0.983564	0.3296
C(70)	3.48977	3.471145	1.005366	0.3191
C(71)	-3.38098	3.1758	-1.06461	0.2917

C(72)	9.930879	8.913997	1.114077	0.2701
C(73)	16.07917	7.407488	2.170665	0.0343
C(74)	0.360776	0.226257	1.594542	0.1165
C(75)	0.721836	0.259343	2.783326	0.0074
C(76)	1.127922	1.408868	0.800587	0.4268
C(77)	3.487196	0.985909	3.537035	0.0008
C(78)	5.621608	1.828371	3.074654	0.0033
C(79)	0.94577	1.027739	0.920243	0.3615
C(80)	-4.6598	1.832016	-2.54354	0.0138

Determinant residual covariance	2.06E-12

Equation: D(LOGF) = C(1)*(LOGF(-1) - 0.0139667409455*DEBT(-1) - 0.209380723975*EXPORT(-1) + 0.810161076111*GDP(-1) - 0.251830207459*LFPR(-1) - 10.6912982968) + C(2)*D(LOGF(-1)) + C(3)*D(LOGF(-2)) + C(4)*D(DEBT(-1)) + C(5)*D(DEBT(-2)) + C(6) *D(EXPORT(-1)) + C(7)*D(EXPORT(-2)) + C(8)*D(GDP(-1)) + C(9) *D(GDP(-2)) + C(10)*D(LFPR(-1)) + C(11)*D(LFPR(-2)) + C(12) + C(13) *NUM1994 + C(14)*NUM2001 + C(15)*NUM2008 + C(16)*BRE_2001

CURRICULUM VITAE

Personal Information:

Name - Surname: Amaama Abdul-Malik

Education:

2011-2015 BA in Economics, University of Ghana, Ghana

2019-2021 MA in Economics, Ibn Haldun University, Turkey

Experience:

July - September, 2013 mathematics tutor at Tawheed Senior High School, Ghana

2015 – 2016, research assistance, Quality Academic Assurance, University of Ghana

2017-2018, class teacher, Fatima Farida International School, Ghana

Publications:

Badshah, W., Abdul-Malik, A., & Özcan, R.(2021). The impact of US sanctions on the Consumer Price Index (CPI) of Turkey. *Review of International Comparative Management*.