

Rent Seeking: It's Impact on Total Factor Productivity and Inflation.

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Nomenclatures

ADF:	Augmented Dickey Fuller
AIC	Akaike Information Criterion
ARDL	Autoregressive Distributive Lag
BI	Business International
CPI	Consumer Price Index
DCE	Decentralised competitive Equilibrium
DF	Dickey Fuller
DUPs	Directly Unproductive Profit seeking activities
ECM	Error Correction Model
FDI	Foreign Direct Investment
FY	Financial Year
GDP	Gross Domestic Productive
GNP	Gross National Productive
GMM	Generalised Method of Moment
HP Filter	Hodrick Prescott Filter
ICRG	International Country Risk Guide
IFS	International Financial Statistics
KPSS	Kwiatkowski-Phillips-Schmidt-Shin(test)
OECD	Organization of Economic Co-operation And Development
OLS	Ordinary Least Square
PCA	Principle Component Analysis
PCs	Principle Components
PP	Phillips Perron(test)
PSR	Political Risk Services
RBC	Real Business Cycle
R&D	Research and Development
SAP	Structural Adjustment Programme
SBC	Shwartz Bayesian Criterion
T.BILLS	Treasury Bills
TFP	Total Factor Productivity
VAR	Vector Autoregressive
VECM	Vector Error Correction Mechanism
WDI	World Development Indicator

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Abstract

In this study a theoretical model is developed by incorporating rent seeking activities in standard Real Business Cycle (RBC) model with money in utility function, to examine the affect of these activities on total factor productivity and inflation in economy. Empirically the study is conducted for Economy of Pakistan by taking time series data from 1983- 2010. Rent seeking index is generated by using data from International Country Risk Guide (ICRG) dataset. Autoregressive Distributive Lag (ARDL) technique is used for estimation .The results estimate, supports the argument that controlling rent seeking activities result in increasing total factor productivity and decreasing inflation.

Chapter 1

1. Introduction:

Rent seeking is defined as resource wasting activities of individuals or groups of individuals seeking to obtain or maintain wealth transfers, normally with the help of the government. Firms and individuals manipulate the economic environment to increase their income without making any productive contribution to the economy. In the words of Tullock(1976) resources are used only for the purpose of obtaining rents for people and these rents are generated from activities which have some negative social value. Krueger(1974) suggests that these unproductive, expropriating activities bring positive returns to individuals but not to the society. So these redistributive activities take up resources, and private returns are obtained from the redistribution of wealth, rather than the creation of wealth.¹

In recent years a number of studies have been undertaken to see the effect of rent seeking activities on economic growth, allocation of resources, investment, production and the determination of the direction of entrepreneurial activities (productive or unproductive). In this study a theoretical model is developed by incorporating rent seeking activities to the baseline Real Business Cycle (RBC) model following Angelopoulos *et al* (2011) to see its impact on TFP growth level of the economy. Along with this money in utility function is also incorporated to see the effect of rent seeking activities on the inflation level of the economy in the form of seigniorage.

Cross countries studies have shown that countries with corruption and rent seeking suffer from low capital formation, growth and productivity². Rent seeking is present both in the private and public sectors. Private rent seeking affects factors directly, whereas public rent seeking affects the policies, which hamper growth more severely than production³. In developing countries it is mostly the government, bureaucracy and powerful political groups that use rent seeking activities⁴.

1 Murphy et al 1991, 1993, Pasour 1985,

2 Mauro 1995, Keefer & Knack 1997, Halls & Jones 1999

3 Murphy et al 1993

4 Norris 2006

When political structure is limited to a few people they formulate the policies to their own advantage, influence the structure of the institutions and force the government to make investments and provide services which favour them.⁵ Rent seeking proves to be a significant obstruction for private investment and has a negative effect on production and growth.

To see the impact of rent seeking activities, as said earlier rent seeking activities are incorporated in RBC model to investigate its effect on TFP level of the economy.⁶ In RBC model technological shocks are considered to be central. But with the exception of some big oil shocks in the world it was hard to find macro-events, which were suggested by the Solow residual. So economists were searching to find some extra shocks which could result in reducing the dependence on unobservable technological shocks and to find the mechanism through which these shocks could affect the macro economy.⁷

There is considerable rich literature on importance of institutions both on theoretical⁸ and empirical⁹ level. These institutional shocks act like technological shocks and contribute to explain the cyclical properties of the macro economic data of TFP for Mexican economy¹⁰. Considering this, present study is investigating, whether these activities have any impact on TFP growth level in Pakistan?

Technology plays a vital role in effecting the TFP level of the economy, especially in developing economies. Rent seekers block the way of new investment, innovation technology transfer for their own interest, this as a result, effect the productivity and growth of the economy. The earlier research in 1960's and 70's found that difference in growth rate of developed and under develop countries was only due to difference in TFP level. 60% of Japan's output growth during 1955-68 was contributed by TFP growth¹¹. Growth in East and South East Asian economies was based on factor inputs and therefore was not sustainable¹².

⁵Acemoglu 2005,2004

⁶Angelopoulos *et al* 2011

⁷Rebelo 2005

⁸Drazen 2000, Muller 2003, Prescott 1998

⁹Keefer & Knack 1997, Mauro 1995, Halls & Jones 1999, Acemoglu 2001, 2002, 2003

¹⁰Angelopoulos *et al* 2011

¹¹Kanamori 1972

¹²Krugman 1994, Halls & Jones 1999

It was witnessed in Pakistan that economic growth was faster in periods when TFP level was high¹³. Economists searched for the determinants of TFP, and found that R&D, human capital, export of manufactured goods, cotton production, development expenditures and remittances have positive effect on TFP level¹⁴. But so far we know rent seeking activities are not considered as a possible cause of effecting TFP level in economy.

The movement of real GDP and TFP follow same trial and evidence show that real GDP in Pakistan has completed three business cycles so far and is in the recessionary phase of fourth cycle¹⁵. So may be these rent seeking activities would be effecting the TFP level , which consecutively shapes the economic fluctuations.

The second contribution of this paper is that. money in utility function is used in this RBC model to capture the effect of rent seeking activities on inflation through seigniorage. Weak institutions can affect the working of both fiscal and monetary authorities. There is consensus in literature that lack of good governance and poor institutions results in poor economic outcomes which in turn promote rent seeking and corruption in economy¹⁶. Institutions and tax collection abilities of government are very closely related¹⁷. When institutions are weak rent seeking may takes in form of bribery, corruption, competition in different levels of government, gifts, all these results in decreasing the tax revenues for the government. Beside this rent seeking could take place inform of competition for export licences, tariff, quota, subsidies and they also results in reducing the revenues.

So all this results in deficit as formal collection of taxes will be less than potential and in order to cover the expenses government moves towards seigniorage. The economies where fiscal dominance is present, sooner or later governments move towards creation of money (seigniorage) to finance their persistent fiscal deficits¹⁸. In Pakistan it is find that domestic financing of deficit from banking system is inflationary in long run¹⁹.

13Pasha *et al* 2002, Khan 2006, Sabir and Qazi 2003

14 Pasha *et al* 2002, Mehmood and Rehanna 2000, Sabir and Qazi 2003, Ahmed and Kalim 2007, Khan 2006

15Arby 2001, Mehmood and Mohammad 2012

16Haider *et al* 2011

17Haung and shang,Wei 2006

18Sergant and Neil,Wallace 1981

19Chaudray and Naveed 1995, Sarfraz and Mumtaz 2009

In the end it could be said that, so far the studies are considered, it could be seen that a lot of research is done in determining the effects of rent seeking activities on economy ,have enquired about factors effecting TFP and inflation level in economy. But very little has considered rent seeking as possible cause of effecting TFP and inflation in economy particularly for Pakistan. This paper fills the gap in literature by developing a theoretical model in form of incorporating rent seeking activities in standard RBC model to observe its effect on total factor productivity (TFP) level. Money is also integrated in utility function to capture its effect on inflation.

1.1. Objectives:

A number of studies are undertaken to investigate the determinants, causes and effects of rent seeking activities, total factor productivity and inflation in economy. After the formal introduction of the concept of rent seeking by Krueger, A (1974), it got particular importance in economic literature and it seems many queries are answered.

But a little work is done to examine, whether these rent seeking activities as a result of weak institutions can affect the TFP and inflation level of the economy? This study tries to investigate this. The paper is incorporating rent seeking activities in standard RBC model following Angelopoulos *et al* (2011), along with standard money in utility function to examine the effect of rent seeking on TFP and inflation rate. Empirically it will also estimate this, to support the theoretical model particularly for Pakistan's economy. The basic objectives are

1. To develop a theoretical model by incorporating rent seeking in standard RBC model with money in utility function.
2. Empirically investigate whether rent seeking will effect TFP and inflation level in economy?

1.2. Scheme of Study:

The study consists of 6 chapters. Chapter 2 is related to literature review which motivates for the paper and supports empirically and theoretically for the need of study. Chapter 3 gives detail on development of theoretical model. Chapter 4 describe the empirical setup, some detail of econometric methodology .Chapter 5 explains the results of estimation and their interpretation, and Chapter 6 concludes the study.

Chapter 2

2. Literature Review:

Immense amount of work has been done on rent seeking and its effect on economy. Generally it is believed that these activities took place because of weak institutions. Economists also try to explore the determinants of total factor productivity. Debate on whether inflation is a monetary phenomenon or fiscal phenomena is still going on. This study explore the relationship between rent seeking activities and their effect on TFP and inflation in economy, this section provide a brief review of literature to support the argument. This section is further divided into three parts , first will consider rent seeking ,its effect on economy and how it is measured , then discuss the papers relating to TFP and its determinants and part three is related with inflation.

2.1.Rent seeking:

The term rent seeking was first coined by Krueger, A.O. (1974). This study shows that in market oriented economies normally government imposed restrictions in form of import licensing, tariff, import quotas etc. Producers compete for these licenses which sometime results in form of bribery , corruption, smuggling and black marketing forms of rent seeking. In this study a model is developed on preposition that, welfare cost(rent seeking cost) incurred due to competition for import license is in addition to the welfare cost that would have incurred if same level of imports are achieved through tariff. The welfare lost estimated to be about 7.3% of GNP in India in 1964 and it was 15% of GNP(trade sector) in Turkey in 1968.These were very shocking for economist .So the term rent seeking got special attention and was formally introduced.

Although the basic idea of rent seeking was already discussed by Tullock (1967).Tullock (1967) was of the point of view that welfare loss measured by Harberger (1954) was under estimation of welfare cost of monopolies.

Harberger (1954) measure the welfare loss due to monopolies. It was believed that monopolies result in misallocation of resources, decrease in aggregate welfare and redistribution of resources in favour of monopolists. The study uses the data for America from 1924-28 for 73 manufacturing industries and estimated that welfare loss was less than one tenth of one per cent of the national income, about \$2,00 per capita. So welfare loss due

to monopolies and tariffs, were considered negligible and of very less importance. But Tullock(1967) argues that it's not just the Harberger triangle(Harberger 1954) rather the rectangle with triangle also represent the cost. Welfare was not transferred from consumers to producers rather it results in inefficient use of resources, which may be due to lobbying, excise tax, tariff on imports, political activity or by pressure groups to obtain certain privilege.

So Tullock(1967) and Kruger(1974) prove that Harberger(1954) was wrong. Then Posner (1975) made first attempt to apply Tullock's (1967) ideas to measure rent seeking. Individuals compete to become monopolists and all the monopoly rent is social cost which is not transferred into social benefit. The consumer welfare is not shifted to monopolists rather it is wasted in form of purchasing of inputs to become monopolist.

Not only Tullock(1967) and Kruger(1974) define the term 'rent seeking' side by side Bhagwati(1982) also define that same concept in form of directly unproductive profit seeking activities (DUP). Bhagwati(1982) defines DUP's as such activities which yield pecuniary returns without increasing production of goods and services in economy, and did not enter in utility function directly or indirectly. The study argues that Kruger(1974) focus solely on licensing/quantitative restrictions which is just subset of broader class of DUP's.

Although the concept was introduced in 1960's but special emphasis on how these activities affect economy and how to measure them was started in 1990's.

As Murphy *et al* (1991) investigate the reasons for low human capital growth in U.S. First reason might be that human capital is not growing as it was before but the second reason seem to be more serious which is, that more ablest individuals are now choosing to become rent seekers instead of producers. It seems as instead of social incentives, the private incentives are governing the allocation of talents between activities, productive or unproductive. Rent seeking rewards talent more than entrepreneurship. Evidence shows that countries with more law colleges have low rate of economic growth than countries which have more engineering colleges. The paper uses enrolment in law colleges as proxy for rent seeking. It used the model of entrepreneurship and growth based on Lucas(1978) used by Kuhn (1988), and data set of Barro's (1991).The result shows that students enrolment in engineering colleges have positive and significant effect on growth while students enrolment in law has negative effect on growth.

Then Murphy *et al*(1993), also provide good reason for why the countries in which rent seeking activities are taking place in form of corruption, poor laws, permissive legal system and poor property rights suffer economically? By a simple model two strong reasons , first ,rent seeking activities have natural increasing returns, secondly rent seeking could be private or public were found. Private rent seeking affect existing resources whereas public rent seeking directly affect polices and innovative activities in economy which are more harmful for economy. Baumol (1990, 2004) also provide evidence that allocation of talent between productive and unproductive activities depends on the rule of the game. Rent seeking negatively affects economic growth and offer rewards higher than production and entrepreneurship. The paper give evidence from Ancient Rome, China, The Middle Ages and Renaissance in Europe.

Then Keefer and Knack done series of papers on examining the role of these rent seeking activities in economy. They use different institutional indicators to measure rent seeking. As Keefer & Knack (1995), analyse whether property rights have any impact on economic growth? Using indicators like quality of bureaucracy, political stability and property rights, from country risk evaluators to potential foreign investors, the study found that property rights have high and significant impact on investment and growth in U S economy. Then Keefer and Knack (1997) used the data from World Value Survey for 29 market countries and explore the relationship between interpersonal trust, civic norms and economic performance. And found significant relationship between them. The variables are found to be are more effective in countries where property rights are effectively protected and countries are less polarized by class and ethnicity.

Then Acemoglu and Robinson(2002) analyse rent seeking in form of activities of political powerful groups (elites).It was observed that some countries developed / industrialised more rapidly than other countries. For example U.S.A , Britain, Germany industrialised in 19th century earlier than Russia , Australia and Hungry. The reason was, in these countries special groups were afraid of ‘political replacement effect’. These political powerful groups were normally against the acceptance of innovation and technological changes. They did not formulate government policies and institutions which were in favour of economic development. As this may result in decreasing their power and rents.

Norris *et al*(2006) by using a simple economic model for rent seeking, show that when credit market is not present and there is fixed cost of rent seeking in economy only wealthy

people can become rent seekers. They can extract a part of income from other person's market production and at the same time they can protect their own wealth by becoming rent seeker. They can avoid taxes. It is evident from history that this is common in developing economies.

Angelopoulos *et al* (2011) incorporated rent seeking activities in form of weak property right into standard Real Business Cycle (RBC) Model to study the role of institutions in the economy. The study calibrated it for Mexican economy and found that weak property right are one of the reasons for business cycles in Mexican economy as it strongly affects total factor productivity. It was consistent with the falling productivity and non-decreasing labour hours in Mexico during 1980-1994.

It was also predicted that poor countries will grow faster than developed countries because of technological development and diminishing returns to capital in latter stage. What actually happens is opposite to this. Keefer and Knack(1997) investigate the reasons for this and found by using different indicators for institutional quality that it is largely because of failure and weakness of the institutions. The indicators used in study were rule of law, incidence of corruption, risk of expropriation and contract negation. Not only them Baumol(1990, 2004), Acemoglu(1995,2004) also supported the argument that allocation of talent between productive and unproductive activities depends on economy's payoffs, Unproductive activities bring positive returns to individuals and reduces the marginal returns to production and relative returns to entrepreneur.

In all these papers one thing was common that economists used different proxies for measuring rent seeking. How to measure rent seeking always remains a big problem. Even Tullock (1997, 1998), after doing original work on rent seeking has problem how to measure the actual cost of rent seeking activities? Kruger (1974) used import quotas in trade for India and Turkey, Tullock (1976) used difference in prices bought by changes in regulations for several non –competitive U.S industries. Then advertisement cost(Muller 1978), agricultural promotion policy(Salhofer et al 2000), contribution of political action committee (Lopez & Pagoulatos1994), number of lawyers(Laband& Sophocleus1988), enrolment in law colleges(Murphy *et al* 1991), corruption ,bureaucratic efficiency, political stability (Mauro 1995), U. S federal and state government employment (Durden 1990), government revenue & political regime (authoritarian & democratic) (Dougan&Synder1993)and corruption, rent seeking, political instability, civil disorder,

quality of regulation bankruptcy laws, privatization proceeds in form of political risk index (Angelopoulos *et al* ,2011) are used to measure rent seeking. Rosal (2009) provide detail of method and different proxies used for measurement of rent seeking.

Angelopoulos *et al* (2011) incorporated these rent seeking activities in form of weak property rights on the bases of argument, that institutional shocks will work like technological shocks in RBC model for Mexican economy. Rebelo (2005) says that basic idea provided by Kydland and Prescott(1982) on RBC models work through real shock , particularly technological shocks. But along with this researchers must investigate about the behaviour of the causes of business cycles other than technological shocks, like oil prices, fiscal policies, investment decisions, monetary models. Government spending when financed by lump sum taxes effect the consumption, investment, hours of work and output sooner or later. So researchers must investigate for “New shocks” which may be the driving force for the business cycles.

As in this study model is developed following Angelopoulos *et al* (2011),empirically the paper will also analyse the effect of these rent seeking activities on Total Factor Productivity, particularly in case of Pakistan. It will calibrate the value for rent seeking activities for Pakistan. As Real Business Cycle theory is used for this purpose Arby (2001) provide evidence for existence of Real Business Cycles in Pakistan.

Arby(2001) , Mehmood and Mohammad(2012) give evidence that real GDP in Pakistan has completed three business cycles. The first was completed during the period 1949-65, second from 1966-85 and third from 1986-2005. The GDP is normally an aggregation of three components, trend, cycle and irregular movements. In order to study business cycle the GDP series is de-trended. Arby(2001) took annual series data on real GDP for the period 1949-50 to 2002-03. With this, the paper also uses data on M2 and inflation to explore the long run relationship between key macroeconomic variables. HP filter is used in two stages to decompose the data, and also to projected the trend and cycles for these variables for next five years. For this reason autoregressive moving average model is used. The study projected that Pakistan is in the recessionary phase which will continues till 2012.

2.2.Total Factor Productivity:

Total factor productivity is defined as such increase in output which is not defined by growth in inputs (Solow, 1957). It is now considered as an important factor of growth. The first attempt was probably made by Abramovitz (1956) at measuring TFP, when the study tries to identify the main source of U.S productivity growth. Solow (1956, 1957) also recognises that only a fraction of growth in output is explained by physical inputs, the exogenous residual captures TFP. Prescott (1998) gives evidence for need for theory of total factor productivity, as new classical growth theory cannot explain the differences in income level and economic development level of different countries unless the variation in total factor productivity in different points of time and in different countries are considered. The difference in physical capital, intangible capital, saving rate, technical knowledge all are important but it is total factor productivity that matters.

Then Hall and Jones (1999) also investigate why the output per worker differs among countries? Is it the difference in physical capital or educational attainment? The study reveals that it is the difference between social infrastructures that matters. By social infrastructure it means institutions and government policies. The study of 127 countries found close relationship between output per worker and social infrastructure.

When Asian and South Asian economies are considered, TFP growth plays a very important role in their development. 60% of Japan's output growth during 1955-68 was contributed by TFP (Kanamori 1972). Dowling (1998), investigated the reasons for outstanding economic growth of developing Asian economies (Hong Kong, Singapore, Taiwan) and found that technological advancement plays the main role. Human capital, skill accumulation and transfer of technology increase their productivity. All these are embodied in measurement of TFP. It was also argued that growth in East and South East Asian economies was not sustainable, as it was based on factor inputs whereas productivity growth is crucial for output growth [Krugman (1994), Hall & Jones (1999)]. Srinivasan (2005) also measures and analyses the effect of TFP on growth. Cross country empirical study shows that institutions, social infrastructure, spill over knowledge do matter. Any restriction on foreign trade and investment could inhibit the growth of TFP.

As far as determinants of Total Factor Productivity (TFP) are concern, Lsaksson & Neg (2006) consider two modes of analysis for 15 countries, first their cross country study and then country case study, it shows that human capital, physical capital, infrastructure, financial development, technology transfer through trade have significant effect on TFP. Then Danquah *et al* (2012) investigate factors effecting TFP growth. It measure TFP using non-parametric frontier technique to compute Malmquist productivity Index. This technique results in decomposing TFP into two components, technical efficiency and technological changes. In order to check the robustness of TFP growth and its components. The study has used Bayesian model averaging technique. Using the data for 67 countries (20 OECD, 47 non OECD) from 1960-2000, the research found that initial GDP, trade openness were significant. In OECD countries investment price, consumption share, labour force was significant and in non-OECD countries population density also have effect on TFP growth.

This study is also concern about effect of rent seeking activities on TFP level in Pakistan. TFP always very strongly effect the overall growth of the economy. Economist also emphasis on exploring the factors effecting total factor productivity of the economy. Mahmood and Rehanna (2000) focus on manufacturing industries in Pakistan. This study follow Solow methodology to measure TFP during the period 1972-1997. It found, that scientific and technical manpower, R&D expenditures, human capital contribute positively and significantly to the TFP growth in economy.

Pasha *et al* (2002) also strongly support the idea that TFP plays very important role in effecting the economic growth rate in Pakistan. High growth during 80's and low economic growth in 90's was mainly due to variation in Pakistan's TFP level. The paper used simple OLS regressions for determinants of TFP in Pakistan. The factors which contribute to growth in TFP were human capital, vintage capital, development expenditures, manufactured exports, cotton production and remittances. Sabir and Qazi (2003) consider TFP in Pakistan from different point. They establish the link between TFP and Structural Adjustment Program (SAP) in Pakistan. The study considers the pre-reform period 1972-73 and reform period 1987-88 to 2001-02. SAP results in low growth in factor inputs which results in lowering growth rate in economy, and this was mainly due to decrease in TFP level in country. The paper uses Growth accounting Approach and Index Number Approach to measure TFP.

Khan (2006) also estimates and then determine the macro determinants of TFP by using OLS technique for the data from 1960-2003 for Pakistan. And found that inflation, FDI, financial sector, budget deficit, population growth, employment and government consumption plays important role in determining TFP level. Then Ahmed and Kalim(2007) found that cotton production, export of manufacturing goods, human capital real development expenditure, real credit to private sector plays important role in effecting TFP level sector wise and overall for the whole economy.

2.3.Inflation:

Bilquees (1988) analyse the complexity of problem of inflation in Pakistan in a different way. The research analyse Pakistan's economy both by monetarists hypothesis and structural hypothesis. Monetarist believes that inflation always a monetary phenomenon. Whereas in structural hypothesis three limitation , inelastic food supply, inelasticity and instability of purchasing power of capital, inelastic tax revenue due to structural deficiencies in the tax system are used. The study shows that inflation in Pakistan is a complex problem. Neither of the theory is superior.

Khan and Mohammad (1996) are also of point of view that Inflation in Pakistan is always a complex phenomenon. It's not only a monetary phenomenon , there are number of factors responsible for inflation in Pakistan like supply side shocks, indirect taxes, inflationary expectations, import inflation etc. The study consider consumer price index (CPI) for food and non-food component separately which were having divergent trends. Then it applies Dickey Fuller (DF) and Augmented Dickey Fuller (ADF) classes of unit root test on time series data from 1971-72 to 1994-95 .And found that series is stationary at first difference $I(1)$. The co integrated equations are estimated by OLS. The multivariate regression found that there is co integration and long run equilibrium relationship between inflation, money supply, import prices and real GDP.

Malik (2006) argues that inflation is a monetary phenomenon in Pakistan. The paper uses near VAR approach to estimate impulse response function and granger causality test to find the causality between reserve money and real GDP and reserve money and inflation. The results show that inflation is granger cause by reserve money but no other way around. The data for CPI inflation, real GDP and reserve money is taken from 1975:03 to 2003:02.

And whether inflation is a fiscal phenomenon or monetary phenomenon, it always remain complex question. Studies provide mix results relating to significant relationship between fiscal deficit and inflation. For instance King and Charles (1985), Montiel (1989), Click (1998), DeHann and Williem (1990) are of the view that fiscal deficit didn't play any significant role in effecting inflation in developed and for many developing countries. Or they are significant only in high inflation countries or during high inflationary periods. Whereas for developing economies, strong evidence are found that fiscal deficits are inflationary, for example Zoli (2005) for Argentina & Brazil, Baldini *et al* (2008) for Sub-Saharan Africa found evidence of positive relationship between two. Catao & Terrones (2005) used panel data for 107 economies for period 1960-2001, and found that 1% point reduction in fiscal deficit to GDP results in reducing inflation by 8.75 % point.

Agha and Mohammad (2006) put argument that inflation is a fiscal phenomenon in Pakistan. Using data on CPI, fiscal deficit, total bank borrowing, real GDP, exchange rate from FY 1973 to FY 2003, find significant relationship between the variables. After checking the stationality of the variables by Augmented Dickey Fuller (ADF) test, Johanson co integration test proves the long run relationship between the variables. Vector error correction model (VECM) proves that inflation is caused by fiscal deficit.

Chaudhary and Naveed (1995), Shabbir and Ahmed (1994) suggest that borrowing from banking sector is inflationary in long run. Budget deficit have significant and positive effect on inflation. 1% increase in deficit results in 6-7 % increase in general price level. Anwar and Sarfraz (2009) also supported that internal or external borrowing and printing of money to finance deficit always results in leading economy towards inflation. The paper have used time series data for Pakistan from 1976-2007. Then GDP deflator is used to measure inflation with money supply M2, total internal borrowing are consider as dependent and total external borrowing as independent variables. Vector autoregressive (VAR) model shows that variables have stable short run and long run relationship. Ammama *et al* (2011) also favour this, the study measure inflation through log of CPI, and put argument that increase in deficit Granger cause inflation. Data was taken from World development indicator (WDI 2009-10), from 1960-2010.

When economies have weak institutes, financial market, less efficient tax system, rent seeking in private and public sector all these adversely affects the working of economies. The countries then faced with problem of deficit budgeting, and countries where fiscal

dominancy is present , sooner or later the government's move towards creation of money (seignorage) to finance their persistent fiscal deficit(Sargent & Wallace, 1981).

Cukierman *et al* (1992) investigate why inflation and seigniorage rates differ so much among countries? It is generally believe that less developed economies are not able to built strong tax base system therefore they rely on seigniorage as a source of generating revenue which then effect the inflation rate of the economy. But it is observe that this problem exist even among developed countries. By using data on average inflation and seigniorage in period from 1971-1982 for 79 countries, the study found that due to inefficient tax system government rely on seigniorage and this is caused due to political instability and high polarisation. Mauro(1995) considered whether corruption effect economic growth of the economy or not? The paper used the data for corruption from Business International (BI) for 70 countries for the period 1980-1983. And has used ethnolinguistic fractionalisation as instrumental variable to control endoginity .This study's cross country analysis shows that corruption result in decreasing private investment which in turn result in decreasing economic growth.

Khan and Axel, S (2006) also analyse the factor effecting inflation in Pakistan . The paper has used standard monetary variables , money supply, credit to private sector, exchange rate and wheat support price as supply side factor. By taking the data from 1998- 2005 it concludes that monetary factors plays very dominating role in effecting inflation rate in economy. Whereas wheat support price effect this only in short term not in long term.

Huang and Shang, W (2006) also suggest that institutional quality and tax collection ability of the government are closely related. Officials can reduce tax obligations in exchange for bribe. All this result in deficit in formal collection of taxes which reduces the government revenues and ultimately government move towards seignorage to finance the deficit. Many economists found positive relationship between seignorage and inflation .As Aisen *et al* (2006,2008) found positive relationship between seigniorage and political instability. The paper used data for variables relating to politics economic and institutes for 100 countries for period 1960-1999. By applying GMM on dynamic panel data it found same positive relationship.

Haider *et al* (2011), this study focused on analysing the consequences of political instability , governance , bureaucratic corruption on inflation and growth in Pakistan. The paper built a theoretical model with micro foundation to examine important features of Pakistan's

economy. Using the data from 1950-2011 and applying Markov –Regime Switching technique with maximum likelihood they found that weak governance with high corruption results in high rate of inflation through seigniorage and low level of economic growth in economy.

Then Hussain and Mohammad (2012) particularly emphasis on the role of institutes for better economic growth and development. The efficient working of fiscal and monetary policy also depends on quality of institutes. This paper study the relationship between fiscal , monetary and institutions in Pakistan from 1976-2008. The paper investigated for the effect of political, social and economic institutes on per capita GDP of the economy. Polity 2 is used for political institutes, civil liberty for social institutes and political rights (combination of democracy & autocracy) are used for economic institutes. The data for variables are taken from Polity IV, Freedom House. Other fiscal and monetary model variables like expenditure, reserves money M2, rate of interest are taken from Hand Book of Statistics Paksitan2005 & 2010. After checking the order of integration , auto regressive distributive lag (ARDL) method and bound testing for co integration was applied .These results confirm long run and short run relationship among variables.

Chapter 3

3. Theoretical model:

This section provides the detail of the theoretical model. Real business cycle model is discrete time version of Ramsey model. It assumes large number of identical price taking firms and households. These households are rational and live for infinite life time. It also assumes that outputs are produced by using capital, labour and technology as inputs. The output produced is divided among consumption, investment and government purchases. These government purchases are financed by lump-sum taxes. It also assumes that inputs capital and labour are paid according to their marginal product.

Following Angelopoulos *et al* (2011), this study is also incorporating rent seeking activities in standard RBC model and assume that households can increase their personal wealth by extracting a part of the income from the output of the firms. It means individuals are involved in productive and unproductive activities²⁰. The household along with consumption, leisure and saving will also choose optimally how to allocate their efforts time into productive and unproductive work. It means such activities could affect the total factor productivity (TFP) level in economy.

Since individuals are involve in rent seeking activities it means there is a possible leakage in the available tax revenue which would be otherwise available to the government. As firms would not be able to get their true profit and household will be receiving less than their potential income. So the tax revenues would be fewer. This deficit in the government fiscal balances would be then financed by monetary seigniorage which will ultimately cause inflation in the economy.

To capture all these effects the paper is not only incorporate rent seeking activities in standard RBC model to see its effect on TFP level in economy, it is also using standard money in utility function²¹ to observe its effect on inflation as well. A lot of research work is done on effects of rent seeking activities in economy and determinants and causes of TFP and inflation in the economy. But very little attention has been given to consider rent

²⁰ Baumol 1990, 2004, Murphy *et al* 1991,1993, Acemoglu 1995

²¹ Walsh 2010, Haider *et al* 2011

seeking as a possible cause of effecting TFP and inflation rate in the economy. Particularly in case of Pakistan.

To see the effect of these rent seeking activities on TFP and inflation, it is assumed that θ represent the rent seeking activities by households and $0 \leq \theta < 1$. It means that firms can get only a fraction $0 < (1 - \theta) \leq 1$ of their out. As in RBC model firm produces homogeneous product using capital and labour and the capital is owned by households. Time is discrete and infinite.

3.1. Household agent:

The population size is N_t with constant growth rate $\gamma_n \geq 1$, so that $N_{t+1} = \gamma_n N_t$ where $N_0 > 0$ is given. And as discussed earlier all households agents are identical, they are represented by h , where $h=1, 2, \dots, N_t$.

The intertemporal utility function of representative household agent at time t is given as²²

$$E_t \sum_{t=0}^{\infty} \beta^i U(C^h_{t+i}, 1 - \ell^h_{t+i}, \frac{M^h_{t+i}}{P_{t+i}}) \quad (1)$$

This is expected lifetime utility function. Where β^i is the discount factor $0 < \beta^i < 1$. C^h_{t+i} represent consumption at time t and $1 - \ell^h_{t+i}$ is leisure. Whereas $\frac{M^h_{t+i}}{P_{t+i}}$ is representing the number of dollar 'M' times their price '1/P' in term of goods: $M(1/P) = M/P$ as the paper is incorporating money in utility function and assumption of rational economic agent so it is not just the number of dollar in utility function which matters, what matter is number of goods which are command by that money holding²³.

It is also assumed that utility function is separable in each of its argument, specifically it is given as²⁴

$$U_t \left\{ C^h_{t+i}, 1 - \ell^h_{t+i}, \frac{M^h_{t+i}}{P_{t+i}} \right\} = \frac{(C^h_{t+i})^{1-\theta}}{1-\theta} + \frac{(1-\ell^h_{t+i})^{1-\nu}}{1-\nu} + \frac{\varepsilon_{m,t+i}}{1-w} \left(\frac{M^h_{t+i}}{P_{t+i}} \right)^{1-w} \quad (2)$$

22 Angelopoulos *et al* 2011, Haider *et al* 2011, Walsh 2010

23 Walsh 2010

24 Angelopoulos *et al* 2011, Haider *et al* 2011, Walsh 2010

Where ϑ is intertemporal elasticity of substitution with $1/\vartheta > 0$ and $0 < \vartheta < 1$. ν is wage elasticity of labour supply, $\nu > 0$ and w is interest elasticity of money demand, $w > 0$. $\mathcal{E}_{m,t+i}$ is stochastic shock to money demand.

This utility function $U(\cdot)$ satisfy the standard conditions that it is increasing with decreasing returns in each of its argument, i.e $U'(\cdot) \geq 0$ and $U''(\cdot) \leq 0$

The representative agent maximise his lifetime function subject to a resource constraint of

$$C_t^h + \frac{M_t^h}{P_t} + I_t^h = w_t z_t \eta_t^h H_t^h + r_t K_t^h + \pi_t^h + \frac{(1-\eta_t^h)H_t^h}{\sum_{h=1}^{N_t} (1-\eta_t^h)H_t^h} \theta_t Y_t + \frac{M_{t-1}^h}{P_t} \quad (3)$$

The household divide one unit of time in each period between leisure $1 - \ell_{t+i}^h$ and work time H_t^h . where $1 - \ell_{t+i}^h = L_t^h$, So $L_t^h + H_t^h = 1$. As the rent seeking activities are considered, so the individual at work further divide his work time into productive activities and unproductive activities. It is assumed that $\eta_t^h H_t^h$ represent productive activities and $(1-\eta_t^h)H_t^h$ represent the unproductive or rent seeking activities, taking place at cost of work time. And $\eta_t^h H_t^h$ will represent effective labour input. w_t is the wage rate and Z_t is labour augmented technology. It is same for all households, it evolves at constant rate $\gamma_z \geq 1$ and $Z_{t+1} = \gamma_z Z_t$; $Z_0 > 0$ is given. Y_t is the total output produced, θ_t is representing the rent seeking activities taking place in economy, higher is the θ_t , lower would be the productivity. The term $\theta_t Y_t$ is the extraction technology²⁵.

All individuals saves in form of investment in capital I_t^h and receive a share of profit π_t^h and interest income from capital as $r_t K_t^h$. Where r_t is the gross return on inherited capital $K_t^h \cdot \frac{M_{t-1}^h}{P_t}$; is representing real money holdings of previous period.

Private holding of capital evolves according to

$$K_{t+1}^h = (1 - \delta)K_t^h + I_t^h \quad (4)$$

Here δ is the depreciation rate and $0 < \delta < 1$, and K_0 is given

Now each household has to maximise (2) subject to (3) and (4).

25 Muller, 2003

The optimisation problem is given as26

$$\begin{aligned} \mathcal{L} = \sum_{t=0}^{\infty} \beta^i & \left[\frac{(C^h_{t+i})^{1-\vartheta}}{1-\vartheta} + \frac{(1-\ell^h_{t+i})^{1-\nu}}{1-\nu} + \frac{\epsilon_{m,t+i}}{1-w} \left(\frac{M^h_{t+i}}{P_{t+i}} \right)^{1-w} + \lambda_{1t} \left[w_t z_t \eta^h_t H^h_t + r_t K^h_t + \right. \right. \\ & \left. \left. \pi^h_t + \frac{(1-\eta^h_t)H^h_t}{\sum_{h=1}^{N_t} (1-\eta^h_t)H^h_t} \theta_t Y_t + \frac{M^h_{t-1}}{P_t} - C^h_t - \frac{M^h_t}{P_t} - I^h_t \right] + \lambda_{2t} \left[(1-\delta)K^h_t + I^h_t - \right. \right. \\ & \left. \left. K^h_{t+1} \right] \right] \end{aligned} \quad (5)$$

Here ' λ ' represent the Lagrange multiplier.

The FOC's are given as

$$\frac{\partial \mathcal{L}}{\partial C^h_{t+i}} = \beta^i \frac{(1-\vartheta)(C^h_{t+i})^{1-\vartheta-1}}{(1-\vartheta)} + \beta^i \lambda_{1t} (-1) = 0$$

$$(C^h_{t+i})^{-\vartheta} = \lambda_{1t} \quad (6)$$

$$\frac{\partial \mathcal{L}}{\partial (1-\ell^h_{t+i})} = \beta^i \frac{(1-\nu)(1-\ell^h_{t+i})^{1-\nu-1}}{(1-\nu)} = 0$$

$$(1-\ell^h_{t+i})^{-\nu} = 0 \quad (7)$$

$$\frac{\partial \mathcal{L}}{\partial M^h_{t+i}} = \beta^i \frac{\epsilon_{m,t+i}}{(1-w)} (1-w) \left(\frac{M^h_{t+i}}{P_{t+i}} \right)^{1-w-1} \cdot \frac{1}{P_t} + \beta^i \lambda_{1,t+1} \cdot \frac{1}{P_{t+1}} - \beta^i \lambda_{1t} \cdot \frac{1}{P_t} = 0$$

$$\epsilon_{m,t+i} \left(\frac{M^h_{t+i}}{P_{t+i}} \right)^{-w} \frac{1}{P_t} = \lambda_{1t} \cdot \frac{1}{P_t} - \lambda_{1,t+1} \cdot \frac{1}{P_{t+1}}$$

$$(1 + \pi_{t+1}) \epsilon_{m,t+i} \left(\frac{M^h_{t+i}}{P_{t+i}} \right)^{-w} - (1 + \pi_{t+1}) \lambda_{1t} = \lambda_{1,t+1} \quad (8)$$

$$\frac{\partial \mathcal{L}}{\partial H^h_t} = \lambda_{1t} \left[w_t z_t \eta^h_t + \frac{(1-\eta^h_t)}{\sum_{h=1}^{N_t} (1-\eta^h_t)H^h_t} \theta_t Y_t \right] = 0 \quad (9)$$

26 Angelopoulos *et al* 2011, Haider *et al* 2011

$$\frac{\partial \mathcal{L}}{\partial \eta^h_t} = \lambda_{1t} [w_t z_t H^h_t] = 0 \quad (10)$$

$$\frac{\partial \mathcal{L}}{\partial (1-\eta^h_t)} = \lambda_{1t} \left[\frac{H^h_t}{\sum_{h=1}^{N_t} (1-\eta^h_t) H^h_t} \theta_t Y_t \right] = 0 \quad (11)$$

$$\frac{\partial \mathcal{L}}{\partial K^h_{t+1}} = \beta^i [\lambda_{2t+1} (1-\delta) - \lambda_{2t}] = 0 \quad (12)$$

$$\frac{\partial \mathcal{L}}{\partial l^h_t} = \beta^i \lambda_{2t} = 0 \quad (13)$$

Each household act competitively by taking economy wise variables as given. They chooses to maximise (2) subject to (3) and (4) the first order condition also include the following constraints as well

$$\frac{\partial \mathcal{L}}{\partial (1-\ell^h_{t+i})} = \frac{\partial \mathcal{L}}{\partial H^h_t} = \left(C^h_{t+i} \right)^{-\vartheta} \left[w_t z_t \eta^h_t + \frac{(1-\eta^h_t)}{\sum_{h=1}^{N_t} (1-\eta^h_t) H^h_t} \theta_t Y_t \right] \quad (14)$$

This equation (14) is optimality condition with respect to effort time H^h_t , it equates marginal value of leisure with marginal value of return to effort.

Now from equation (10) and (11) we get

$$\lambda_{1t} = \frac{1}{w_t z_t H^h_t} \text{ and } \lambda_{1t} = \frac{\sum_{h=1}^{N_t} (1-\eta^h_t) H^h_t}{H^h_t} \theta_t Y_t$$

So

$$\frac{1}{w_t z_t H^h_t} = \frac{\sum_{h=1}^{N_t} (1-\eta^h_t) H^h_t}{H^h_t} \theta_t Y_t$$

$$w_t z_t H^h_t = \frac{H^h_t}{\sum_{h=1}^{N_t} (1-\eta^h_t) H^h_t} \theta_t Y_t \quad (15)$$

Equation (15) is optimality condition for productive and unproductive work²⁷. It means in equilibrium returns to productive and unproductive work is equal.

²⁷ Angelopoulos *et al* 2011

$$\frac{\partial U_t(\cdot)}{\partial C^h_t} = \beta^i E \left[\frac{\partial U_{t+1}(\cdot)}{\partial C^h_{t+1}} (1 + r_{t+1} - \delta) \right] \quad (16)$$

equation (16) is Euler equation for K_{t+1} , and the transversality condition for capital is

$$\lim_{t \rightarrow \infty} \beta^i E_0 \frac{\partial U_t(\cdot)}{\partial C^h_t} K^h_{t+1} = 0.$$

3.2. Firms:

It is assumed that there are as many identical firms as households. The firms are represented by 'f' and $f=1,2,\dots,N_t$. Each firm produces homogeneous product Y^f_t by using private capital K^f_t and private effective labour Q^f_t . Each firm could get only a fraction of total output which is $0 < (1 - \theta_t) \leq 1$ as rest of the output $\theta_t Y^f_t$ is taken away by the household in form of rent seeking activities.

The production function is Cobb Douglas, the output in period 't' is

$$Y^f_t = A_t (K^f_t)^\alpha (Q^f_t)^{1-\alpha} \quad (17)$$

A_t is stochastic total product. α is the parameter $0 < \alpha < 1$.

Profit maximising problem is given as

$$\Pi^f_t = (1 - \tau_t)(1 - \theta_t)Y^f_t - r_t K^f_t - w_t Q^f_t \quad (18)$$

Where $0 < (1 - \theta_t) \leq 1$ are rent seeking activities. As in RBC model total output is divided among C, I and G (govt expenditure). The government expenditure are financed by lump-sum taxes, and these taxes are paid by individuals in the economy.

The FOC's are

$$\frac{\partial \Pi^f_t}{\partial K^f_t} = A_t \cdot \alpha \cdot (K^f_t)^{\alpha-1} (Q^f_t)^{1-\alpha} - r_t$$

$$\frac{\alpha(Y^f_t)}{K^f_t} = r_t$$

$$\frac{\alpha(1-\tau_t)(1-\theta_t)Y^f_t}{K^f_t} = r_t \quad (19)$$

Similarly will have

$$\frac{(1-\alpha)(1-\tau_t)(1-\theta_t)Y_t^f}{Q_t^f} = W_t \quad (20)$$

Labour and capital are paid according to their marginal product. Firms are assumed to have only normal profit $\Pi_t^f = 0$.

Now the equation (19), (20) shows that households are paid according to their marginal product. But as rent seeking activities are taking place in economy and portion of output θ_t is extracted by rent seekers in economy and firms are getting only $(1 - \theta_t)$ level of output, so the households are not able to get all the returns to their investment and labour efforts because of these activities.

3.3. Government:

In this model economy's output is divided between C, I, G. The government expenditure are financed by the lump-sum taxes. Due to rent seeking activities firms are able to get only a fraction of output that is $0 < (1 - \theta_t) \leq 1$. So there is possible leakage of the available taxes. It means government would not be able to get as many revenues as it would be possible otherwise. Households are also not receiving all the returns to their efforts.

All these types of activities will cause deficit in government fiscal balances. This deficit is then financed by monetary seigniorage $(M_t - M_{t-1})$ which will cause inflationary pressure in economy. So in this case the government budget constraint will take the form²⁸.

$$\frac{\bar{m}}{1+\bar{m}} \left[\frac{M_t}{P_t} \right] = G_t - (1 - \theta_t)(\tau_t) \quad (1 - \theta_t)(\tau_t) > 0 \quad (21)$$

Where this \bar{m} is representing the rate of growth of monetary base define as²⁹

$$\bar{m} = \frac{M_t - M_{t-1}}{M_{t-1}}.$$

In equation (21), ' θ_t ' is representing rent seeking activities. G_t is representing government expenditure. For the time being if we assume that $\theta_t = 0$, then there will be no leakages in

²⁸ Haider *et al* 2011

²⁹ Haider *et al* 2011

tax revenues and government will not depend on seigniorage to meet its expense. But with positive ‘ θ_t ’ government will move towards seigniorage.

It means that rent seeking activities not only result in effecting total factor productivity in the economy but will also effect inflation rate in the economy.

3.4. Exogenous stochastic process A_t , G_t and θ_t :

The exogenous stochastic variables are aggregate productivity A_t , government spending shock G_t and rent seeking activities θ_t . It is assumed that A_t , G_t and θ_t follow univariate stochastic AR(1) process of the form

$$\ln G_{t+1} = (1 - \rho_G) \ln G_0 + \rho_G \ln G_t + \varepsilon_{t+1}^G \quad (22)$$

$$\ln A_{t+1} = (1 - \rho_A) \ln A_0 + \rho_A \ln A_t + \varepsilon_{t+1}^A \quad (23)$$

$$\ln \theta_{t+1} = (1 - \rho_\theta) \ln \theta_0 + \rho_\theta \ln \theta_t + \varepsilon_{t+1}^\theta \quad (24)$$

Here A_0 , G_0 and θ_0 are stochastic process. ρ_A , ρ_G and ρ_θ are first order autocorrelation coefficient and ε_t^A , ε_t^G and ε_t^θ are i.i.d.

3.5. Decentralise Competitive Equilibrium (DCE):

In decentralised competitive equilibrium

- (i) Each individual household and firm maximise its utility and profit by taking market price as given.
- (ii) Market clears via flexible *price*^(*)

Then solve for symmetric DCE, so the equilibrium quantities will be express without superscripts ‘h’ or ‘f’.

The DCE is given from equation (1) to (24). All the components of national income identity are growing at the same rate (balanced growth rate). And to make all the components

*.In each time period $\sum_{f=1}^{N_t} K^f_t = \sum_{h=1}^{N_t} K^h_t$ in capital market, $\sum_{f=1}^{N_t} Q^f_t = Z_t \sum_{h=1}^{N_t} \eta^h_t H^h_t$ in labour market

stationary all the components of national income identity are expressed in per capita and efficient unit term. The economy grows because of labour augmented technology and population growth.

Equation (1) to (24) entail the following stationary DCE

$$y_t = c_t + i_t + g_t \quad (25)$$

$$y_t = A_t k_t^\alpha (\eta_t h_t)^{(1-\alpha)} \quad (26)$$

$$\gamma_n \gamma_z k_{t+1} = (1 - \delta)k_t + i_t \quad (27)$$

$$\frac{\partial u(\cdot)}{\partial c_t} = \beta E_t \left[\frac{\partial u_{t+1}(\cdot)}{\partial c_{t+1}} \left(\frac{\alpha(1-\theta_{t+1})(1+\tau_{t+1})y_t}{k_{t+1}} + 1 - \delta \right) \right] \quad (28)$$

From eq (15) we have

$$w_t z_t H_t = \frac{H_t}{\sum_{h=1}^{N_t} (1 - \eta_t) H_t} \theta_t Y_t$$

$$\frac{(1 - \alpha)(1 - \tau_t)(1 - \theta_t)Y_t}{Q_t} \cdot z_t H_t = \frac{H_t}{\sum_{h=1}^{N_t} (1 - \eta_t) H_t} \theta_t Y_t$$

$$\frac{(1 - \alpha)(1 - \tau_t)(1 - \theta_t)Y_t}{\eta_t H_t} \cdot z_t H_t = \frac{H_t}{\sum_{h=1}^{N_t} (1 - \eta_t) H_t} \theta_t Y_t$$

$$\frac{(1 - \alpha)(1 - \tau_t)(1 - \theta_t)}{\eta_t} = \frac{\theta_t}{(1 - \eta_t)}$$

$$(1 - \alpha)(1 - \tau_t)(1 - \theta_t)(1 - \eta_t) = \theta_t \eta_t$$

$$\eta_t = \frac{(1 - \alpha)(1 - \tau_t)(1 - \theta_t)}{[\theta_t + (1 - \alpha)(1 - \tau_t)(1 - \theta_t)]} \quad (29)$$

From this expression it could be seen that when rent seeking increases it results in decreasing TFP ,and decrease in rent seeking has positive effect on TFP. Whereas taxes negatively effect the TFP level.

From equation (14)

$$\begin{aligned} \frac{\partial \mathcal{L}}{\partial(1-\ell_{t+i})} &= \frac{\partial \mathcal{L}}{\partial H_t} = (C_{t+i})^{-\vartheta} \left[w_t z_t \eta_t + \frac{(1-\eta_t)}{\sum_{h=1}^{N_t} (1-\eta_t) H_t} \theta_t Y_t \right] \\ \frac{\partial \mathcal{L}}{\partial L_t} &= \frac{\partial \mathcal{L}}{\partial H_t} = (C_{t+i})^{-\vartheta} \left[w_t z_t \eta_t + \frac{(1-\eta_t)}{\sum_{h=1}^{N_t} (1-\eta_t) H_t} \theta_t Y_t \right] \\ (L_t)^{-\nu} &= (C_{t+i})^{-\vartheta} \left[\frac{(1-\alpha)(1-\tau_t)(1-\theta_t)Y_t}{Q_t} \cdot z_t \eta_t + \frac{(1-\eta_t)}{\sum_{h=1}^{N_t} (1-\eta_t) H_t} \theta_t Y_t \right] \\ \frac{(C_{t+i})^{\vartheta}}{(1-H_t)^{\nu}} &= \left[\frac{(1-\alpha)(1-\tau_t)(1-\theta_t)y_t}{h_t} + \frac{(1-\eta_t)}{(1-\eta_t)h_t} \theta_t y_t \right] \\ \frac{(c_{t+i})^{\vartheta}}{(1-h_t)^{\nu}} &= \left[\frac{(1-\alpha)(1-\tau_t)(1-\theta_t)y_t + \theta_t y_t}{h_t} \right] \\ \frac{(c_{t+i})^{\vartheta}}{(1-h_t)^{\nu}} &= \left[\frac{((1-\alpha)(1-\tau_t)(1-\theta_t) + \theta_t)y_t}{h_t} \right] \end{aligned} \tag{30}$$

This Equation (30) would be utilize to calibrate the value of ‘ θ_t , after considering the values of other parameters .This θ_t represent the rent seeking activities which are taking place in economy.

Chapter 4

4. Econometric Setup:

In this section, the empirical setup with description and construction of variables (when required), data sources and econometric techniques used for estimation will be discussed.

4.1. Data, Variable description and Construction:

In this study the annual time series data for Pakistan from 1983-2010 is used. The sources used for data are International Financial Statistics (IFS), International Country Risk Guide (ICRG) and Hand Book of Statistics for Pakistan's Economy 2010. The study analyse the effect of rent seeking activities on total factor productivity and inflation in economy, for these qualitative institutional measures, data are taken from ICRG which is compiled by the experts of Political Risk Services (PSR) group. This data is available from 1983 due to this constraint , time span for data is restricted from 1983-2010. Rent seeking index is formulated by using six variables corruption, law & order, bureaucratic quality, government stability, democratic accountability and military in politics. Description of variables with sources is given in Table 1 in appendix.

4.1.1. Rent Seeking Index:

Measurement of rent seeking always remains a problem. Different proxies are used to measure the effect of rent seeking activities in economy. Mostly the data is taken from ICRG data set, compiled by Political risk services(PSR) group. ICRG data set is consisting of 12 categories, out of which six are used to capture the effect of these rent seeking activities in economy. An index is formulated by using Principle Component Analysis (PCA) method. The values are normalise between 0-1. These proxies are used by different economists and are chosen by considering Pakistan's environment particularly. It includes corruption, law and order, bureaucratic quality, government stability, democratic accountability and military in politics (0-40 points scale). The higher values of shows betterment in controlling rent seeking activities. Improvement in institutional quality.

4.1.1.1. Corruption (max 6 points):

When the rent seeking activities are considered, corruption plays the major role in such activities, whether they are related with export licenses, import licenses, quotas or with working of public and private sector. In political systems, lobbying, pressure groups and misuse of power are common practises. Rent seeking activities in form of import restrictions, government subsidies, price control measures etc all are potential cause of corruption .Individuals bribe government official to get special favour. Corruption result in effecting prices, investment, inflation, tax revenues and allocation of talent. Tax evasions, improper use of power, discretionary tax exemptions all results in budget deficits and hamper the rate of growth and development.

4.1.1.2. Law & Order (max 6 points):

Law is formal institutional legislation, formulated for the masses. Order is execution of law by the government. Economic progress depends on quality of political, legal and economic institutes. Secure property rights and well-functioning legal system guarantee prosperity.

4.1.1.3. Bureaucracy Quality (max 4 points):

Bureaucratic quality represents the quality of the system to expertise and strengthens the policies without drastic changes with government changes. Higher scores of bureaucratic quality represent autonomous bureaucracy free from political pressures. Good governance is closely related with better quality bureaucratic services.

4.1.1.4. Government Stability (max 12 points):

It refer to government's ability to stay in office till the completion of legal tenure. Efficiently execute the declared programme. Consistency in policies is very important for smooth functioning of the economy.

4.1.1.5. Democratic accountability (max 6 points):

It is the measure, that how responsive is the government to its people. Good governance, rule of law, efficient working of departments and implementation of policies all will strengthen with democratic accountability.

4.1.1.6. Military in Politics(max 6 points):

Military intervention in politics badly effects the smooth functioning of the government.

4.1.2. Total Factor Productivity:

Total factor productivity growth is taken as dependent variable, and will examine the effect of rent seeking activities on TFP growth of the economy. If condition in country improves to control these unproductive activities , the growth of TFP will increases.

The data for total factor productivity is not available, it is computed by different economists. The data used in this paper is computed by Safdar ullah khan(2006)³⁰

Two approaches are used for the computation of total factor productivity (TFP).

(a).The Growth Accounting Approach:

The basic framework for this approach is provided by Solow (1957).In this approach TFP is computed as residual. The share of some specific factor (input) to total output growth is subtracted from the total output growth. The difference between the two is known as “Solow Residual”.

(b). The Index Number Approach:

In this method TFP is the ratio of an index of output growth and index of input growth.³¹

4.1.3. Inflation:

The data on inflation is taken as log difference of consumer price index (CPI) from Hand book of statistics for Pakistan’s economy 2010.Inflation is computes as

$$\text{Inflation} = \pi_t = \log(CPI_t) - \log(CPI_{t-1}) \quad (4.1)$$

Where ‘t’ is current period and‘t-1’ shows the previous period. Role of inflation is controversial. Here it is used to show stability of the economy.

30 Khan 2006

31 Sabir and Qazi 2003

4.1.4. Tax:

Total tax revenue data is taken from Hand book of statistics for Pakistan's economy 2010, and is used as percentage of nominal GDP. Tax revenues affect the amount of total revenues generated by the government which are further used for developmental and consumption expenditures. Pakistan is continuously faced with the problem of low tax to GDP ratio, it is on average remain between 10- 11 %. And when rent seeking activities are taking place in economy the revenue collection is less than potential. It necessitates sharp decline in public developmental expenditures, which in turn effect productivity and growth momentum of the economy. Because of these deficits government relay on banking sector or move towards seigniorage to finance its deficit.

4.1.5. Fiscal Balances:

Fiscal balances shows the size of the economy and collectively it gives a composite picture of revenues (taxes) and expenditure (developmental & non developmental). Again budget deficits result in effecting productivity and efficiency level in the economy. When deficit increases growth decreases and inflation increases.

4.1.6. Interest Rate:

Common measures used for interest rate are Discount rate, call money rate, treasury bills (T.B) rate, yields on government bonds. In Pakistan discount rate does not show any variability before 1992, as they were not use as a tool for monetary policy before 1992. Other proxy used for interest rate was T.Bills rate, the data on T.Bills is not available as they were not auctioned before 1992. So call money rate is used as proxy for interest rate. Call money rate ,T.Bills and discount rate shows strong correlation .The Table 2 in appendix summarise the correlation between them. The data is taken from IFS.

4.1.7. Net Budgetary Borrowings:

These net budgetary borrowings are taken for period from 1983 to 2010. When government is faced with the problem of deficit budget, it rely on internal and external resources to finance that deficit. They are included to analyse its effect on inflation rate of the economy because directly or indirectly they results in increasing inflation in economy.

All above mentioned selected indicators are used as proxy for rent seeking activities. Corruption is most widely used component of institutional quality and governance. These two factors are behind rent seeking activities. Corruption have negative effect on CPI inflation and is positively related with GDP growth and productivity. There are number of reasons to include corruption in rent seeking index. It leads towards misallocation of talent and skills between productive and unproductive activities. It create obstacle to business, innovation and technology transfer. It also results in increasing illegal income, which results in increasing deadweight loss of resources, which is particularly related with rent seeking cost. It could have negative effect on revenues and expenditure of government. It could result in reducing total tax revenue from almost all types of taxable resources. Which definitely will results in pushing government towards seigniorage.

When we consider the law & order condition of the economy. It is strongly correlated with bureaucratic quality and government stability. They all have positive and strong effect on GDP growth and productivity. When government complete its legal tenure and execute the policies efficiently, achieve the targets at time, it reduces uncertainty related to future policies. It strengthens the institute's .Better institutional quality improves the working of government officials. It encourages investment, production, foreign investment and all these results in increasing employment opportunities. Fiscal and monetary authorities could play their role more effectively by formulating policies for long period of time. Better bureaucratic environment ensure conducive environment for everyone to participate. Improvement of institutes and law and order condition create suitable environment for business and investment. It could even result in eradicating tax evasion and corruption from economy.

When democratic accountability is considered, it checks the response of the government to people. Strong accountability restricts the politicians and pressure groups from formulating policies for their own interest. Democracy has positive and direct effect on growth. Normally democracy and autocracy are collectively used to measure the institutional quality and rent seeking. For Pakistan military in politics is used instead of autocracy, as it is one of the major reasons for government instability. It affects the smooth working of policies and uncertainties about future have negative effect on economy. Ultimately TFP and inflation is affected by this instability.

4.2. Principle Component Analysis (PCA):

All the six variables which are taken from ICRG , are highly correlated. In order to avoid the problem of multicollinearity , all they are combined in an index. The rent seeking index is generated by principle component analysis (PCA) , a variable deducting method³². This is the most commonly used technique for aggregate social indicators. In this method set of many correlated variables are transformed into a smaller number of representative uncorrelated variable (called principle component).These principle components (PC's) are linear combination of original values. In this method only a few initial PC's retain most of the information relating to variables in dataset. Normally only those PC's are retain which explain more than 60% of variation, as rule of thumb³³.Or retain the PC's whose eigen values are greater than one. Table3 in appendix give detail about PC's.

First the normalisation of data is done .The values are normalise between 0-1.Each PC is a linear combination of the variables, from Table3(appendix) it could be seen that only PC1 and PC2 explain more than 60% of variation in data.

But by looking at eigen values PC 3 could be consider. PC is a linear combination, it is given as

$$X_j = \sum_{i=1}^n a_{ij} P_i \quad (j=1,2,3,\dots,n) \quad (4.2)$$

Where X_j the variable under consideration is, P_i is the i th principle component, a_{ij} is the factor load of the j th variable on the i th principle component. The principle component is given as

$$P_i = \sum_{j=0}^n \frac{a_{ij} X_j}{\lambda_i} \quad (4.3)$$

Where λ_i is the eigen value associated with the principle component P_i . After obtaining the principle component , the rent seeking index is obtain as

$$RSI = \frac{\sum_{i=1}^n (P_i E_i)}{\sum_{i=1}^n E_i} \quad (4.4)$$

Where E_i is the eigen value, RS is the rent seeking index used to measure rent seeking. The eigen values ≥ 1 , are retained. and are accounting for more than 60% of variation.

³²Bishoi *et al* 2009

³³Bishoi *et al* 2009

4.3 . Econometric Methodology:

4.3.1. Test of Stationarity:

Generally it is believed that time series data are non-stationary and contain unit root. If this problem is not taken into consideration , the results would be spurious. So in order to check the stationarity of the data or existence of unit root a number of tests are developed as, Dickey Fuller, DF (1979), Augmented Dickey Fuller , ADF(1981), Phillip Perron ,PP(1988) and Kwiatkowski, Phillips, Schmidt and Shin ,KPSS(1992). ADF test is used for unit root, while relies on rejection of null hypothesis of unit root , against alternative hypothesis of stationarity . In general form , the ADF test is given by expression.

$$\Delta y_t = \alpha_0 + \alpha_1 y_{t-1} + \sum_{i=1}^n \alpha_{1+i} \Delta y_{t-1} + \delta_t + \mu_t \quad (4.5)$$

Where y_t is time series, t is the time trend, Δ represent the first difference, α_0 is a constant, and n is maximum number of lags. μ is the error term.

4.3.2. Co integration:

Autoregressive distributive lag (ARDL) method is used for co integration. Cointegration means that there is long run equilibrium association among the variables. The reason for using ARDL method of cointegration is that, it could be used even if the regressors are I(0) or I(1) or even mutually co integrated³⁴.The variables used in this model are integrated of different order . Some variables are stationary and some are stationary at first difference. When the variables are integrated of different order then traditional methods of cointegration like Engle Granger (1987), Johenson (1991, 1995) are not applicable. These techniques are based on assumption that order of integration must be same. As the sample size is also very small for which the ARDL approach is most appropriate as in traditional techniques , explanatory power depends on sample size. Then ARDL approach can take plenty of lags, which is very helpful in data generating process in a general to specific form of modelling framework ³⁵.It inherently takes into account the problem of endogeneity and autocorrelation. And lastly the error correction model (ECM) integrated short run dynamics

³⁴Persaran and Persaran 1997

³⁵Laurehceson and chai 2003

with long run equilibrium without losing any information. This dynamic equilibrium could be obtain from ARDL through linear transformation³⁶.

4.3.3. ARDL Method:

For Total Factor Productivity (TFP) the ARDL equation in general form is

$$\begin{aligned} \Delta TFP_t = & \alpha_0 + \alpha_1 T + \beta_1 TFP_{t-1} + \beta_2 RS_{t-1} + \beta_3 TAX_{t-1} + \beta_4 FB_{t-1} + \beta_5 Inf_{t-1} + \sum_{i=1}^p \eta_i \Delta TFP_{t-1} \\ & + \sum_{i=1}^p \vartheta_i \Delta RS_{t-1} + \sum_{i=1}^p \rho_i \Delta TAX_{t-1} + \sum_{i=1}^p \varphi_i \Delta FB_{t-1} + \sum_{i=1}^p \psi_i \Delta Inf_{t-1} + \varepsilon_t \end{aligned} \quad (4.6)$$

And for Inflation the equation in general form is

$$\begin{aligned} \Delta Inf_t = & \gamma_0 + \delta_1 Inf_{t-1} + \delta_2 RS_{t-1} + \delta_3 FB_{t-1} + \delta_4 i_{t-1} + \delta_5 B_{t-1} + \sum_{i=1}^p \nu_i \Delta Inf_{t-1} + \\ & i=1 p \xi_i \Delta RS_{t-1} + i=1 p \sigma_i \Delta FB_{t-1} + i=1 p \phi_i \Delta i_{t-1} + i=1 p \omega_i \Delta B_{t-1} + \mu t \end{aligned} \quad (4.7)$$

Where α_0 and γ_0 are intercepts, T is trend, t is time period, TFP is total factor productivity, RS is rent seeking index, Tax is total tax revenues as percentage of GDP, FB is fiscal balances as percentage of GDP, Inf is inflation computed as log difference of CPI, i is the interest rate for which call money rate is consider as proxy, B is net budgetary borrowings as percentage of GDP. $\beta, \eta, \vartheta, \rho, \varphi, \psi, \delta, \nu, \xi, \sigma, \phi, \omega$ are parameters. ε, μ are error terms.

In these equations the variables at level presents long term relationship and variables at difference show the short run dynamics. The maximum lags are selected at three years, whereas the final selection of the model will be made on the basis of Schwarz Bayesian Criteria (SBC), as it is better than Akaik Information Criteria (AIC) ³⁷. After selecting the model the existence of co integration is confirmed by using “Bound test” proposed by Pesaran *et al* (2001).

4.3.4. Co integration Test:

Bound test is used for determining the long run cointegration .Bound test provides two sets of asymptotic critical values providing two extremes, the lower bound on the basis that variables are I(0), upper bound on the basis that variables are I(1). If calculated Wald or F-statistic lies above upper bound , it means the result is conclusive , long run relationship

³⁶Banerjee *et al* 1993

³⁷Pesaran *et al* 2001

exists between variables. If it lies within the bounds , then inconclusive result and if lies below lower bound , no long run relationship exist. The bound test for equation 4.6 and 4.7 is written as follow

$$H_0 = \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0 \quad (4.8)$$

$$H_0 = \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = 0 \quad (4.9)$$

Two sets of critical F – values , are suggested by Pesaran *et al* (2001) representing lower and upper bound.

4.3.5. Long run relationship:

Now from equation 4.6 and 4.7 the long run coefficient can be extracted by normalising the coefficient of the variables with respect to coefficient of dependent variable. It could be done as

$$\beta_1 TFP_{t-1} + \beta_2 RS_{t-1} + \beta_3 TAX_{t-1} + \beta_4 FB_{t-1} + \beta_5 Inf_{t-1} = 0 \quad (4.10)$$

$$\beta_1 TFP_{t-1} = -\beta_2 RS_{t-1} - \beta_3 TAX_{t-1} - \beta_4 FB_{t-1} - \beta_5 Inf_{t-1}$$

$$TFP_{t-1} = -\frac{\beta_2}{\beta_1} RS_{t-1} - \frac{\beta_3}{\beta_1} TAX_{t-1} - \frac{\beta_4}{\beta_1} FB_{t-1} - \frac{\beta_5}{\beta_1} Inf_{t-1}$$

$$TFP_{t-1} = \theta_1 RS_{t-1} + \theta_2 TAX_{t-1} + \theta_3 FB_{t-1} + \theta_4 Inf_{t-1}$$

Where

$$\theta_1 = -\frac{\beta_2}{\beta_1}, \theta_2 = -\frac{\beta_3}{\beta_1}, \theta_3 = -\frac{\beta_4}{\beta_1}, \theta_4 = -\frac{\beta_5}{\beta_1} \quad \text{are long run coefficients for equation 4.6.}$$

$$\delta_1 Inf_{t-1} + \delta_2 RS_{t-1} + \delta_3 FB_{t-1} + \delta_4 i_{t-1} + \delta_5 B_{t-1} = 0 \quad (4.11)$$

$$\delta_1 Inf_{t-1} = -\delta_2 RS_{t-1} - \delta_3 FB_{t-1} - \delta_4 i_{t-1} - \delta_5 B_{t-1}$$

$$Inf_{t-1} = -\frac{\delta_2}{\delta_1} RS_{t-1} - \frac{\delta_3}{\delta_1} FB_{t-1} - \frac{\delta_4}{\delta_1} i_{t-1} - \frac{\delta_5}{\delta_1} B_{t-1}$$

$$Inf_{t-1} = \lambda_1 RS_{t-1} + \lambda_2 FB_{t-1} + \lambda_3 i_{t-1} + \lambda_4 B_{t-1}$$

Where

$$\lambda_1 = -\frac{\delta_2}{\delta_1}, \lambda_2 = -\frac{\delta_3}{\delta_1}, \lambda_3 = -\frac{\delta_4}{\delta_1}, \lambda_4 = -\frac{\delta_5}{\delta_1} \quad \text{are long run coefficient.}$$

4.3.6. Error correction and Dynamic Short run Relationship:

The dynamic short run relationship of equations 4.6 and 4.7 could be obtained by replacing the long run equation 4.10 and 4.11 by error correction term. Specifically it could be written as

$$\begin{aligned} \Delta TFP_t = & \alpha_0 + \alpha_1 T + \varrho ECM_{t-1} + \sum_{i=1}^p \eta_i \Delta TFP_{t-1} + \sum_{i=1}^p \vartheta_i \Delta RS_{t-1} + \sum_{i=1}^p \rho_i \Delta TAX_{t-1} \\ & + \sum_{i=1}^p \varphi_i \Delta FB_{t-1} + \sum_{i=1}^p \psi_i \Delta Inf_{t-1} + \varepsilon_t \end{aligned} \quad (4.12)$$

$$\begin{aligned} \Delta Inf_t = & \gamma_0 + \varsigma ECM_{t-1} + \sum_{i=1}^p \nu_i \Delta Inf_{t-1} + \sum_{i=1}^p \xi_i \Delta RS_{t-1} + \sum_{i=1}^p \sigma_i \Delta FB_{t-1} + \\ & \sum_{i=1}^p \phi_i \Delta i_{t-1} + \sum_{i=1}^p \omega_i \Delta B_{t-1} + \mu_t \end{aligned} \quad (4.13)$$

The coefficients on ECM represent the speed of adjustment.

Chapter 5

5.1. Summary Statistics:

Table 4 and 7 describes the summary statistic, of the variables. It includes mean, median, standard deviation, maximum and minimum. Table 5 and 6 explain the correlation and covariance matrix for the variables used in total factor productivity equation .It could be seen that rent seeking index is positively related with total factor productivity growth, improvement in conditions to control rent seeking activities will result in increasing TFP. Along with this fiscal balances are positively correlated whereas tax and inflation are negatively correlated. The covariance matrix also exhibit same relationship as observed in correlation matrix. Table 8 and 9 presents correlation and covariance matrix for the variables used in inflation equation. It presents rent seeking and fiscal balances are negatively correlated while interest rate and net budgetary borrowings are positively correlated with inflation. When efforts are made to control rent seeking activities in economy, it will result in reducing inflation .The covariance matrix also exhibit same relationship.

5.2. Unit Root Test:

In order to check the stationarity of the time series data ADF test has been applied. The results in Table 10 (in appendix) demonstrate that , total factor productivity and inflation are stationary at level, probability less than .05, which provide evidence that null hypothesis could be rejected and the variable have unit root. Fiscal balance is also stationary at level but with intercept and trend. Whereas rest of the variables rent seeking, tax, interest rate (call money rate), net budgetary borrowings are non-stationary at level, they are co integrated of order one I(1).

5.3. Estimated Results:

5.3.1. Total Factor Productivity and rent seeking:

First the empirical findings of regression relating to total factor productivity are discussed.

Table 11 represent the auto regressive distributive lag (ARDL) estimates. The main variable rent seeking appears with positive sign and is significant. As the index is built by including

six variables and higher values show that whenever these activities are controlled, they will positively affect the total factor productivity in economy, the results support the theory. Taxes appear to be insignificant in explaining the variation in TFP. Fiscal balances and inflation are significant with negative sign. When fiscal condition improves and inflation decreases it will have positive effect on TFP.

5.3.1.1. Co integration Test:

To test the existence of long run relationship between variables, Bound test is used, Table 12 summarises the results. The results indicate that computed F-stats lies outside the inconclusive range and is also greater than upper bound which indicate that co integrating relationship exists between variables.

5.3.1.2. Long run relationship:

Table 13 presents the long run relationship between the variables. In long run rent seeking is positive and significant, taxes are insignificant in explaining variation, fiscal balances appear with negative sign and significant according to expectation and inflation also negatively affect the total factor productivity.

5.3.1.3. Short run Dynamic Relationship:

Table 14 explain the short run dynamic relationship between dependent and independent variables. The results indicate that in short run mix results are observed about variables. In current period rent seeking activities are positively related with TFP with positive sign as was in ARDL estimation and in long run relationship. But first and second lags are negatively related. Tax in current period again is insignificant but first lag is significant with positive sign. Fiscal balances are significant with negative sign and first and second lag are significant with positive sign. Inflation also shows the same relationship. High value of R-square indicates that model has high explanatory power. ECM₃₈ coefficient also lies between the range 0-1 and is negative and is significant. ECM shows the speed of adjustment, to the long run equilibrium after short run shock, and its 54%.

5.3.1.4. Discussion:

As the order of integration is different, some variables are stationary $I(0)$, and some are stationary at first difference $I(1)$. So the ARDL technique is used for estimation. In which total factor productivity TFP is taken as dependent variable, rent seeking, tax, fiscal balances, inflation are taken as independent variables. Out of which the rent seeking is main variable of concern. The paper is evaluating the effect of rent seeking on TFP.

First of all the rent seeking variable is observed, the coefficient of rent seeking variable (RS) have desire positive sign in long run and is significant as well in explaining the variation in TFP. Whenever the improvement takes place in economy regarding institute and governance, which are captured through formulating the index of variables corruption, law & order, government stability, bureaucratic accountability, democracy and military in politics, it will always result increasing the productivity and growth in economy. Improvement in controlling these activities will result in decreasing corruption, high quality of bureaucracy, democracy with government stability and low military intervention in politics will results in sound law & order condition. They will result in creating favourable environment for investment, production, will encourage entrepreneurship, with innovation and improved technology and total factor productivity will increases. In short run these rent seeking activities are significant but have mixed results. As one period lag has positive sign whereas two and three period lags are showing negative sign. It means the quality of controlling these activities in current period and previous period strongly affect the TFP level of the economy.

Along with this when the effect of fiscal balances on TFP is observed, its significant with negative sign in long run (in accordance with Khan 2006)³⁹. When fiscal deficit increases, then government's total expenditure specially developmental expenditure are strongly affected by this which could hamper growth in TFP.

It could be seen from the result that even inflation is significant with negative sign, which again support that when inflation increases it reduces the TFP of the economy. Because this money illusion reduces the labour hour worked, it even affect the investment. Low and stable inflation provide favourable environment for TFP. In short period of time mixed results.

³⁹ Khan 2006

When taxes are considered, the long run and short run dynamic analysis both show that tax revenues did not explain variations in TFP. It's insignificant.

5.3.2. Inflation and rent seeking:

Now the empirical findings of inflation equation is discussed, with inflation as dependent variable and rent seeking, fiscal balances, interest rate and net budgetary borrowing as independent variables. Table 15 explain the findings, rent seeking, fiscal balances and net budgetary borrowing have positive sign and are significant. When rent seeking activities are controlled, fiscal balance position improves and budgetary borrowings decreases which results in reducing inflation in economy. While coefficient of interest rate appears with negatives sign and is significant in explaining variation in inflation.

5.3.2.1. Co integration:

To examine the long run cointegration between variables bound test is used. Table 16 summarise the result. The result indicates that computed F-statistic is greater than upper bound and outside the inconclusive result range. So confirms that cointegrating relationship exist between variables.

5.3.2.2. Long run relationship:

Table 17 explains the long run relationship between variables. In long run rent seeking, fiscal balances and interest rate appear with negative sign and all are significant. When conditions improves for controlling rent seeking activities inflation will decreases. Similar is the condition with improvement in fiscal balance condition and interest rate. Net budgetary borrowing appear with positive sign because whenever borrowing are increased directly or indirectly they are inflationary in economy. They play significant role in effecting inflation.

5.3.2.3. Dynamic short run relationship:

Table 18 explain the short run dynamic relationship of variables. In short period of time again the mix result are observed. Like rent seeking activities appear with positive sign, first period lag is significant with positive sign while second lag is significant with negative sign. Fiscal balance in current period and first lag both are significant with positive sign, it means inflation is effected by fiscal balance position and specially when faces with problem of deficit, it definitely result in increasing inflation in economy. Interest rate again

is significant with negative and then with positive sign in first and second lag. So previous period interest rate more strongly effect the inflation rate of the economy. Net budgetary borrowings are also significant and have positive sign. They always are inflationary in economy. ECM₄₀ coefficient also lies between the range 0-1 and is negative and is significant. ECM shows the speed of adjustment , to the long run equilibrium after short run shock , and its 97%.

5.3.2.4. Discussion:

When the effect of rent seeking activities on inflation is observed in long run, the improvement in quality of institutes, inflation rate decreases. Coefficient of rent seeking is significant with negative sign which shows that controlling of these activities with better law and order, bureaucratic accountability, democracy, government stability will result in increasing tax revenue collection by the government. As less people will be involve in corruption, tax evasion, bribery etc. When revenues increases government will not depend on seigniorage to finance its deficit, which ultimately leads to decrease in inflation in economy. In short period of time mixed results are observed.

When the fiscal balances are consider, it is significant with negative sign showing inverse relationship between the two. When fiscal balance increases inflation decreases. The data on fiscal balance have negative values which shows that the economy is faced with the problem of fiscal deficit. When deficit increases, inflation also increases. As discuss earlier when developing economies are faced with the problem of deficit budget, they move towards internal and external borrowing, So whether its monetization of deficit (seigniorage) or increase in public debt holding (foreign & domestic)it will result in increasing inflation in economy.

Interest rate coefficient appears with negative sign and is significant.

As far as net budgetary borrowing is concern it has positive, significant effect on inflation in economy. Government borrowings from internal or external resources always are inflationary in economy. The borrowing from banking sector (Central Bank), directly affect the inflation via monetization channel or through open market operation which results both in increasing inflation and interest rate in economy. Now a day the conditional debts not only add to debt burden, but will also result in continuous rise in interest rate as well.

40 Granger 1981, Engle and Granger 1987

Chapter 6

6.1. Conclusion:

In this study rent seeking activities are incorporated in standard Real Business Cycle (RBC) model to analyse its effect on total factor productivity (TFP) of the economy following Angelopoulos *et al*(2011). In addition it has also used money in utility function to examine whether these rent seeking activities have played any role in effecting the level of inflation in the economy. In RBC model technological changes are considered as central, whereas in this paper it is assumed that any change in productivity which is associates with change in institutions and institutional shocks act like technological shock⁴¹. These institutional shocks are captured through rent seeking activities. It was evident from studies that economies with corruption and rent seeking suffer from low capital formation, growth and productivity⁴². The working of fiscal and monetary authorities are also affected by these activities. They result in leakages in public revenues through corruption, tax evasion, lobbying and misuse of political power. Sooner or later forces the governments to relay on seigniorage to finance its deficit⁴³.And adverse effect of this act is inflation in economy.

In this paper an empirical study is also done to support the argument that whether these rent seeking activities affect TFP and inflation in Pakistan's economy? Time series data is used form 1983-2010. Rent seeking index is formulated by PCA method from ICRG dataset. Due to difference in order of integration ARDL technique is used for estimation and results are consistent with the theory. The long run relationship and short run dynamic relation also support the theory. Whenever improvement took place in economy regarding reforms to control rent seeking activities they will result in increasing total factor productivity growth and decreases inflation in economy. Future extension of the paper will be to calibrate the value of θ_t ,the rent seeking activities for Pakistan's economy.

⁴¹ Angelopoulos *et al* 2011, Rebelo 2005

⁴² Mauro 1995, Keefer & Knack 1997, Halls & Jones 1999

⁴³ Sargent & Wallace1981

6.2. Policy Implications:

Rent seeking concept is well defined and is universally accepted by economists. But measurement of this loss always remains a tricky task. Rent seeking remains an inevitable phenomenon and reforms are needed at grass root level. Different type of proxies are used to measure rent seeking loss, although it could not be measured accurately but lessons could be drawn to design new economic policies, political regulation and arrangements which could strengthen the institutions.

Corruption, law & order, bureaucratic quality, government stability, democratic accountability and military intervention in politics are used to formulate the rent seeking index. They play significant role in effecting TFP and inflation in economy. So reforms are needed to improve all these. By strengthening governance and institutional quality these rent seeking activities could be controlled. Policy makers could implement reforms for growth and development. Accountability from politician to bureaucrats, from masses to elite are required.

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Appendix

Table : 1

Description of Variables		
S. No	Variables	Description / Sources
1	Rent seeking index	Index is consist of six variables corruption, law & order , bureaucratic quality, government stability, democratic accountability and military in politics. (0- 40 points scale) /ICRG, PSR group
2	Total factor productivity	The data is computed by Safdar ullah khan 2006
3	Tax	Total tax revenue as percentage of GDP/ Hand book of statistics for Pakistan's economy 2010
4	Fiscal balance	Fiscal balance as percentage of GDP/ Hand book of statistics for Pakistan's economy 2010
5	Inflation	Log difference of consumer price index (CPI) / Hand book of statistics for Pakistan's economy 2010
6.	Interest rate	Call money rate is taken as proxy for interest rate /IFS
7	Budgetary borrowings	Net budgetary borrowings as percentage of GDP / Hand book of statistics for Pakistan's economy 2010

Table:2

Ordinary Correlation (1992-2011)			
Correlation	Discount Rate	T.Bills Rate	Call Money rate
Discount Rate	1.00		
T.Bills Rate	0.74	1.00	
Call Money Rate	0.71	0.90	1.00

Table:3

Eigen values of correlated matrix

	PC1	PC2	PC3	PC4	PC5	PC6
Eigen Values	2.35	1.54	1.25	.39	.34	.14
Cumulative %	39.09	64.72	85.49	91.94	97.65	100

Eigen Values

Variables	PC1	PC2	PC3	PC4	PC5	PC6
Corruption	.53	-.12	-.37	-.21	.57	-.46
Law & order	.47	-.43	-.01	-.52	-.43	.36
Bureaucracy Quality	.44	.31	.48	.13	-.42	-.53
Govt Stability	.38	.24	-.57	.57	-.25	.29
Democratic Accountability	.26	.65	.28	-.26	.36	.49
Military in Politics	.28	-.49	.49	.52	.34	.24

Table: 4

Summary Statistic

	Mean	Median	Maximum	Minimum	Std. Dev
TFP	.744444	.60000	4.1000	-3.0000	1.829950
RS	.622741	.645000	.749000	.414000	.075702
TAX	12.37756	13.24839	14.48560	10.10344	1.639601
FB	-5.534206	-4.558970	-1.746478	-18.72485	3.917505
Inf	2.265937	7.484022	18.86993	-81.21100	21.39958

Table : 5

Correlation Matrix

	TFP	RS	TAX	FB	Inf
TFP	1.0000				
RS	.279476	1.0000			
TAX	-.191622	-.100917	1.0000		
FB	.109185	.245783	.644649	1.0000	
Inf	-.102036	-.197666	.054911	-.125174	1.0000

Table : 6

Covariance Matrix:

	TFP	RS	TAX	FB	Inf
TFP	3.224691				
RS	.037282	.005518			
TAX	-.553647	-.012062	2.588725		
FB	.753741	-.070190	3.987314	14.77845	
Inf	-3.847774	-.308356	1.855287	-10.10504	440.9814

Table : 7

Summary Statistic

	Mean	Median	Maximum	Minimum	Std. Dev
Inf	2.265937	7.484022	18.86993	-81.21100	21.39958
RS	.622741	.645000	.749000	.414000	.075702
FB	-5.534206	-4.558970	-1.746478	-18.72485	3.917505
i	8.431481	8.49000	12.3000	2.14000	2.684468
B	1.635977	1.270929	10.37975	-2.245005	2.437942

Table: 8

Correlation Matrix

	Inf	RS	FB	i	B
Inf	1.0000				
RS	-.197666	1.0000			
FB	-.125174	.245783	1.0000		
i	.320825	-.512127	-.508902	1.0000	
B	.143534	-.096326	-.760459	.565843	1.0000

Table: 9

Covariance Matrix

	Inf	RS	FB	i	B
Inf	440.9814				
RS	-.308356	.005518			
FB	-10.10504	.070190	14.77845		
i	17.74767	-1.00219	-5.153608	6.939464	
B	7.210934	-.017119	-6.993078	3.566047	5.723427

Table: 10

Unit root Test

Variables	Statistics	Probability	None/Intercept/Trend & Intercept	Order of Integration
TFP	-4.011207	.0003	None	I(0)
RS	-3.570061	.0009	None	I(1)
TAX	-6.002711	.0000	None	I(1)
FB	-4.396184	.0116	Trend/Intercept	I(0)
Inf	-5.091866	.0000	None	I(0)
i	-4.576117	.0001	None	I(1)
B	-7.923958	.0000	None	I(1)

Table: 11

Empirical Findings

Dependent Variable: TFP			
Variables	Coefficients		Standard Error
TFP(-1)	.608		(.112)***
TFP(-2)	-.152		(.095)
RS	51.37		(4.406)***
RS(-1)	-61.5		(7.057)***
RS(-2)	14.372		(6.311)*
RS(-3)	17.275		(6.277)**
TAX	-.583		(.338)
TAX(-1)	2.352		(.345)***
TAX(-2)	-.536		(.251)*
FB	-.996		(.161)***
FB(-1)	-.623		(.132)***
FB(-2)	3.416		(.381)***
FB(-3)	-4.211		(.486)***
Inf	-.061		(.009)***
Inf(-1)	.009		(.007)
Inf(-2)	-.074		(.012)***
Inf(-3)	-.015		(.008)
Intercept	-36.309		(9.817)**
Trend	-.160		(.127)
R- Square	.984	S. E of regression	.476
Schwarz Bayesian Criterion	-27.602	F- stats(prob.)	17.658(.002)
Number of observation : 27			

Note: values in parenthesis indicate standard error ; ***, **, * shows significant at 1%, 5% and 10% respectively.

Table: 12

Bound test

Computed F- Stats	Lower critical F- statistics	Upper Critical F- statistics	Result
4.57	5%=3.05 10%=2.68	5%=3.968 10%=3.53	Co integration

Table: 13

Long run relationship

Dependent Variable: TFP		
Variables	Coefficient	Standard Error
RS	39.518	(12.665)**
TAX	2.264	(1.313)
FB	-4.434	(1.781)*
Inf	-.257	(.114)*
Intercept	-66.686	(29.695)*
Trend	-.294	(.265)

Note: values in parenthesis indicate standard error; **, * shows significant at 5% and 10% respectively

Table :14

Short run dynamic relationship

Dependent variable: Δ TFP			
Variables	Coefficient	Standard Error	
Δ TFP(-1)	.152	(.095)	
Δ RS	51.370	(4.405)***	
Δ RS(-1)	-31.647	(5.151)***	
Δ RS(-2)	-17.275	(6.278)**	
Δ TAX	-.583	(.338)	
Δ TAX(-1)	.536	(.251)*	
Δ FB	-.996	(.161)***	
Δ FB(-1)	.795	(.175)***	
Δ FB(-2)	4.211	(.486)***	
Δ Inf	-.061	(.009)***	
Δ Inf(-1)	.088	(.018)***	
Δ Inf(-2)	.015	(.008)	
Δ Intercept	-36.309	(9.817)***	
Δ Trend	-.160	(.127)	
Ecm(-1)	-.544	(.157)***	
R- Square:	.99	S.E of regression:	.476
Schwarz Bayesian Criterion :	-27.602	F- Stats(prob):	35.409(.000)

Note : values in parenthesis indicate standard error;***, **, * shows significant at 1%, 5% and 10% respectively.

Table: 15

Empirical Findings

Dependent Variable: Inflation			
Variables		Coefficient	Standard Error
Inf (-1)		-.545	(.112)***
Inf (-2)		.594	(.215)**
RS		400.506	(81.603)***
RS(-1)		-81.972	(72.785)
RS(-2)		-1546.7	(214.188)***
RS(-3)		969.734	(160.942)***
FB		34.496	(6.067)***
FB(-1)		19.317	(4.249)***
FB(-2)		-64.984	(10.831)***
i		-15.078	(3.393)***
i(-1)		24.319	(4.901)***
i(-2)		3.849	(2.153)
i(-3)		-33.088	(5.097)***
B		29.762	(4.939)***
B(-1)		-2.957	(2.991)
B(-2)		-16.339	(3.729)***
B(-3)		6.158	(2.438)**
Intercept		278.0017	(67.779)***
R-Square:	.96	S.E of regression:	8.3714
Schwarz Bayesian Criterion	-97.017	F-Stats(prob):	9.6064(.005)
Number of observation: 27			

Note : Note: values in parenthesis indicate standard error;***, ** shows significant at 1%, and 5% respectively.

Table: 16

Bound test

Computed F- Stats	Lower critical F- statistics	Upper Critical F- statistics	Result
4.24	5%=3.05 10%=2.68	5%=3.968 10%=3.53	Co integration

Table: 17

Long run relationship

Dependent Variable: Inf		
Variables	Coefficients	Standard Error
RS	-266.244	(95.569)**
FB	-11.509	(5.829)*
i	-20.602	(7.529)**
B	17.126	(6.332)**
Intercept	286.388	(100.986)**

Note : Note: values in parenthesis indicate standard error, **, *shows significant at 5% and 10% respectively.

Table: 18

Dynamic Relationship

Dependent Variable: ∇ Inflation			
Variables	Coefficient	Standard Error	
Δ Inf(-1)	-.594	(.214)**	
Δ RS	400.506	(81.603)**	
Δ RS(-1)	576.982	(96.233)***	
Δ RS(-2)	-969.734	(160.942)***	
Δ FB	34.496	(6.067)***	
Δ FB(-1)	64.985	(10.832)***	
Δ i	-15.078	(3.393)**	
Δ i(-1)	29.239	(4.413)***	
Δ i(-2)	33.088	(5.097)***	
Δ B	29.762	(4.939)***	
Δ B(-1)	10.181	(5.160)*	
Δ B(-2)	-6.158	(2.439)**	
Δ Intercept	278.002	(67.779)**	
Ecm(-1)	-.970	(.242)**	
R-square:	.98	S.E of regression:	8.3714
Schwarz Bayesian Criterion:	-97.017	F-stats(prob):	26.343(.000)

Note : Note: values in parenthesis indicate standard error,***, **, * shows significant at 1%, 5% and 10% respectively.