

IMPACT OF REGIONAL MACROECONOMIC POLICY SHOCKS IN PAKISTAN'S ECONOMY



BY

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Registration No: PIDE2015FMPHILETS11

MPhil Econometrics

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Islamabad, in partial fulfillment of the requirements of the Degree of Master of
Philosophy in Econometrics*

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CERTIFICATE

This is to certify that this thesis entitled: **“Impact of Regional Macroeconomic Policy Shocks in Pakistan’s Economy”** submitted by Ms. Muneeza Maqbool is accepted in its present form by the Department of Econometrics and Statistics, Pakistan Institute of Development Economics (PIDE), Islamabad as satisfying the requirements for partial fulfillment of the degree in **Master of Philosophy in Econometrics**.

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DISCLAIMER

This document represents part of the author's MPhil study program at Pakistan Institute of Development Economics. The views stated therein are those of the author herself and the work has been completed in a scheduled time.

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*Dedicated to my beloved Father Maqbool Ahmed (Late) and
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ABSTRACT

In this study regional trade macro econometric model estimated for Pakistan. For this purpose data for five countries used like Pakistan, India, China, Bangladesh and Sri Lanka where Pakistan is the main country and remaining are trading partners. The main purpose of the study is to estimate a regional trade macro econometric model and also see the impact of policy shocks like monetary and fiscal policy shocks on our country and vice versa. The regional trade macro econometric model basically consist of six main blocks that include; the product block, aggregate demand block, supply block, trade block, monetary block and fiscal block. In this study we use Structural Vector Autoregressive Approach for the estimation purposes and use time series data for the period 1971 to 2015. Results shows that the country responds to changes in the region and the changes in the country also impact the region. Hence, we can come to the conclusion that the policies in the region impact country and vice versa. Regional monetary shock impacts Pakistan but in terms of fiscal shocks, not the regional but rather the fiscal shock of Pakistan impacts Pakistan.

Key Words

[Regional trade macro econometric model, Policy shocks, Structural Vector Autoregressive Approach]

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CHAPTER 01

INTRODUCTION

We live in a well-connected world where we all are connected individually as well as on national level. The regional trade agreements have reiterated the importance of the need for regional trade model. Regional trade agreements basically started from past 25-30 years. Regional trade agreements have both positive and negative impact on trade, depending on their structure and implementation. According to Ethier (1998), the growing number of regional trade agreements is caused by new regionalism. There are few main characteristics that describe the new regionalism:

The regional trade model is needed to analyse the shocks and for prediction using the historical data. The analysis is important because it needs to be seen how shocks impact on a regional level or if they don't impact on a regional level. Work has been done where regional trade models for different regions have been created to analyse different issues like regional trade model for EU to see whether being members of EU is better or not. Similarly different trade models have been created for different regions to see different shocks or issues like monetary or fiscal policy shocks. Klein (1950), in late 1960s the US economy encouraged the attention of the central banks in industrialised countries to improve large macroeconomic models for policy making. Furthermore, Fair (1976) also developed macro econometric models; a multi-country model was made for the economy of US in 1984 for thirty nine countries. In Pakistan, there are limited efforts by research organizations and some economists to construct both large and medium size macro econometric models such as Naqvi et al., (1983) worked on PIDE Macro econometric model, Pasha et al., (1995) concentrated on Integrated Social Policy Macroeconomic Model and Chisti et al., (1992) dealt with macro econometric modelling and Pakistan's Economy: A vector auto- regression approach was applied.

Monetary policy works through the channels of financial markets, bank-based intermediation and transmit into prices, exchange rate and economic growth of the economy. Long term real interest rates, credit management, asset prices and exchange rates are different channels of monetary transmission. In traditional economic analysis the monetary policy maker's behaviour is considered as exogenous. In Pakistan, State Bank of Pakistan controls the monetary policy formation. Fiscal policy is an instrument through which a government can achieve objectives of development very efficiently by making a balance between resources and expenditures. It works by changing existing resources from an unproductive form to productive and profitable form.

Since, the work is going to be done on regional macro econometric trade model, then we need to look at the regional variables from the perspective of the monetary and fiscal policy and see how the regional variables impact the country. So e.g. let's talk about regional interest rate and how it would impact Pakistan if there is some monetary shock in it. If regional interest rate falls, then that would mean that there would be more investments and more foreign direct investments, since on taking loans they would not have to return more due to less interest rate. So this would negatively impact Pakistan, since the investments would get pooled in the region rather than in Pakistan. Similarly if money supply in the region increases, that would mean people will have more money, so their demand would increase, leading to less supply to meet that demand which would lead to inflation and also to meet the demands, the regions would increase the exports and their imports would fall due to more prices and also shortage. Hence, it would have a positive impact for Pakistan in terms of trade that the other countries would do more trade with Pakistan, due to having stability in terms of prices. But on the other side this might cause interest rate to fall and exchange rate falls as well, which would means more exports rather than vice versa. So it can have positive and negative impact on Pakistan depending on the dominant channel. If we look at the fiscal side, the let's say the regional taxes

are cut down, which would mean people have more to spend leading to inflation and at the same time the interest rates will increase which would crowd out the investments and thus Pakistan would benefit but at the same time it is expansionary fiscal policy as government spending more than the revenue, so there would be a positive channel for the region.

Different studies examined that different regions of countries or a group of countries have impacts of the monetary policy shocks on their economic activities (e.g. Gerlach and Smets, 1995; Carlino and DeFina, 1998, 1999; Di Giacinto, 2003; Owyang et al., 2005; Francis et al., 2009). These readings revealed that monetary policy shock had altered effects in the regions output, excluding Gerlach and Smets (1995) who found no dissimilar reactions among G-7 countries. Carlino and DeFina (1999) found confirmation that in U.S. states had positive correlation with the share of industrial sector in the state output. Francis et al. (2009) claimed that these dissimilar reactions are also describe by the features like demographic and domestic government.

1.1 Literature gap and objective of the study:

There is a huge literature is available on the regional macro econometric model and impact of monetary and fiscal policy on different regions. From literature review we also see the impact of monetary and fiscal policy on different regions of the economies, in which they used different estimation techniques. Also we see that there are no such studies about the impact of monetary and fiscal policy on a regional trade macro econometric model. In case of Pakistan, no such literature is available on this issue in which we see the impact of monetary and fiscal policy on the regional trade macro econometric for Pakistan. The main objectives of the study are as follow:

First we create a regional trade macro econometric model, and for that we take Pakistan as our main country which would be among the dependent variable and since we are talking about

regional model, so we create region by taking countries such as India, China, Sri Lanka, India and Bangladesh.

Secondly we have to see the impact of shocks like monetary, fiscal, demand, and price shocks on the regional trade macro econometric model, in which we see that due to these shocks how regional variables effect our variables and vice versa.

1.2 Organization of the study:

The rest of the study is organized as follow; chapter 2 covers the review of existing literature. Chapter 3 is about theoretical framework, while; chapter 4 describes the data sources, description of variables and also explains the required estimation methodology. Chapter 5 is about results and discussions while chapter 6, the last one is about conclusion and policy recommendations.

CHAPTER: 02

LITERATURE REVIEW

2.1 Overview of chapter:

This chapter contains two sections, in the first section we discuss the literature review about regional macro econometric models for different economies and in the second section we discuss about the impact of monetary and fiscal policy on different regions of the economies.

2.2 Review of literature:

Nugent (1975) made a study on a policy-oriented macro econometric models for development and planning. They present a method for applying macro econometrics models to policy planning through the use of linear programming techniques. They made a small macro econometric model and then estimated separately for five countries of Central America. They combined all these models and made one large model for the region. They applied linear programming to get the optimal set of the macroeconomic policies by taking two steps; one is without coordination among the countries and the other one is with coordination among the countries. The results came from these alternative situations shows that when there were coordination among the countries, then Central American countries get benefits range from 2 to 7 percent of the regions GNP.

Gerlach (1995) et al. made a study on the monetary transmission mechanism for G-7 countries. They basically see the impact of monetary policy shocks on the output and prices of the G-7 countries by using an econometric model. They use time series quarterly data for the period 1979Q1 to 1993Q4. They use structural VAR method to see the impact of monetary policy. Results shows that the effect of monetary policy action are similar across the countries.

Pasha (1996) et al. made a study on integrated social-sector macro econometric model for Pakistan. They integrated planning macro econometric model for Pakistan's economy defined

by them that has been developed by the Social Policy and Development Center (SPDC), in understanding of the evolving social development problems and need for varying public expenditure priorities. There are perfect linkages among macro-economy that are shown in the model like public finances and the social sectors. Number of important policy problems are reported by this model like comprising the relative influence of public investments on economic growth, the financial sustainability of the SAP etc. this macro model have 244 equations which integrated the social, public finance and macro-economic measurements of the economy. In specification the model is rich dynamically and behaviorally. There is a huge number of inter-module and inter block connections that are included in this model. Different type of official and easy econometric tests are used to check the goodness of fit, social correlations, heteroskedasticity, which indicates that the model performs well. The model shows from the validation exercise that it has high ex-post forecasting power. Different essential policy simulations of the model have been done to get some significant understandings. The model is flexible due to which it gave solution for the important questions related to policies.

Kannapiran (2003), made a study on a macro econometric model for a unindustrialized economy. They develop a simple macro econometric model for a developing economy using IS-LM and Mundell Fleming framework. The model had national income accounts, fiscal, monetary, external, employment and inflation blocks. For estimation purposes we used quarterly data for the period 1979 to 1995. The simultaneous equation model is estimated by method 2SLS-CORC and estimated for altered form of specification errors, predictive accuracy and structural stability. The description of the model was good and structural stability was acceptable. The model provided the basic form to study the macroeconomic activities and to create forecasting in unindustrialized economies. Results shows that the forecasted values fit

good with the actual in-sample values. The model was suitable for a small open unindustrialized economy.

Bidabad (2003), made a study on small macro econometric model for Iran. The simple monetary model given according to the monetarists. The annually time series data used for the period 1960 to 2001. The methodology Ordinary Least Square used for the estimation purposes. Result shows that model perform well.

Pesaran (2004) et al. made a study on demonstrating regional interdependencies by applying a global error-correcting macro-economic model. They give the idea of global modeling frame work by using new advances in the examination of co integration system. They use unrestricted VAR (p) model having 'k' endogenous variables which cover N countries and number of unknown parameters are unfeasibly large of order $p(kN-1)$. They first estimate vector-error correcting model for different country or region separately in which the local macro-economic variables are associated to equivalent foreign variables that are created to compare the pattern of international trade for the country of concern. The individual country models pooled to create forecasts for the economy of world by considering all the variables at once. They estimate a model for twenty six countries which assembled into eleven regions. Quarterly data used for the estimation purposes for period 1971Q1 to 1999Q1 and emphasis on the degree of regional interdependencies by examining the time span for the diffusion of shocks from one variable in a country/region that is under consideration to the rest of the world. The estimated global model used as an economic engine for making a restricted loss distribution of a credit portfolio and describe the effects of numerous global risk situations on the loss distribution.

Ra and Rhee (2005), made a study on macro econometric model for Nepal. For Nepalese economy they contributed a Keynesian model of income and expenditure that is of medium size. The model consist of final demand, prices, credit and money, government and balance of

payment blocks. About 59 variables and 37 equations out of which 20 were behavioral equations 17 were identities incorporated in the model. Annual time series data, sample period from FY1995 to FY2004 used for the estimation purpose. The model was good for policy simulations, economic planning and debt sustainability analysis. The model shows satisfactory within-sample forecasting. A comparison of the forecasts of the model with those of the Tenth Plan shows that the growth projection of the Tenth Plan is overly optimistic compared with the model.

Anderson (2005) et al. made a study on a macro econometric model of the Lithuania economy by using 12 sector input or output table as a central element. The other equations that also describe the real flow like final consumption, import and factor inputs by sectors also used. Quarterly data for the period 1995Q1 to 2002Q2 used. The model consist 205 equations. The methodology Error Correction Model used for the estimation purpose. Result shows that the consumers of the Lithuanian economy was with strict budget in the short term. While the results of simulations shows that overall properties was comparable with similar models for other countries.

Iraheta and Carlos (2007) studied the regions of Central America and Dominican Republic and gave a regional macro model. He took the data from 1960-2006 .The approach adapted was Keynesian, thus it was demand oriented. He firstly checked the time series properties for them followed by applying Johansen and then applied ECM. After that made simultaneous equations and solved them to find a model which was used further for forecasting and also to analyze the shocks. It was seen that the inflation in these regions declined in 2007 but picked up again in 2008.

Qin (2007) et al. made a study on a macro econometric model for the Chinese economy. Model was in large in size and quarterly data used mostly started from the year 1992. The model contain 8 blocks including household income and consumption, investment, government, trade,

production, prices, money and employment blocks. For behavioural equations equilibrium correction used and for general simple dynamic specification approach used. Result shows that real time forecasts and empirical investigation of many macro-economic issues shows that the model is useful.

Hanif (2008) et al. made a study on the Pakistan's macro econometric model that is small in size. The main objective of this model was to see the impact of monetary policy on fundamental macro-economic variables by doing forecasting and simulations. The annual time series data for the period FY73-FY06 used. The methodology Ordinary Least Square used for estimation purpose. The model consist of total 17 equations in which 11 were behavioural equations and remaining were identities. Result shows that model in its present form have many limitations.

Benedictow (2008), made a study on the US macro econometric model that is small in size to work with the FRISBEE, basically a model of the international oil markets. The main objective was simulation of interaction between international oil market and the surrounding macro environment. The US model contains 9 estimated equations and several identities. The model had household consumption, private domestic investment, exports and imports blocks that modelled econometrically. Annual data used and the estimation period were chosen based on data availability. Ordinary Least Square (OLS) used to estimate equilibrium correction models. The US model also analyses the other things like effects of changes in interest rates, government expenditures, international demand and prices also including oil prices for the US economy. The model also used for forecasting purposes. The estimated equations satisfy standard statistical tests for residuals properties and parameters stability. The model used for simulation purposes also and comparing with the historical data. Mostly variables explained fairly well by the model.

Benedictow (2009) et al. made a study on Russian econometric macro model. The model comprises thirteen estimated equations and few of identities. In model many variables took in real terms like household consumption, private domestic investment, oil exports etc. Oil prices took as exogenous in the model. The model based on the IS-LM frame work, the IS side covers the consumption, investment, public activity, and net exports. While the LM side covers the exchange rate and inflation. Quarterly data used for the period 1994Q1 to 2008Q1. General to specific approach applied, to estimate equilibrium econometric model by the use of Ordinary Least Square method. Result shows that both the Russian society and the economy was in constant development throughout the data period.

Chuku (2009), made a study on measuring the effects of monetary policy innovations for Nigeria by using Structural Vector Auto regression (SVAR) approach. They used time series quarterly data set for period 1986Q1 to 2008Q4. They basically saw that how Nigerian price level and output get effected by the policy shocks like monetary shocks. They used three policy instruments, broad money, Minimum Rediscount Rate (MRR) and Real Effective Exchange Rate (REER). From results they conclude that the instrument for monetary policy shock, broad money had the uncertain effects on output and prices with very swift speed of adjustment. The other monetary policy shock instruments MRR and REER have impartial effects on output.

Hanif (2011) et al. made a study on Pakistan's macro econometric model which is of small size. Through different methods like forecasting and simulations we see the impact of policies like monetary on the fundamental variables. The model consist of seventeen equations out of which eleven are behavioral equations and remaining eighteen are identities or differential equations. For estimation purposes yearly data used from FY73 to FY06, that cover about thirty four years. Ordinary Least Square (OLS) is used to estimate the individual equation. This model has limitations that it is predominately explained in terms of nominal variable and GDP that is in real terms is figured through association between nominal GDP and GDP deflator.

This model is only demand oriented model there is no supply side block present in this model.

This model only get the long run association however not consider short run dynamics.

Ozdemir and Gundogdu (2012), made a study on structural macro econometric model for Turkey to see the impact of standard macroeconomic policies at the target levels and actual levels. The model is divided into five blocks: monetary, government, production, trade and national income. Model consist 11 simultaneous equations with dependent, independent and recursive blocks. The main objective is to check the consistency the set of equations, data and parameters. The model simulated for the same period and also for future periods. For estimation purpose quarterly data used.

Naranpanawa and Arora (2014), made a study on Indians multiregional Computable General Equilibrium (CGE) model that is for single country and they examine linkages. The main objective was to recognize and compute the regional impact of trade liberalization with in a general equilibrium frame work. They also done simulations to see the impact of tariff reductions in the whole economy, regional wise also across the industries. The CGE model for India covering 17 regions and it contain 57 commodities that were produced by 57 industries. The scenarios of tariff reforms were simulated under two assumptions; first one was perfect competition illustration on continual return to scale technology and second was the monopolistic competitive market structure with growing return to scale technology. From results we see that liberalization of trade have positive influence on the rich and fast emergent middle income states and negative influence on the poor states in short-run.

Anagnostou and Papadamou (2014), made a study on the influence of monetary policy shocks on the regional output growth. They see the impact of monetary policy shocks on the regional output growth. They see the influence of policy shocks like monetary on the regional output of fifty eight regions of the countries of South Euro-Zone, which include Greece, Spain, Italy, and

Portugal. The econometric technique they used was Bayesian Panel VAR. They used data from 1980 to 2009. The results indicate that the regional GDP of regions react differently to the shocks of monetary policy.

Mandalinci (2015), made a study in which he examines the effects of monetary policy shocks on the economic growth of the regions of UK. They used time series quarterly data for the period 1990Q1 to 2013Q4. They include 12 regions of UK. The econometric technique they used was Constrained Mixed Frequency Vector Auto regression (MFVAR) framework. From result we see that monetary policy shocks had noteworthy impact on the regional growth UK. The most vulnerable regions to monetary policy shocks are South East, Midlands, South west, east and London.

Silva (2016), made a study that whether monetary and fiscal policy had symmetric effects on the regions of Brazil. They used time series monthly data for the period January 2003 to December 2012. They basically used Structural Vector Auto regression (SVAR), in which they used Bayesian sign restriction approach to identify the shocks. From result we see that the regional products had comparable reactions to the shocks of monetary policy, however they show unbalanced reactions to the shocks of fiscal policy. The shocks of monetary policy influence economic activity huge as compared to fiscal policy shocks in all the regions of Brazil.

So from the literature review we can gather insight on the impact of monetary and fiscal policy on different regions of the economies, for which they used different estimation techniques. However there are no such studies about the impact of monetary and fiscal policy on a regional trade macro econometric model. In case of Pakistan, no such literature is available on this issue in which we see the impact of monetary and fiscal policy on the regional trade macro econometric for Pakistan. So this is the gap that we will try to fill.

CHAPTER: 03

THEORETICAL FRAMEWORK

3.1 Overview of chapter:

In this chapter we discuss the theoretical framework of our regional trade macro econometric model for an open economy. We also discuss about the main blocks of our model and also explain the general channels of relationship among the variables. Monetary and fiscal policies are also discussed that how it fits in the model and how it effects the regions and our country Pakistan.

3.2 Regional Trade Macro Econometric Model:

A regional trade macro econometric model constructed by using the article of Iraheta and Carlos (2007). The model constructed in which Pakistan is major country and a region constructed from five countries which includes India, China, Bangladesh and Sri Lanka, which are also the trading partners of Pakistan. So basically the objective is to check that due to monetary and fiscal shocks in the economy, what will be the impact of regional variables on our country Pakistan and vice versa.

The regional trade macro econometric model contains six main blocks: the product block, the aggregate demand block, trade block, aggregate supply block, monetary block and fiscal block and there description is given below.

THE PRODUCT BLOCK:

$$Y_t = f(ry_t, rbm_t, rI_t, y_t, bm_t, I_t)$$

Where

y_t = GDP of Pakistan

bm_t = Broad money for Pakistan

I_t = Gross fixed capital formation for Pakistan

y_t = Regional GDP

rbm_t = Regional broad money

rI_t = Regional gross fixed capital formation

Production function gives the functional relationship between the quantity of good produced (outputs) and factor of production (inputs). Since we are using regional trade model, so here we are using the regional independent variables. Here we are using the GDP of Pakistan as a dependent variable and y_t , rbm_t , I_t are the regional GDP, regional broad money and regional gross fixed capital formation, GDP of Pakistan, broad money for Pakistan and gross fixed capital formation respectively. Regional gross domestic product is basically a sub national gross domestic product for measuring the size of that region's economy. It is the aggregate of gross value added of all resident producer units in the region. Broad money is basically gives the method of calculating the given country's money supply and money supply is basically the total assets through which the households and businesses make payments or hold them as short term investments, such as currency, funds in the bank accounts and anything of value resembling money. Gross fixed capital formation is the net increase in physical assets for the given measurement period, so regional gross fixed capital formation is basically the net increase in physical assets for the given measurement period of all the countries that lie in the particular region.

In our production function the GDP of Pakistan is the dependent variable, so firstly the regional GDP have positive impact on the GDP of Pakistan because in region we have China, India, Bangladesh and Srilanka, so as regional GDP increases then consumption of the trading partners increases due to which there import and export increase and it enhance the GDP of Pakistan. Then we took regional broad money and we see that money supply have positive

influence on the GDP. Lastly we have regional gross fixed capital formation and we know that as investment and infrastructure increases then it automatically effect GDP positively.

THE AGGREGATE DEMAND BLOCK:

The aggregate demand block is further divided in to two parts, which represent the investment function and consumption function.

INVESTMENT FUNCTION:

$$I_t = f(y_t, i_t, bm_t, ry_t, ri_t, rbm_t, op_t)$$

Where

I_t = Gross fixed capital formation

y_t = GDP of Pakistan

i_t = Interest rate of Pakistan

bm_t = Broad money of Pakistan

ry_t = Regional GDP

ri_t = Regional interest rate

rbm_t = Regional broad money

op_t = International oil prices

Investment function is basically gives the summary of variables that influence the level of aggregate investment. In our investment function we have gross fixed capital formation for Pakistan as dependent variable and regional GDP, regional interest rate, regional broad money and regional international oil prices, GDP of Pakistan, interest rate and broad money of Pakistan as an independent variable. Firstly regional GDP have positive impact on investment or gross fixed capital formation because as GDP of the region or trading partners increases due

to which there is more betterment in the region and they start investing. We know that interest rate have negative impact on the investment, here we are using regional interest rate, and so as regional interest increases which means that will be investment lower as a result gross fixed capital formation become less. Regional broad money is incorporated to include the wealth effect and we know that money supply have positive impact on investment. Lastly international oil prices are taken to encompass the risks and we know that oil prices effect investment negatively because all machinery and transport depends on the oil prices, so if oil prices increases then there will be less capital formation.

CONSUMPTION FUNCTION:

$$C_t = f(ri_t, rcpi_t, rndi_t, i_t, cpi_t, ndi_t)$$

Where

C_t = Consumption

i_t = Interest rate of Pakistan

cpi_t = Consumer price index of Pakistan

ndi_t = National disposable income

ri_t = Regional interest rate

$rcpi_t$ = Regional consumer price index

$rndi_t$ = Regional national disposable income

Now we talk about consumption function, we see that in consumption function household consumption for Pakistan is a dependent variable and regional interest rate, regional consumer price index and regional national disposable income, interest rate for Pakistan, consumer price

index for Pakistan, and national disposable income of Pakistan are the independent variables respectively. First we talk about regional interest rate, in general we see that the impact of interest rate on consumption is ambiguous due to substitution and wealth effect. But there are two situations when interest rate increases, one is that when interest increases people keep their money in banks and they don't take loans due to which their consumption reduces, second is that when interest rate increases so their money increases which kept in banks as a result their consumption increases. Regional national disposable income have positive impact on household consumption, in general we see that when income increases then consumption will also increase. Lastly we see regional consumer price index which is used encompass the wealth effect.

TRADE BLOCK:

Trade block is further divided in to two parts that represent the exports and imports separately as export function and import function.

EXPORT FUNCTION:

$$X_t = f(ry_t, rtot_t, y_t, tot_t)$$

Where

X_t = Exports of Pakistan

y_t = GDP of Pakistan

tot_t = Term of trade for Pakistan

ry_t = Regional GDP

$rtot_t$ = Regional term of trade

Now in export function we see that export for Pakistan is the dependent variable while regional GDP and regional term of trade, GDP of Pakistan and term of trade for Pakistan are independent variables. First we see the impact of regional GDP on the exports of Pakistan. In general we know that when GDP increases then exports will also increase, they have a positive relation. In our case regional GDP contains the GDP of China, India, Bangladesh and Sri Lanka and all these are the trading partners of Pakistan, so when their GDP's increase automatically they enhance our exports. Lastly we talk about regional term of trade, in general term of trade is basically the value of exports of the country relative to the value of its imports and it defines as the ratio of export prices to import prices. We see that in general term of trade has a positive impact on exports.

IMPORT FUNCTION:

$$M_t = f(ry_t, rtot_t, y_t, tot_t)$$

Where

M_t = Imports of Pakistan

y_t = GDP of Pakistan

tot_t = Term of trade for Pakistan

ry_t = Regional GDP

$rtot_t$ = Regional term of trade

Now moving towards import function, we see that imports of Pakistan is taken as a dependent variable while regional GDP and regional term of trade, GDP for Pakistan and term of trade for Pakistan are the independent variables respectively. First we see the relation between

imports and regional GDP, in general we know that as GDP increases so demands of people for goods and services increases due to which imports increases so they have positive relation. In our case as regional GDP increases as a result of it regional demand increases which enhances our imports. Lastly we the relation between regional term of trade and GDP, here term of trade is taken as the price of imports, so as the price of imports increases then imports will automatically discourage.

AGGREGATE SUPPLY BLOCK:

From aggregate supply side we only considering the Philips curve instead of using the factor market. In aggregate supply block there is a price function.

PRICE FUNCTION:

$$P_t = f(rp_t, rex_t, rog_t, ex_t, og_t)$$

Where

P_t = Consumer price index of Pakistan

ex_t = Exchange rate of Pakistan

og_t = Output gap for Pakistan

rp_t = Regional consumer price index

rex_t = Regional exchange rate

rog_t = Regional output gap

Now we see the price function, in which consumer price index of Pakistan is the dependent variable and regional consumer price index, regional exchange rate and regional output gap,

exchange rate of Pakistan, and output gap for Pakistan are the independent variables. First consumer price index which is basically the index in which prices varies for the selling goods and other things, they are the change in prices. Thus when regional prices increases then our prices also increases. Next is exchange rate, we see that countries playing with their exchange rates, so when the exchange rates of the trading partners changes then it automatically effects our prices. Lastly regional output gap, we see that when output gap increases then it pressure the demand to increase and when demand increases then automatically prices increases.

MONETARY BLOCK:

$$i_t = f(ri_t, rog_t, og_t, r \text{ inf}_t, \text{inf}_t)$$

Where

i_t = Interest rate of Pakistan

ri_t = Regional interest rate

rog_t = Regional output gap

og_t = Output gap

$r \text{ inf}_t$ = Regional inflation

inf_t = Inflation of Pakistan

Interest rate gets affected by regional interest rate. The more regional interest, lower regional prices, so interest of country should be higher to have control on trade and if lower regional interest, then more investment, so interest rate of country should be same. Interest rate is affected by regional output gap and output gap, i.e. it creates demand pressure which changes

interest rate. If regional output gap more, the regional demand pressure is more, so interest rate would be increased to lower prices to have more trade. Also if output gap more, then demand pressure more, so prices would be higher and that would mean they would lower interest to get prices under control. Interest rate and inflation has an effect since prices affect interest rate. Hence inflation of country and region affects interest rate.

FISCAL BLOCK:

$$gex_t = f(og_t, rog_t, lagtaxes_t, emp_t, remp_t)$$

where

gex_t = Government expenditures of Pakistan

og_t = Output gap of Pakistan

rog_t = Regional output gap

$lagtaxes_t$ = Lag of taxes for Pakistan

emp_t = Employment of Pakistan

$remp_t$ = Regional employment

Government expenditure gets affected by output gap and regional output gap as demand pressure affects the prices, which in turn would affect the expenditure. Taxes affect the government expenditure, so like more taxes, then the government has more to spend. Employment and regional employment also affects government expenditure i.e. more employment means people have money and can pay taxes, so better expenditures. And on regional level, the more employment is countries are better off and their gross domestic

production is good, and so the country can do more trade with these countries, increasing revenues and hence government expenditure.

Monetary policy works through the channels of financial markets, bank-based intermediation and transmit into exchange rate, economic growth and prices of the economy. There are many long run monetary transmission channels like real credit management, asset prices, exchange rates and real interest rate. In traditional economic analysis the monetary policy maker's behavior is considered as exogenous. In Pakistan, State Bank of Pakistan controls the monetary policy formation.

The view has emerged during the last three decades where policy makers implement rational expectations in that economy only few objectives of monetary policy fulfilled. Monetary policy has determined effects only on few variables, it cannot give objectives that are beyond its control, (Friedman 1968; Svensson 2002). To accomplish these objectives, the unrestricted policies become time varying, (Kydland and Prescott 1977; Barro and Gordon 1983a; Taylor 1993).

In short term the main objective of monetary policy has become price stability in most of the central banks in the world. Thus in short the goals of monetary policy defined loss functions in the literature of monetary economics by deviances in inflation when it's targeted and also by output from its potential level. On the other hand in short run monetary policy stabilize real economic activity. In long term growth the objective of monetary policy is to target real interest rate in such a way that it become always below the neutral interest rate.

Fiscal policy is an instrument through which a government can achieve objectives of development very efficiently by making a balance between resources and expenditures. It works by changing existing resources from an unproductive form to productive and profitable form.

The relatively new macroeconomics literature focuses on both the short term and long term reasons of fiscal policy [Romer (2006)]. In the shorter term it can be used to argue for cyclical stability of output and to stabilize the volatility in variables that are macro, which is in description the same as the impacts of the short term monetary policy. Also for the long-term, fiscal policy would impact both the supply and demand side of the economy. But in most classical analyses it is pre believed that fiscal policy would make place to ensure the constraint on intertemporal budget to be satisfied, whereas the monetary policy is free to accommodate its instruments [‘Ricardian Regime’ by Sargent (1982)] like stock of supply of money or the interest rate that is nominal [Walsh (2003)]. The financing of debt methods, tax authority and expenditures of fiscal authorities as in the fiscal policy also impact both the demand and supply side of the economy. As seen by Baxter and King (1993), the first Real Business Cycle models only had the effects of supply side of the fiscal policy, where these were transported through the labor and leisure choices and wealth effects of the household. Currently also New-Keynesian type models with micro-foundations and sticky prices refute that even now fiscal policy from the side of supply is the one responsible for stability[Linnemann and Schabert (2003)]. The impacts of fiscal policy from demand side could be found only with more flaws like ‘Rule of Thumb’ consumers or the ones with liquidity restrictions, which lead to exit of Ricardian equivalence [Gali, et al. (2005)]. But it all depends on the economy structure, as Blanchard and Perotti (2002) said : “The evidence from large-scale econometric models has been largely dismissed on the grounds that, because of their Keynesian structure, these models assume rather than document a positive effect of positive fiscal expansion on output”.

By different hypothetical assumptions about the construction of the economy differently, fiscal policy affect the economy vigorously. Fiscal policy may effects directly or indirectly the future variables of fiscal policy and also the growth rates and levels of demand and supply side of

different variables like prices, balance of payment, consumption, interest rate, output, debt and exchange rate.

Since, work is going to be done on regional macro econometric trade model, then we need to look at the regional variables from the perspective of the monetary and fiscal policy and see how the regional variables impact the country. So e.g. let's talk about regional interest rate and how it would impact Pakistan if there is some monetary shock in it. If regional interest rate falls, then that would mean that there would be more investments and more foreign direct investments, since on taking loans they would not have to return more due to less interest rate. So this would negatively impact Pakistan, since the investments would get pooled in the region rather than in Pakistan. Similarly if money supply in the region increases, that would mean people will have more money, so their demand would increase, leading to less supply to meet that demand which would lead to inflation and also to meet the demands, the regions would increase the exports and their imports would fall due to more prices and also shortage. Hence, it would have a positive impact for Pakistan in terms of trade that the other countries would do more trade with Pakistan, due to having stability in terms of prices. But on the other side this might cause interest rate to fall and exchange rate falls as well, which would means more exports rather than vice versa. So it can have positive and negative impact on Pakistan depending on the dominant channel. If we look at the fiscal side, the let's say the regional taxes are cut down, which would mean people have more to spend leading to inflation and at the same time the interest rates will increase which would crowd out the investments and thus Pakistan would benefit but at the same time it is expansionary fiscal policy as government spending more than the revenue, so there would be a positive channel for the region.

CHAPTER: 04

DATA AND METHEDODOLOGY

4.1 Overview of chapter:

In this chapter we discuss about the sources of data and also about the description of variables that are used for estimations. We also discuss about the methodologies which are used in this research for the estimation of underground economy. Basically we used Structural Vector Auto regression (SVAR) technique for estimation to see the transmission of monetary and fiscal policy in a regional trade macro econometric model.

4.2 Data source and description of variables:

Annual time series data for the period 1971 to 2015 have been used in this study. The data have been obtained from different sources, mainly including World Development Indicator (WDI), International Monetary Fund (IMF), Organization for Economic Cooperation and Development (OECD). We took data for 5 countries; Pakistan, China, India, Bangladesh and Srilanka, in which Pakistan is the major country and remaining are the trading partners, and we make a region from these trading partners of Pakistan.

The variables that included in this study are basically GDP, regional GDP, regional broad money, regional gross fixed capital formation, gross fixed capital formation of Pakistan, international oil prices, regional interest rate, household consumption of Pakistan, regional national disposable income, regional consumer price index, and regional term of trade, imports, exports, consumer price index, regional nominal exchange rate and regional output gap. The regional variables are constructed by aggregating the data for the trading partners of Pakistan. The description for regional variables is given below:

Regional GDP:

For regional GDP data was taken for GDP and convert it to baseline 2010. Then calculated the weighted index for GDP, the weighted index is calculated for the trading partners like China, Bangladesh, Srilanka, India. The weighted index is obtained by dividing the GDP of individual country by the sum of the GDP's of all countries, then we multiply these weights with the series of GDP for individual country and then we add them to get one individual series of regional GDP.

Regional broad money:

For regional broad money data taken for M3 and converted it to baseline 2010. Then we make the weighted index for GDP, the weighted index is calculated for the trading partners like China, Bangladesh, Srilanka, India. The weighted index is obtained by dividing the GDP of individual country by the sum of the GDP's of all countries, then we multiply these weights with the series of broad money for individual country and added them to get one individual series of regional broad money.

Regional gross fixed capital formation:

Data was taken for gross fixed capital formation and converted it to baseline 2010. Then we make the weighted index for GDP, the weighted index is calculated for the trading partners like China, Bangladesh, Srilanka, India. The weighted index is obtained by dividing the GDP of individual country by the sum of the GDP's of all countries, then multiplied these weights with the series of gross fixed capital formation for individual country and then added them to get one individual series of regional gross fixed capital formation.

Regional interest rate:

Data was picked for gross interest rate and converted it to baseline 2010. Then we make the weighted index for GDP, the weighted index is calculated for the trading partners like China, Bangladesh, Srilanka, India. The weighted index is obtained by dividing the GDP of individual country by the sum of the GDP's of all countries, then multiplied these weights with the series of interest rate for individual country and added them to get one individual series of regional interest rate.

Regional national disposable income:

Data was collected for Net National income, taxes, and current transfers and convert it to baseline 2010, by summing up these we get the data for national disposable income. Then we make the weighted index for GDP, the weighted index is calculated for the trading partners like China, Bangladesh, Srilanka, India. The weighted index is obtained by dividing the GDP of individual country by the sum of the GDP's of all countries, then multiplied these weights with the series of national disposable income for individual country and added them to get one individual series of regional national disposable income.

Regional Consumer price index:

Data was gathered for consumer price index and convert it to baseline 2010. Then we make the weighted index for GDP, the weighted index is calculated for the trading partners like China, Bangladesh, Srilanka, India. The weighted index is obtained by dividing the GDP of individual country by the sum of the GDP's of all countries, then multiplied these weights with the series of consumer price index for individual country and added them to get one individual series of regional consumer price index.

Regional term of trade:

Data was gathered for term of trade and convert it to baseline 2010. Then we make the weighted index for GDP, the weighted index is calculated for the trading partners like China, Bangladesh, Srilanka, India. The weighted index is obtained by dividing the GDP of individual country by the sum of the GDP's of all countries, then multiplied these weights with the series of term of trade for individual country and then we add them to get one individual series of regional term of trade.

Regional nominal exchange rate:

We get data for real exchange rate from WDI, to get data for nominal exchange rate we multiply real exchange rate with the ratio of domestic price level to foreign price level. We done this for the baseline year 2010. . Then we make the weighted index for GDP, the weighted index is calculated for the trading partners like China, Bangladesh, Srilanka, India. The weighted index is obtained by dividing the GDP of individual country by the sum of the GDP's of all countries, then we multiply these weights with the series of nominal exchange rate for individual country and added them to get one individual series of regional nominal exchange rate.

Output gap:

To get data for output gap of Pakistan, we use the data of gross domestic product of Pakistan by using quadratic formula for estimations in the eviews. From that we got actual, fitted and residual series and from these series we got output gap of Pakistan.

Regional output gap:

To get data for regional output gap, used the data of regional gross domestic product by using quadratic formula for estimations in the eviews. From there we got actual, fitted and residual series and from these series we got regional output gap.

Regional inflation:

Data was collected for inflation and converted it to baseline 2010. Then we make the weighted index for GDP, the weighted index is calculated for the trading partners like China, Bangladesh, Srilanka, India. The weighted index is obtained by dividing the GDP of individual country by the sum of the GDP's of all countries, multiplied these weights with the series of inflation for individual country and added them to get one individual series of regional inflation.

Regional employment:

We took data for total employment and convert it to baseline 2010. Then we make the weighted index for GDP, the weighted index is calculated for the trading partners like China, Bangladesh, Srilanka, India. The weighted index is obtained by dividing the GDP of individual country by the sum of the GDP's of all countries, then we multiply these weights with the series of total employment for individual country and then we add them to get one individual series of regional employment.

4.3 Econometric methodology

In this study, we are going to see that due to monetary and fiscal shocks in the economy what will be the impact of region on our country Pakistan or what will be the impact of our country Pakistan on the region. In region we include China, India, Bangladesh and Srilanka, and they are also the trading partners of Pakistan. We are using time series data for the estimation purposes.

Time series is basically the assemblage of measureable observations that are equally spread out in time and measured successively. Time series are used to get the idea about the organisation and task that produce the observations. Getting the knowledge about time series mechanism, it permits to establish a mathematical model that describe the informations in such a technique that expectation, observing, or control can happen. The first assumption is that there is a one

systematic pattern in the time series data set. Mostly mutual patterns are trend and seasonality while generally trend may be linear or quadratic, basically moving averages or regression analysis are used to find the trend. Seasonality is also a kind of trend in which trend repeated analytically over time. Secondly the supposition is that data having random processes due to which it is difficult to find the logical patterns in the data. Mostly time series examination methods used some kind of filters which reduce the errors.

In our study basically the econometric methodology we use is Vector Auto regression (VAR), basically we estimate Structural vector auto regression (SVAR) from an estimated VAR model. Vector auto regression (VAR) is basically an econometric model which is used to analyse the linear interdependencies between multiple time series. VAR models simplify the univariate auto regression (AR) models by tolerating for more than one changing variable. All variables in a VAR are treated proportionally in a structural sense, each variable has an equation clarifying its development based on its own previous values and the previous values of other model variables. VAR modelling does not need huge information about the things that effect a variable as in structural models that have simultaneous equations. Previous knowledge needed a list of variables which can be assumed to impact each other. The vector auto regression (VAR) models are mainly used for the multivariate time series analysis, the VAR construction is that each variable is the linear function of its own previous values and also the previous values of other variables and error terms. Sim's in 1980 gave an idea that VAR has the property that all the variables are symmetric, which means that in VAR we consider all the variables as an endogenous variables.

The Structural Vector Auto regression (SVAR) is used to explain our objective, to study the monetary and fiscal policy transmission mechanism in a regional trade macro econometric model. The reason that we used Structural VAR, firstly SVAR's require minimum restrictions to solve the movements of the endogenous variables in to parts due to underlying shocks like

demand and supply shocks and monetary and fiscal policy shocks. The identification of restrictions is more important in a cross country study because it gives an idea that whether the results are driven by different or implausible assumptions. Secondly, vector auto regression give number of tools like impulse response function etc that helps us to answer the number of questions about the effects of shocks, its role and importance in particular historical episodes. Thirdly, after adopting identifying scheme it is easy to estimate SVAR's due to which they are suitable for multi country studies.

In this study we basically using the regional trade macro econometric model. So our regional trade macro econometric model in a VAR (1) form is given as:

THE PRODUCT BLOCK:

$$Y_t = b_{10} + \sum_{i=1}^p \alpha_i Z_{t-i} + e_{1t}$$

Where

$$Z_t = (Y_{t-1}, y_{t-1}^r, bm_{t-1}^r, I_{t-1}, y_{t-1}, bm_{t-1})$$

THE AGGREGATE DEMAND BLOCK:

$$I_t = b_{20} + \sum_{i=1}^p \beta_i Z_{t-i} + e_{2t}$$

$$C_t = b_{30} + \sum_{i=1}^p \gamma_i Z_{t-i} + e_{3t}$$

Where

$$Z_t = (y_{t-1}, y_{t-1}^r, bm_{t-1}^r, I_{t-1}^r, I_{t-1}, i_{t-1}^r, op_{t-1}, cpi_{t-1}^r, ndi_{t-1}^r, bm_{t-1}, i_{t-1}, cpi_{t-1}, ndi_{t-1})$$

TRADE BLOCK:

$$X_t = b_{40} + \sum_{i=1}^p g_i Z_{t-i} + e_{4t}$$

$$M_t = b_{50} + \sum_{i=1}^p \phi_i Z_{t-i} + e_{5t}$$

Where

$$Z_t = (y_{t-1}^r, X_{t-1}, tot_{t-1}^r, M_{t-1}, tot_{t-1})$$

AGGREGATE SUPPLY BLOCK:

$$P_t = b_{60} + \sum_{i=1}^p \Omega_i Z_{t-i} + e_{6t}$$

Where

$$Z_t = (P_{t-1}, p_{t-1}^r, ex_{t-1}^r, og_{t-1}^r, p_{t-1}, ex_{t-1}, og_{t-1})$$

MONETARY BLOCK:

$$i_t = b_{70} + \sum_{i=1}^p \delta_i Z_{t-i} + e_{7t}$$

Where

$$Z_t = (i_{t-1}, i_{t-1}^r, og_{t-1}^r, og_{t-1}, inf_{t-1}^r, inf_{t-1})$$

FISCAL BLOCK:

$$gex_t = b_{80} + \sum_{i=1}^p \lambda_i Z_{t-i} + e_{8t}$$

Where

$$Z_t = (gex_{t-1}, og_{t-1}, og_{t-1}^r, lagtaxes_{t-1}, emp_{t-1}, emp_{t-1}^r)$$

y_t = GDP of Pakistan

I_t = Gross fixed capital formation

C_t = House hold consumption

X_t = Exports of Pakistan

M_t = Imports of Pakistan

P_t = Consumer price index of Pakistan

y_t^r = Regional GDP

bm_t^r = Regional broad money

I_t^r = Regional gross fixed capital formation

i_t^r = Regional interest rate

op_t = International oil prices

cpi_t^r = Regional consumer price index

ndi_t^r = Regional national disposable income

tot_t^r = Regional term of trade

p_t^r = Regional consumer price index

ex_t^r = Regional exchange rate

inf_t^r = Regional inflation

inf_t = Inflation of Pakistan

gex_t = Government expenditures of Pakistan

og_t = Output gap of Pakistan

og_t^r = Regional output gap

lagtaxes_t = Lag of taxes for Pakistan

emp_t = Employment of Pakistan

emp_t^r = Regional employment

e_{it} = error terms

In VAR model we know that the residuals or error terms e_{it} are actually the combination of shocks ε_{it} , which were basically present in the primitive VAR form. While e_{it} do not have structural interpretation. For measuring the impulse response functions and variance decomposition it is essential to use the structural shocks (ε_{it}). The basic objective of the structural VAR (SVAR) is to recover the structural innovations from the residuals e_{it} and to estimate the relationships among the structural shocks using an economic model. We consider an n-variable VAR (1) model:

$$\begin{bmatrix} 1 & b_{12} & b_{13} & \cdot & \cdot & \cdot & b_{1n} \\ b_{21} & 1 & b_{23} & \cdot & \cdot & \cdot & b_{2n} \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ b_{n1} & b_{n2} & b_{n3} & \cdot & \cdot & \cdot & b_{nn} \end{bmatrix} \begin{bmatrix} x_{1t} \\ x_{2t} \\ \dots \\ x_{nt} \end{bmatrix} = \begin{bmatrix} b_{10} \\ b_{20} \\ \dots \\ b_{n0} \end{bmatrix} + \begin{bmatrix} \gamma_{11} & \gamma_{12} & \gamma_{13} & \cdot & \cdot & \cdot & \gamma_{1n} \\ \gamma_{21} & \gamma_{22} & \gamma_{23} & \cdot & \cdot & \cdot & \gamma_{2n} \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \gamma_{n1} & \gamma_{n2} & \gamma_{n3} & \cdot & \cdot & \cdot & \gamma_{nn} \end{bmatrix} \begin{bmatrix} x_{1t-1} \\ x_{2t-1} \\ \dots \\ x_{nt-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \dots \\ \varepsilon_{nt} \end{bmatrix}$$

Or, in compact form:

$$Bx_t = \gamma_0 + \gamma_1 x_{t-1} + \varepsilon_t$$

By multiplying B^{-1} on both sides:

$$x_t = B^{-1}\gamma_0 + \gamma_1 x_{t-1} + \varepsilon_t$$

Where, $A_0 = B^{-1}\gamma_0$, $A_1 = B^{-1}\gamma_1$, and $e_t = B^{-1}\varepsilon_t$. The problem, then, is to use the observed values of e_t and after that we have to make the system restricted so we get ε_t as $\varepsilon_t = B e_t$. To restrict the system the issue is, first to recover the various ε_{it} shocks and the second is preserve the supposed error structure regarding the independence of the numerous ε_{it} shocks. To solve this problem of identification the simple solution is to count the equations and unknowns. By using OLS the variance/covariance matrix is given as:

$$\Sigma = \begin{bmatrix} \sigma_1^2 & \sigma_{12} & \dots & \sigma_{1n} \\ \sigma_{21} & \sigma_2^2 & \dots & \sigma_{2n} \\ \dots & \dots & \dots & \dots \\ \sigma_{n1} & \sigma_{n2} & \dots & \sigma_n^2 \end{bmatrix}$$

We know that Σ is symmetric and it contains $(n^2 + n)/2$ distinct elements. Along the principle diagonal there are $n-1$ elements, $(n-2)$ elements along second off diagonal and so on, so for total there are $(n^2 + n)/2$ free elements. In B matrix the diagonal elements are equal to one. In the structural model there are n unknown values because $n^2 - n$ values for matrix B and n values for $\text{var}(\varepsilon_{it})$. So for identification problem the answer is simple that in order to find n^2 unknown from the known $(n^2 - n)/2$ independent elements of Σ , hence it is essential to apply $n^2 - [(n^2 + n)/2] = (n^2 + n)/2$ restrictions on the system. So its rule for the

generalized p lag model that, to identify the structural VAR model from the estimated VAR, we need to apply $(n^2 - n)/2$ restrictions on the model with structural parameters.

$$\Sigma = B^{-1} \Sigma_{\epsilon} (B^{-1})^T$$

Where Σ , B^{-1} and Σ_{ϵ} are $n \times n$ matrices. So by imposing restriction on this system we get the system which is exactly identified.

LAG LENGTH CRITERIA:

We have to choose the lag length in the VAR, which tells if we choose the order of lag length p , then how fine the data is built-in by the $VAR(p)$ as compared to $VAR(q)$, where $p \neq q$.

The concern is that to get precise fit one can set either p and q to T/n , where T is the size of sample. Due to this purpose one needs to device the benchmarks which tradeoff between the number of parameters and to get exact fit. There are many such criteria like the Akaike Information Criterion (AIC), the Schwartz Bayesian Information Criterion (SC) and the Hannan-Quinn (HQ) Criterion.

$$\mathbf{AIC:} \quad -2 \left(\frac{L}{T} \right) + 2 \frac{K}{T}$$

$$\mathbf{SC:} \quad -2 \left(\frac{L}{T} \right) + \frac{\ln(T)}{T} K$$

$$\mathbf{HQ:} \quad -2 \left(\frac{L}{T} \right) + 2 \frac{\ln(\ln(T))}{T} K$$

In these criteria log likelihood (L) is used as a measure of fit, while K is the number of estimated parameters. To add an extra regressors to a regression model and for this purpose, if these criteria were applied then the rule would retain the regressors if F-statistics exceeded. For

AIC it will be $(T - K - 1)(e^{2/T} - 1)$ and for SC it will be $(T - K - 1)(e^{(\ln T)/T} - 1)$. As we know

that $\frac{(e^{2/T} - 1)}{e^{(\ln T)/T} - 1} < 1$, this suggests that AIC favors bigger models as compared to SC. So we

prefer SC because it's not good to estimate a vast number of parameters with partial data. Due to minus sign with the L term, we diminish the each criteria.

IMPULSE RESPONSE FUNCTION:

Impulse response function (IRF), of a dynamic system is its output when presented with a brief input signals, called an impulse. More generally, an impulse response function is the reaction of any dynamic system in response to some external change.

Just like an auto regression has moving average representation, a vector auto regression can also be written in the vector moving average (VMA) form. The VMA representation is an important feature of the Sim's (1980) methodology, in which he illustrate that how it lets you to trace out the time path of the several shocks on the variables contained in the VAR system.

So in general a VAR was written in vector moving average (VMA) practice as:

$$x_t = \mu + \sum_{i=0}^{\infty} \phi_s \varepsilon_{t-i}$$

Thus, the matrix ϕ_s has the interpretation $\frac{\partial x_{t+s}}{\partial \varepsilon_t} = \phi_s$ that is, the row i and column j elements

of ϕ_s , identifies the consequences of one unit increase in the j^{th} variable's innovations at time t (ε_{jt}) for the value of the i^{th} variable at time $t + s$ (x_{it+s}), kept all other innovations constant.

$\frac{\partial x_{it+s}}{\partial \varepsilon_{jt}}$ as a function of s is called the impulse response function. It describes the response of

x_{it+s} to a one-time impulse in x_{jt} with all other variables for time t held constant.

CHAPTER: 05

RESULTS AND INTERPETATION

5.1 Overview of chapter:

In this chapter the first section represent the descriptive analysis of all variables that are used for the estimation purpose. Second section of this chapter represent the estimation results and the interpretation of results.

5.2 Descriptive Analysis:

From table 1 in Appendix 'A', we see that:

So from here, we can sort out descriptive analysis by seeing at the mean, the standard deviation and the stability ratio. Firstly we are examining the Gross domestic product of Pakistan and we get that as time moving further, the mean is increasing and an enormous jump can be got during 2001 and 2010. The standard deviation indicates that there was deviations in different years. While the stability ratio which represent the standard deviation as a percentage of mean. Stability ratio shows that it's relatively remained stable as times passes. Regional Gross domestic product, over here we see that in the regional GDP, there is of variation as can be seen through the standard deviation. The stability ratio has a bit of difference, hence it's unstable over time. Regional broad money, here it's seen that regional broad money is increasing in terms of mean over time. The standard deviation shows that it keeps varying especially from 1986 till 2015, there is a lot of deviation. The stability ratio shows that there is stability from the 90's but before that there was instability.

Now Gross fixed capital formation of Pakistan, this shows that at first there was increment but then it declined, however near the end it again picked up pace in terms of mean. The standard deviation shows that there was a lot of variation in the early years but deviation decreased from 80's. The stability ratio shows that there was a lot of instability during beginning but late on

became stable, however overall it's unstable. International oil prices, it can be seen that there is not a lot of variation from the standard deviation side but still there is variation. Stability ratio shows that it's unstable over time. Regional interest rate was seen that kept on increasing but fell during 2006-2010 in mean. There is a lot of deviation in the standard deviation and stability ratio is unbalanced as time passes. Household consumption of Pakistan, we can see that household consumption in terms of mean kept on increasing but fell during 1991-1995. There is standard deviation and there is instability from the stability ratio but it's rather less during the first decade.

Now Regional consumer price index, it kept on increasing in terms of mean. There is standard deviation but more so during the last decade. The stability ratio shows that there is instability but not of that much magnitude. Regional national disposable income, it can be seen that there is deviation and there is instability over time through the stability ratio. Regional term of trade, it shows that the standard deviation is not that much but in 1996-2000 there was a lot of deviation and similarly the stability ratio shows that there was stability but during 1996-2000 there was a huge jump showing a lot of volatility. Imports of Pakistan, the mean showed the imports kept fluctuating over time and there was deviation as shown by the standard deviation and stability ratio showed instability over time. Exports of Pakistan, its mean show that it kept on increasing but fell during 2001-2005 and started increasing after that again. From standard deviation we see that there are variations over the time and stability ratio also shows variability. Now Consumer price index of Pakistan, the mean shows that CPI kept on increasing. The deviation had a jump from 2006-2015 as seen in standard deviation. The stability ratio shows that as time passes it become unstable. Regional nominal exchange rate, its mean showed that it increased over time. The deviation is there but not that much. The stability ratio shows instability for some periods but for some it's quite stable. Regional output gap, there is instability in the stability ratio and the mean also keeps fluctuating though deviation is not

much. Output gap of Pakistan, there is a lot of instability in stability ratio along with fluctuations in mean and deviations in standard deviation.

Now Interest rate of Pakistan, its mean fluctuates over time however the standard deviation remains stable. Stability ratio over time keeps fluctuating. Regional interest rate, its mean keeps fluctuating but standard deviation remains stable. Stability ratio is unstable over time. Inflation of Pakistan, its mean and standard deviation keeps fluctuating. Stability ratio is unstable over time. Regional inflation, its mean and standard deviation have a lot of fluctuation. Stability ratio is also very unstable in the beginning but becomes a little less unstable over time. Government expenditure of Pakistan, its mean fluctuates a lot but standard deviation has somewhat less fluctuation. Stability ratio is unstable.

Now Lag of taxes, its mean and standard deviation keep fluctuating. Stability ratio is unstable over time. Employment of Pakistan, its mean fluctuates but less and standard deviation is stable in the start but fluctuates a little in the later periods. Stability ratio is stable in the start but fluctuates a little bit in the later period. Regional employment, its mean and standard deviation stays stable in the start but fluctuates a lot in the later period. Stability ratio stays stable during the start but becomes unstable in the later periods.

5.3 Results and Interpretations:

In this section, emphasis on the reactions of macroeconomics variables to the aggregate supply, aggregate demand, price, and monetary and fiscal shocks using the SVAR model. Prior to estimation, we also estimated the diagnostic test for determining the optimum lag length of the models. The optimum lag for all blocks is one and is found by using AIC, SC and HQ, so the order of VAR is one. To estimate the structural parameters we impose restrictions according to Cholesky decomposition method, in which we restrict the upper diagonal values equal to zero for each block.

So now we interpret the results for each block that we get from the Structural Vector Autoregressive Approach.

THE PRODUCT BLOCK:

For product block we imposed restrictions according to Cholesky decomposition method to identify the structural shocks. The structural parameter estimates of matrix A and B are given in Table 2. Table 2 shows the results for SVAR estimations of the product block.

TABLE 2. Structural VAR estimates

Variables	Parameters	Coefficients (probability)
Gross domestic product of Pakistan	b₂₁	9.73e ⁻⁹ (0.99)
	b₃₁	2.39e ⁻¹⁶ (0.99)
	b₄₁	-8.37e-14 (0.99)
	b₅₁	1.72e ⁻¹⁵ (0.99)
	b₆₁	-2.69e ⁻¹⁵ (0.97)
Regional gross fixed capital formation	b₃₂	1.30e-7 (0.00)
	b₄₂	8.34e ⁻⁹ (0.98)
	b₅₂	-9.21e ⁻¹⁰ (0.91)
	b₆₂	4.28e ⁻⁸ (0.00)
Gross fixed capital formation of Pakistan	b₄₃	-17.68 (0.00)
	b₅₃	-0.450 (0.00)
	b₆₃	0.058 (0.42)
Regional broad money	b₅₄	-0.0088 (0.01)
	b₆₄	-0.018 (0.07)
Broad money of Pakistan	b₆₅	-0.145 (0.17)

The parameter b_{32} represent Regional gross capital that has contemporaneous positive and significant relation with gross capital formation of Pakistan. Hence more the regional gross capital formation, more will it be in a country. This could be if region is developing in terms of investment and attracting more projects and FDI, then a country residing in the region would also benefit from the influx of attention of investors.

The parameter b_{43} represent gross fixed capital formation of Pakistan that has contemporaneous negative and significant relation with regional broad money. So if there is more gross capital formation in a country that means investment is more, so interest rate would be lower, and hence money supply of that country would be more. So prices would be higher in the country because of more money supply and demand and the region would lower its money supply to decreases prices and control exchange rate to attract more trade.

The parameter b_{53} represent gross capital formation of Pakistan that has contemporaneous negative relation with broad money of Pakistan, so prices would increase as demand would be more due to more employments. Thus country would try to decrease broad money i.e. decrease money supply to get control over the prices. Similarly the parameter b_{54} represent regional broad money that has also contemporaneous negative relation with broad money of Pakistan, which shows that if regional broad money is more, then prices more, so a country can take trade benefit from this and reduce its money supply to lower prices for exports.

The parameter b_{62} represent regional gross fixed capital formation that has contemporaneous positive and significant relation with regional gross domestic product. The more the investment in the region, the better will be the gross domestic product. Similarly b_{64} represent regional broad money that has also contemporaneous negative and significant relation with the regional

gross domestic product. If regional broad money more, then more the money supply, so higher prices and hence inflation which would lead to lower regional gross domestic product.

THE AGGREGATE DEMAND BLOCK:

For the aggregate demand block we imposed restrictions according to Cholesky decomposition method to identify the structural shocks. The structural parameter estimates of matrix A and B are given in Table 3. Table 3 shows the results for SVAR estimations of the aggregate demand block.

TABLE 3. Structural VAR estimates

Variable	Parameter	Coefficients (probability)
Gross fixed capital formation	b_{21}	55900786 (0.81)

In the second row of matrix A it shows the results for contemporaneous effects on consumption of Pakistan. The parameter b_{21} represent gross fixed capital formation of Pakistan that does not have significant relation with consumption. So the investment does not affect the consumption as people already have preset baskets of consumption and increase in the income does not mean that there hunger would increase. So consumption does not get affected by changes in the investment due to preset of demands.

TRADE BLOCK:

For trade block we imposed restrictions according to Cholesky decomposition method to identify the structural shocks. The structural parameter estimates of matrix A and B are given in Table 4. Table 4 shows the results for SVAR estimations for trade block.

TABLE 4. Structural VAR estimates

Variable	Parameter	Coefficients (probability)
Imports of Pakistan	b_{21}	0.828 (0.00)

The parameter b_{21} represent exports of Pakistan that has contemporaneous positive and significant relation with imports of Pakistan. So if the exports of the country are more than the imports would be better off too as the country would have the trade benefit of being able to imports after earning from exports and people would be better off due to exports, so they would be able to demand more and hence imports would be taken.

AGGREGATE SUPPLY BLOCK:

For aggregate supply block we imposed restrictions according to Cholesky decomposition method to identify the structural shocks. The structural parameter estimates of matrix A and B are given in Table 5. Table 5 shows the results for SVAR estimations for aggregate supply block.

TABLE 5. Structural VAR estimates

Variables	Parameters	Coefficients (probability)
Regional output gap	b_{21}	0.110 (0.139)
	b_{31}	-0.112 (0.06)
	b_{41}	-0.099 (0.11)
	b_{51}	-0.130 (0.01)
	b_{61}	-0.017 (0.01)
Output gap of Pakistan	b_{32}	0.093 (0.43)
	b_{42}	0.235 (0.05)

	b₅₂	0.549 (0.01)
	b₆₂	0.050 (0.72)
Regional consumer price index	b₄₃	-1.04 (0.00)
	b₅₃	1.565 (0.00)
	b₆₃	1.290 (0.00)
Consumer price index of Pakistan	b₅₄	2.03 (0.00)
	b₆₄	-1.006 (0.00)
Exchange rate of Pakistan	b₆₅	-0.189 (0.03)

The parameter b_{31} represent regional output gap that has a contemporaneous negative and significant relationship with regional consumer price index. So basically if regional output gap is more than regional consumer price index would be more, since the output gap creates demand pressure, so more the pressure, more will be the regional consumer price index which is the degree of inflation. Hence the price fluctuation would increase with more demand pressure. So this is regional demand shock which has an effect on regional consumer price index. So if regional demand pressure is more, then more would be the regional inflation.

The parameter b_{42} represent output gap of Pakistan that has contemporaneous positive and significant relation with consumer price index of Pakistan. Thus the increase in the demand pressure in Pakistan leads to increase in prices and hence inflation and since CPI is a measure of inflation so it increases. Thus the demand shock in the country leads to increase in CPI, so inflation. The parameter b_{43} represent regional consumer price index that has negative relation with consumer price index of Pakistan. So increase in regional consumer price index means that there is regional surge in prices and Pakistan could take advantage of such situation by decreasing prices in the country and getting export advantage over the rest of the countries. So

the CPI in the country falls with the increase in regional CPI. So regional demand shock does impact the CPI in Pakistan. So if there is positive demand shock leading to regional inflation, then CPI of the country would fall to gain trade advantage and maybe even have investments due to lower prices in the country.

The parameter b_{51} represent regional output gap of Pakistan has contemporaneous negative and significant relation with the exchange rate of Pakistan. So if less is the regional output gap i.e. demand pressure, then the exchange rate would be more of Pakistan. This could be done to take trade advantage as the higher demand pressure would imply inflation in the region and thus lowering the exchange rate of Pakistan would mean lower prices for the exports, thus giving trade advantage. So regional demand shock has effect on Pakistan exchange rate, which is if more is the regional demand pressure, then Pakistan would lower exchange rate to gain trade advantage. Similarly the parameter b_{52} represent output gap of Pakistan that has contemporaneous positive relation with exchange rate of Pakistan. Thus more the demand in the country implies the prices would increase which would lead to increase in the exchange rate which would badly impact the exports. So the demand shock in the economy impacts the exchange rate in the country. If the demand shock causes inflation, then the exchange rate in the country would increase. Similarly the parameter b_{53} represent regional consumer price index that also has a contemporaneous positive and significant relation with exchange rate i.e. more the regional consumer price, so more price fluctuation, hence inflation which would lead to higher exchange rate in Pakistan meaning the regional variable impacts Pakistan's economy. Regional price shock has an effect on Pakistan's exchange rate where if there is regional inflation, then that would lead to higher exchange rate inadvertently in Pakistan. The parameter b_{54} represent consumer price index of Pakistan that has contemporaneous positive relation with exchange rate of Pakistan. The CPI is the measure of inflation, so if more is the inflation i.e.

prices in the economy then higher would be the exchange rate in the economy. So when there is price shock in the country, then it impacts the exchange rate in the country. Hence if the price shock causes inflation, the exchange rate would increase in the country.

The parameter b_{61} represent regional output gap that has a contemporaneous negative and significant relationship with regional exchange rate, So more the demand pressure, then higher would be the prices and the region would try to lower exchange rate in order to keep the prices of exports low so to not be taken back by the inflation. Regional demand shock has an effect on regional exchange rate. So if regional demand shock causes inflation, then the region would try to lower the exchange rate to gain trade advantage and control the prices as well. The parameter b_{63} represent regional consumer price index that has contemporaneous positive relation with regional exchange rate. When regional consumer price index increases then that means that there is inflation in the region, which would lead to rise the exchange rate of the region. Hence the regional price shock affects the regional exchange rate. The higher the prices, the more would be the exchange rate of the region. Similarly the parameter b_{64} represent consumer price index of Pakistan that has negative relation with regional exchange rate i.e. more inflation in Pakistan's imports would increase and the countries of the regions would lower their exchange rate to keep it that way. Price shock in Pakistan would affect regional exchange rate. So if the price shock causes inflation, then that would mean there exports would lower but imports would increase and so exchange rate would be lowered of the region to gain trade advantage. The parameter b_{65} represent exchange rate of Pakistan that has contemporaneous negative relation with regional exchange rate. Hence if the regional exchange rate is more, then that means there export prices would be more and so Pakistan could take advantage of this and lower their exchange rate to increase the exports in the country.

MONETARY BLOCK:

For monetary block we imposed restrictions according to Cholesky decomposition method to identify the structural shocks. The structural parameter estimates of matrix A and B are given in Table 6. Table 6 shows the results for SVAR estimations for monetary block.

TABLE 6. Structural VAR estimates

Variables	Parameter	Coefficients (probability)
Interest rate of Pakistan	b₂₁	0.43 (0.013)
	b₃₁	-1.60 (0.00)
	b₄₁	0.094 (0.70)
	b₅₁	-15.35 (0.00)
	b₆₁	-4.35 (0.00)
Regional interest rate	b₃₂	-0.20 (0.349)
	b₄₂	-0.032 (0.82)
	b₅₂	-2.82 (0.16)
	b₆₂	-0.012 (0.22)
Regional output gap	b₄₃	-0.156 (0.12)
	b₅₃	2.70 (0.05)
	b₆₃	-0.044 (0.27)
Output gap of Pakistan	b₅₄	-2.59 (0.20)
	b₆₄	-0.118 (0.03)
Regional inflation	b₆₅	-0.002 (0.61)

The parameter b_{21} represent the interest rate of Pakistan that has a contemporaneous positive and significant association with regional interest rate. So more the interest rate of Pakistan,

more the interest rate of the region. The more the interest rate, the less people borrow, hence less consumption leading to lower prices. So the region would keep interest rate low to keep their prices low too and attract FDI as well.

The parameter b_{31} represent the interest rate of Pakistan that has negative relation with regional output gap. So if less the interest rate then there would be inflation since consumption would be more and that would lead to higher prices and hence people would start consuming less as imports would become expensive, so the output gap on regional level would decline.

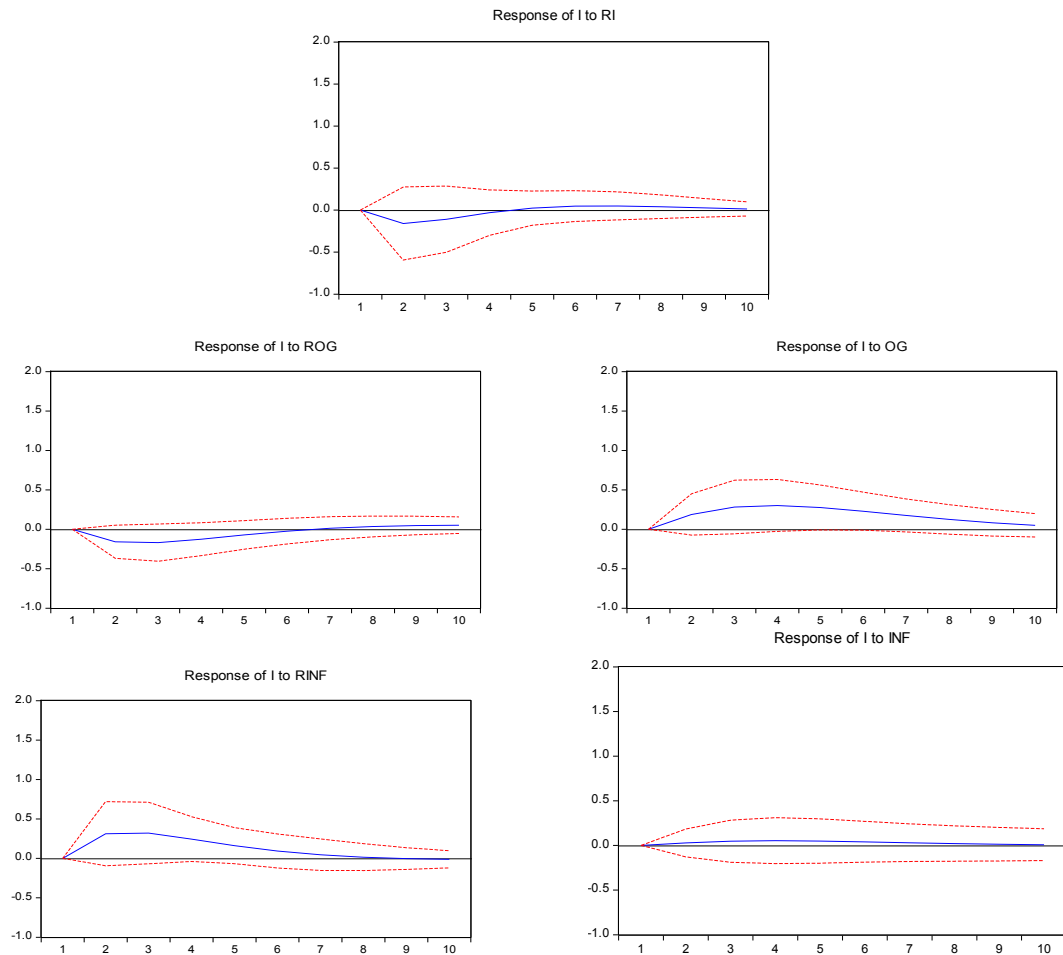
The parameter b_{51} represent the interest rate of Pakistan that has a contemporaneous positive relation with regional inflation i.e. if interest rate less, then more would be the inflation in country which would lead to higher inflation in the region. Inflation in country leads to imports which leads to increase in prices in regional level. Similarly the parameter b_{53} represent the regional output gap that has a contemporaneous positive relationship with regional inflation i.e. more the demand pressure then more would be the prices.

The parameter b_{61} represent the interest rate of Pakistan has negative relation with inflation of Pakistan i.e. interest rate less, would lead to inflation i.e. more prices in the country. Similarly the parameter b_{64} represent the output gap of Pakistan that has a negative relation with inflation of Pakistan i.e. positive output gap, then higher the inflation. So they have an inverse relation like in UK in 1980, there was Lawson boom due to which output gap become positive and inflation rose to just under 10%. So this shows that monetary policy is effective.

Now we discuss the impulse responses of the monetary block. Impulse response functions with a 95% confidence interval for the structural shocks like aggregate demand, aggregate supply, price, monetary and fiscal shocks, are reported in figures 1. Each structural shock is of one standard deviation of their size.

Impulse Response functions of basic structural VAR model

Figure: 1



When there is a one unit positive shock in the regional interest rate then the interest rate of Pakistan initially decreases till the second period and then it start increasing till fourth period and then it dies out completely and afterwards it increases till fifth to sixth period and then it became remain constant till the end. So the correspondence is to the regional interest rate i.e. if regional interest rate more, then the interest rate in country decreases to give more loans out and to attract more FDI, but it might increase due to more money supply in the economy and to control that. Then again the cycle may repeat. So regional monetary shock does impact our country. If the regional monetary shock is of the kind that the interest rate of the region increases, then it can be seen that Pakistan's interest rate responds to that change. So the

regional monetary policy seems to be effective that when the regional interest rate changes, Pakistan's interest rate changes as well whether to attract more FDI or to control prices.

One unit positive shock in the regional output gap causes interest rate of Pakistan to decrease till second period and then it became constant third period and after that it start increasing till seventh period and at that point it completely dies out and afterwards it increases to some extent till the end. The demand gap in the region causes inflation in the region and Pakistan could take advantage by lowering interest rate to attract more FDI, but it might increase in the later period to control the inflation of the country. So output gap is basically the demand pressure, hence it is the demand shock. So when there is demand shock in the region, it causes Pakistan to respond to it. So if the demand shock causes inflation in the region, Pakistan would respond accordingly and try to lower its interest rate in order to attract more investments and later on would probably increase it to control the inflation.

Due to one unit positive shock in the output gap of Pakistan the interest rate of Pakistan is initially zero and then it start increasing till third period and then it became constant up to fourth or fifth period and then afterwards it start decreasing till the end but remain positive. Again with the more demand pressure, prices are high, so to control prices, interest rates might go up. And then later for FDI or for investment purposes, it goes down. The demand shock in the country causes the country to respond to it. The demand shock might cause inflation in the country, which would lead the policy makers to increase the interest rate in order to get the money supply under control and hence the prices under control and later on lower the interest rate to attract FDI.

When there is a one unit positive in the regional inflation then interest rate of Pakistan is initially at zero, then it increases till second period and remain constant till third period and afterwards it start decreasing till eighth period and then it completely dies out at the end. With

regional inflation again the interest goes up to control prices and later to get investment advantage lower it. So regional price shock impacts our country. When there is regional inflation, then Pakistan increases its interest rate to control the money supply and lower the prices in the country and then later on lowers it, so to attract investments and more projects in the country.

One unit positive shock in the inflation of Pakistan causes interest rate of Pakistan remain constant till second period and after that a little bit increase and then it remain constant till seventh period, and then decrease and afterwards remain constant till the end. Same would be with inflation and interest rate in Pakistan i.e. more prices, more interest rate to control the money supply and then later when control garnered, for investment purposes lowered. Price shock in county causes country to respond to it. So if there is price shock like inflation in the country, then it can be seen country increases the interest rate to control the inflation in the country and once it has been controlled, then county lowers it to pave way for investments and projects for development and employment.

FISCAL BLOCK:

For fiscal block we imposed restrictions according to Cholesky decomposition method to identify the structural shocks. The structural parameter estimates of matrix A and B are given in Table 7. Table 7 shows the results for SVAR estimations for fiscal block.

TABLE 7. Structural VAR estimates

Variables	Parameters	Coefficients (probability)
Employment of Pakistan	b₂₁	1.137 (0.00)
	b₃₁	0.005 (0.96)
	b₄₁	0.884 (0.00)
	b₅₁	-0.389

		(0.67)
	b₆₁	-1.064 (0.46)
Government expenditure of Pakistan	b₃₂	-0.083 (0.09)
	b₄₂	0.011 (0.89)
	b₅₂	-0.095 (0.75)
	b₆₂	0.436 (0.36)
Output gap of Pakistan	b₄₃	-0.36 (0.17)
	b₅₃	-0.879 (0.33)
	b₆₃	-0.316 (0.82)
Regional output gap	b₅₄	-0.097 (0.84)
	b₆₄	0.534 (0.49)
Lag of taxes	b₆₅	-0.054 (0.81)

The parameter b_{21} represent the employment of Pakistan that has a contemporaneous positive relationship with government expenditure of Pakistan i.e. more the government expenditure, more would be employment opportunities as more projects would start. Hence higher employment.

The parameter b_{32} represent the government expenditure that has a negative relation with output gap i.e. more investments and more would be the projects which means higher employment and more spending would happen so inflation, which has an inverse relation with output gap as shown in Lawson boom case in UK in 1980s.

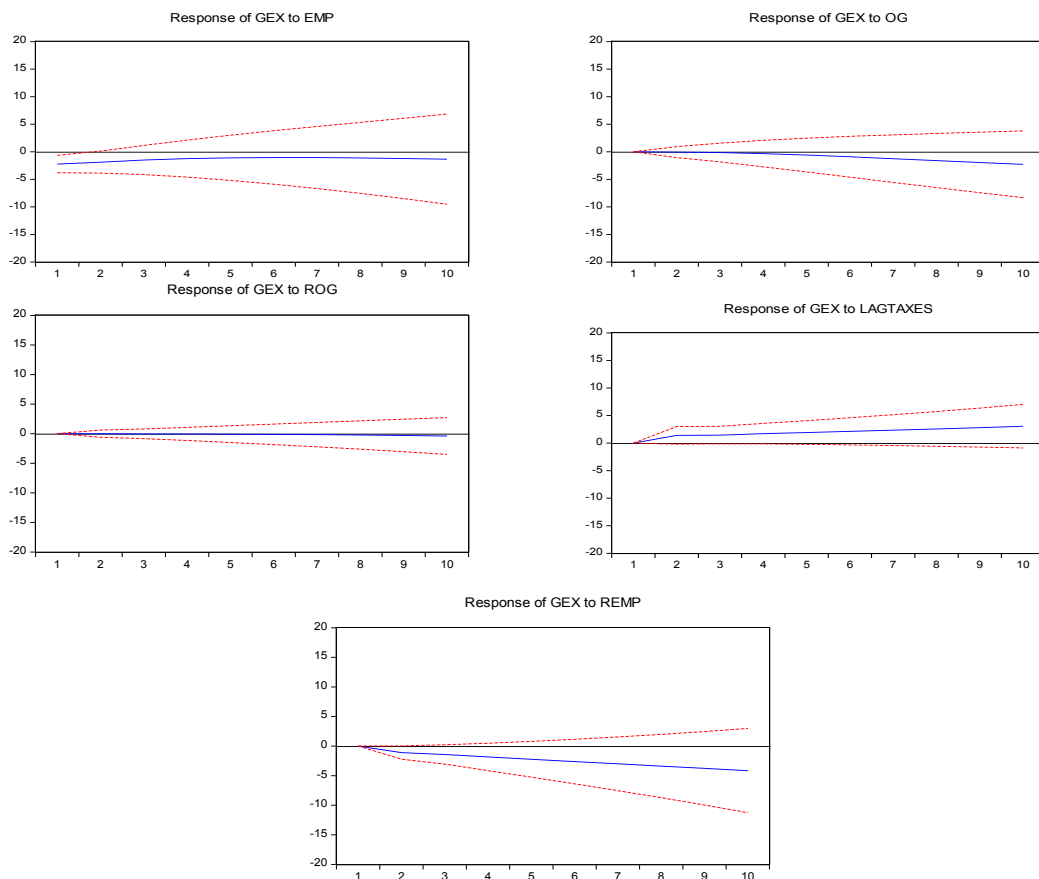
The parameter b_{41} represent the employment of Pakistan that has a contemporaneous positive relation with regional output gap. The more the employment in the country, then regional output gap would increase. Which means more employment so more spending can happen so

consumption more, than relying more on imports and that would mean the output gap on regional level would increase as imports increase within the region. Fiscal policy however does not have regional impact.

Now we discuss the impulse responses of the fiscal block. Impulse response functions with a 95% confidence interval for the structural shocks like aggregate demand, aggregate supply, price, monetary and fiscal shocks, are reported in figures 2. Each structural shock is of one standard deviation of their size.

Impulse Response functions of basic structural VAR model

Figure: 2



When there is a one unit positive shock in the employment level of Pakistan then government expenditure of Pakistan respond negatively. Initially it start increasing slowly up to sixth period but it remains negative, then it became constant till seventh period and after that it decreases

about one unit and then remain constant and negative till the end. So more employment means more government projects are going around, but with time there is natural cycle of employment along with maximum labour productivity and an extent to government expenditures in a country like Pakistan and not all employment can be due to government expenditures. Hence employment shock in the economy causes government expenditure to respond. The more the employment means the better the people are and thus can pay taxes which would accumulate the revenue for the government expenditure. So with more employment, it would go up but with time it seems there is a constant nature, and that employment implies that government expenditure depends on other factors as well like loans. However employment shock does impact the government expenditure.

Due to one unit positive shock in the output gap of Pakistan then government expenditure of Pakistan initially respond constant till fourth period and afterwards it start decreasing negatively till the end. With more demand pressure, the prices go up and there is an extent to which the people can pay taxes which finance the government expenditures and also to control prices, the influx of such expenditures has to be monitored. The demand shock in the economy causes the government expenditure to respond. If there is inflation due to the demand shock, then prices go up and that limits the amount of taxes the government can get from the population. So after some time, the government expenditure decreases.

One unit positive shock in the regional output gap causes government expenditure of Pakistan almost remain constant. Regional output gap does not causes the government expenditure of Pakistan to change since the regional demand pressure does not get catered by the government expenditure of the country. Regional demand shock does not impact the country that much in terms of government expenditure.

When there is a one unit positive shock in the lag of taxes for Pakistan the government expenditure of Pakistan respond positively. Initially at zero then increases gradually till the end. The taxes accumulation allows the government to have enough revenues to do investments. As the taxes act as the capital for government to divulge into projects for the country. So the tax accumulation in the previous year would definitely impact the government expenditure of the present and in a positive way. As more taxes, then more revenues, thus more expenditure. Fiscal policy does impact the country and especially the government expenditure. The more the taxes, the better the revenues for the government to be able to have expenditures in the county. So the fiscal policy is effective for the country.

Due to one unit positive shock in the regional employment level, then government expenditure of Pakistan respond negatively. It start decreasing gradually and remain negative till the end. So the regional employment shock impacts Pakistan's government expenditure. The more the regional employment, the more the population of the region is better off and hence the trade in the region is better. The region performs well and the political stability of the region gets more investment in the region and maybe the foreign loans also flow toward the stable part of the region, affecting the government expenditure of the country negatively.

CHAPTER: 06

CONCLUSION

6.1 Overview of chapter:

The first section of this chapter represent the conclusion. Second and third section of this chapter is about policy implications and limitations.

6.2 Conclusion:

We estimated a regional trade macro econometric model for Pakistan. For this purpose we create a region of five countries including; Pakistan, China, India, Bangladesh and Srilanka. Pakistan is our main country and other are trading partners of Pakistan. We choose different variables and make them regional accordingly. The regional trade macro econometric model consist of six main blocks, The product block, aggregate demand block, aggregate supply block, trade block, monetary block and fiscal block. The foremost aim of the study is to estimate the regional macro econometric model and also see the impact of policy shocks like monetary and fiscal policy shocks. The econometric technique we used is Structural Vector Autoregressive Approach. For estimation purpose we use time series data for the period 1971 to 2015. From the results, we get that regional gross capital formation effects positively and noteworthy impact on the gross capital formation of Pakistan, gross capita formation has negative and significant relationship with regional broad money, gross capital formation has negative and significant impact on broad money of Pakistan, regional broad money has negative and significant impact on broad money of Pakistan, regional gross capital formation has positive and significant impact on regional GDP and regional broad money has negative relation with regional GDP. We also saw that when there was an investment shock, then the consumption of Pakistan responded and similarly due to consumption shock, the investment in the country responded, but it was till some extent constant. Imports affect exports and the

relationship between them is positive. So a shock in imports affects exports and shock in exports also impact imports. Regional output gap negatively effects regional CPI, regional output gap also negatively effects the exchange rate, regional CPI has positive relation with exchange rate, regional output gap also negatively effects the exchange rate, and CPI has negative relation with regional exchange rate. We also saw the regional demand shock caused CPI of Pakistan to respond, demand shock of Pakistan caused the CPI of Pakistan to respond, regional price shock caused the CPI of Pakistan to change, exchange rate change caused CPI to change in Pakistan, and regional exchange rate impacted CPI of Pakistan. Interest rate effects positively and the relationship is significant with regional interest rate, interest rate has negative relation with regional output gap, interest rate has positive relation with regional inflation, regional output gap has positive relation with regional inflation, interest rate has negative relation with inflation in Pakistan, and output gap has negative relation with inflation. Regional monetary shock impact interest rate of Pakistan, regional demand shock impacts interest rate of Pakistan, Demand shock in Pakistan causes the interest rate in Pakistan to change, regional price shock impacts the interest rate of Pakistan and the price shock in Pakistan affects interest rate of Pakistan. So regional monetary shock does impact Pakistan, hence our monetary, demand and price shocks as well as regional monetary shock affect us. Employment has positive impact on government expenditure, government expenditure has negative impact on output gap, and employment has positive impact on regional output gap. Employment shock in the country causes the government expenditure to change, demand shock impact government expenditure of the country, regional demand shock does not impact the government expenditure of Pakistan, and shocks in taxes i.e. lags of taxes impacts government expenditure and regional employment shock impacts government expenditure.

6.3 Policy implications:

So from the results we can see that the country responds to changes in the region and the changes in the country also impact the region. Hence, we can come to the conclusion that the policies in the region impact country and vice versa. So the policy makers in the region have to keep the policies of each other in mind before making a policy. Regional monetary shock impacts Pakistan but in terms of fiscal shocks, not the regional but rather the fiscal shock of Pakistan impacts Pakistan. So the monetary policies have to be made keeping the region in mind. So the interest rate cannot be seen as an isolated variable but rather the effect on the region has to be seen and similarly the other countries changing their interest rate have to keep in minds how the rest of the countries would respond. In terms of fiscal shock, policy makers of Pakistan have only to be concerned with Pakistan i.e. taxes would be set keeping the economy and the population of Pakistan in minds and its impact on the Pakistan's economy.

6.4 Limitations:

There is an option that some of the variables that could have been major to our model might have been missed as it's not possible to could have used all of them. The addition of labour could have been of huge importance but the lack of data in this genre needs to be tackled by the countries. China had an extremely limited data and the rest of the countries also had limited data in many cases. Major trading partner might not have been taken correctly for the countries. There is always room for improvement in terms of further research. Further work can be done in different sectors especially financial and real sector, as it's imperative for the investors and investments and hence very useful for predictions.

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APPENDIX: A

Table: 1
Descriptive analysis of variables

	GDP (PAK)			regional GDP		
Years	Mean	SD	SR	Mean	SD	SR
1971-1975	16.71	1.10	6.58	12.47	0.63	5.04
1976-1980	21.39	2.13	9.96	14.72	0.94	6.37
1981-1985	30.03	2.94	9.78	17.86	1.05	5.88
1986-1990	40.64	3.70	9.09	21.16	1.14	5.37
1991-1995	52.07	3.40	6.52	26.50	2.48	9.35
1996-2000	62.02	2.91	4.69	35.55	3.36	9.46
2001-2005	74.71	6.88	9.21	46.44	4.67	10.05
2006-2010	95.60	3.99	4.17	68.30	8.58	12.56
2011-2015	111.81	7.92	7.08	100.21	10.40	10.38
	regional broad money			gross fixed capital formation		
Years	mean	SD	SR	Mean	SD	SR
1971-1975	205.10	59.13	28.83	399374608.18	90409266.46	22.64
1976-1980	405.08	67.90	16.76	851784678.82	345629012.74	40.58
1981-1985	578.10	74.16	12.83	1238158050.72	87951045.75	7.10
1986-1990	759.51	53.62	7.06	1213835232.38	128317223.85	10.57
1991-1995	1047.95	149.54	14.27	1306787202.08	127872262.89	9.79
1996-2000	1481.53	210.68	14.22	1707580800.38	232519821.75	13.62
2001-2005	2483.51	325.88	13.12	1944648399.71	269608826.60	13.86
2006-2010	3916.85	551.94	14.09	2874972167.43	334835050.83	11.65
2011-2015	6118.32	784.17	12.82	4841740134.08	414560237.37	8.56
	international oil prices			regional interest rate		
Years	Mean	SD	SR	mean	SD	SR
1971-1975	5.113653886	2.648698861	51.7966	1.640966345	1.05594753	64.34913
1976-1980	8.503807684	2.593690877	30.50035	3.576280877	3.487299257	97.5119
1981-1985	7.127783927	1.430632445	20.07121	3.624113047	1.753940795	48.39642
1986-1990	1.346361169	0.180837674	13.43159	5.629226622	0.801885896	14.24505
1991-1995	0.842990097	0.188643351	22.37788	6.061879644	0.730764577	12.05508
1996-2000	0.653645788	0.168205533	25.73344	5.368704939	1.109653643	20.66893
2001-2005	0.881395327	0.178300471	20.22934	5.152673503	0.931404167	18.07613
2006-2010	1.155784328	0.215079342	18.60895	4.728921935	2.206811823	46.66628
2011-2015	0.878245303	0.264922214	30.16495	5.580386838	0.500791226	8.974131
	household consumption			regional consumer price index		
Years	Mean	SD	SR	mean	SD	SR
1971-1975	38242584327.55	1140451741.50	2.98	2.00	0.45	22.51
1976-1980	42841273454.22	2485711345.12	5.80	2.86	0.37	12.78
1981-1985	50727380288.98	3146181565.86	6.20	4.76	0.71	14.87
1986-1990	66424072046.14	13431156514.50	20.22	13.93	1.70	12.22
1991-1995	113310020193.78	17749190178.75	15.66	20.86	2.69	12.88
1996-2000	184247737962.62	26419886846.28	14.34	31.45	3.55	11.28
2001-2005	293659827727.70	44565280996.31	15.18	42.15	4.00	9.48

2006-2010	512987041215.08	93873565717.60	18.30	65.31	11.33	17.34
2011-2015	854509826503.85	111055887783.72	13.00	103.30	11.05	10.69
	regional national disposable income			regional term of trade		
Years	Mean	SD	SR	mean	SD	SR
1971-1975	7777357857.88	1359988548.64	17.49	78.56	5.07	6.46
1976-1980	9908277053.80	1105776432.59	11.16	77.71	3.66	4.72
1981-1985	16190661781.52	4799999940.62	29.65	77.90	5.55	7.12
1986-1990	26939766237.22	3351026594.48	12.44	73.79	2.74	3.72
1991-1995	51290675523.38	17855049843.67	34.81	76.91	3.07	3.99
1996-2000	121854013284.98	20394655762.72	16.74	70.05	11.22	16.01
2001-2005	238689625405.63	60188874925.23	25.22	75.13	1.86	2.48
2006-2010	708430532499.47	245200392382.83	34.61	74.47	3.76	5.05
2011-2015	1651179640409.97	284223906747.75	17.21	75.83	2.06	2.71
	imports			exports		
Years	Mean	SD	SR	mean	SD	SR
1971-1975	5733257359.50	1420792121.96	24.78	2699241512.21	617544942.35	22.88
1976-1980	4449174200.60	1608778468.30	36.16	2132161954.20	793248497.94	37.20
1981-1985	7446217881.40	437348893.61	5.87	3541377987.20	198917681.13	5.62
1986-1990	9516213070.40	1369064293.98	14.39	5528382825.20	1063869336.07	19.24
1991-1995	13959307662.60	1465908464.02	10.50	8881764920.60	921135259.29	10.37
1996-2000	15148023734.40	1701439758.26	11.23	9847685647.40	681443283.08	6.92
2001-2005	20754850000.00	7720228424.89	37.20	14767210000.00	3565168961.00	24.14
2006-2010	43723286000.00	5883086879.26	13.46	24630700000.00	3023047667.50	12.27
2011-2015	53280780000.00	1751940750.14	3.29	31012800000.00	1237640577.87	3.99
	consumer price index			regional nominal exchange rate		
Years	Mean	SD		mean	SD	SR
1971-1975	4.22	1.26	29.77	4.74	0.10	2.19
1976-1980	7.66	1.02	13.38	5.77	0.66	11.45
1981-1985	11.51	1.06	9.25	9.36	1.62	17.32
1986-1990	15.33	1.83	11.94	21.20	1.84	8.68
1991-1995	24.63	4.13	16.75	29.25	2.47	8.45
1996-2000	38.94	3.72	9.55	38.58	4.21	10.92
2001-2005	48.70	4.37	8.98	51.86	1.90	3.67
2006-2010	77.80	16.62	21.36	58.49	1.34	2.30
2011-2015	130.77	13.71	10.49	66.88	4.18	6.25
	output gap			regional output gap		
Years	Mean	SD	SR	mean	SD	SR
1971-1975	0.58	0.96	165.71	23.45	0.84	3.59
1976-1980	3.66	0.79	21.59	13.16	4.54	34.48
1981-1985	3.20	1.60	50.05	1.52	2.59	170.37
1986-1990	-3.30	1.77	-53.56	-6.52	3.19	-48.88
1991-1995	-2.31	4.25	-183.94	-12.99	1.74	-13.39
1996-2000	0.98	2.21	224.51	-2.87	3.83	-133.48
2001-2005	10.78	23.58	218.75	4.83	3.25	67.31
2006-2010	68.30	8.58	12.56	0.47	0.31	65.67
2011-2015	100.21	10.40	10.38	-0.06	0.52	-833.29

	interest rate			regional interest rate		
Years	Mean	SD	SR	mean	SD	SR
1971-1975	6.35	3.94	62.12	1.64	1.06	64.35
1976-1980	3.63	0.93	25.56	3.58	3.49	97.51
1981-1985	3.00	1.06	35.24	3.62	1.75	48.40
1986-1990	2.84	1.03	36.41	5.63	0.80	14.25
1991-1995	4.61	0.53	11.54	6.06	0.73	12.06
1996-2000	3.04	1.36	44.86	5.37	1.11	20.67
2001-2005	2.18	1.18	54.18	5.15	0.93	18.08
2006-2010	5.14	1.99	38.79	4.73	2.21	46.67
2011-2015	3.25	1.41	43.57	5.58	0.50	8.97
	inflation			regional inflation		
Years	Mean	SD	SR	mean	SD	SR
1971-1975	27.77	18.12	65.23	47.77	29.60	61.95
1976-1980	15.55	4.43	28.50	47.63	48.60	102.04
1981-1985	13.64	4.79	35.14	61.89	29.96	48.40
1986-1990	13.67	5.25	38.42	98.92	35.17	35.56
1991-1995	22.31	2.36	10.59	110.65	23.66	21.38
1996-2000	13.48	6.61	49.03	63.66	30.04	47.19
2001-2005	8.83	4.85	54.89	59.27	12.48	21.06
2006-2010	19.57	7.78	39.72	87.47	40.02	45.75
2011-2015	10.52	4.89	46.49	66.56	23.28	34.98
	government expenditure			lag of taxes		
Years	Mean	SD	SR	mean	SD	SR
1971-1975	5.49	1.09	19.85	10.82	2.47	22.84
1976-1980	10.37	1.93	18.59	17.95	5.47	30.45
1981-1985	18.41	2.16	11.73	39.90	4.78	11.98
1986-1990	29.89	6.16	20.61	49.25	9.43	19.15
1991-1995	35.99	1.94	5.38	69.61	5.40	7.76
1996-2000	38.63	3.63	9.40	70.68	10.90	15.42
2001-2005	39.21	6.64	16.94	74.82	10.70	14.30
2006-2010	89.55	9.24	10.32	97.34	23.35	23.98
2011-2015	137.43	18.03	13.12	115.39	21.68	18.79
	employment			regional employment		
Years	Mean	SD	SR	mean	SD	SR
1971-1975	25.65	0.69	2.67	25.65	0.69	2.67
1976-1980	26.64	0.58	2.18	26.64	0.58	2.18
1981-1985	28.54	0.38	1.33	28.54	0.38	1.33
1986-1990	29.67	0.41	1.38	29.67	0.41	1.38
1991-1995	24.60	3.77	15.33	120.54	7.59	6.29
1996-2000	27.32	2.43	8.88	109.09	7.75	7.11
2001-2005	33.43	1.40	4.20	108.29	2.88	2.66
2006-2010	21.23	2.36	11.14	84.81	7.46	8.80
2011-2015	19.85	1.00	5.04	76.95	1.09	1.42