Impact Of Institutional Quality On Inflation Growth Nexus

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CERTIFICATE

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TABLE OF CONTENTS

List of Tables

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Abstract

We use to examine the panel data set of 55 countries for a period of 1986 to 2014 to investigate a certain level of inflation rate after which economic growth is predicted to be decline, and at what extent intuitional quality matter to control the threshold level. To approximate threshold level of inflation threshold regressive approach has been used and the association between institutional quality and threshold level of inflation ordinary least square has been used. The result of the study indicates that estimates of threshold level are stable with previous empirical studies. However, impact on institutional quality is reliable with theory but insignificant except investment profile.

Chapter 1

Introduction

An essential objective of monetary policy is to attain high and sustainable rate of economic growth with low and stable inflation rate (Ibarra and Trupkin 2015). Inflation disturbs economic growth through various channels positively as well as negatively. Inflation reduces the real debt burden of both public and private sector. If inflation is anticipated, an increase in inflation rate encourages investment and makes capital more attractive relative to holding money, therefore stimulating a higher rate of growth (Fischer and Modigliani, 1978 and Gregorio, 1996). Chaudhary and Ahmed (1996) test the causality between inflation, savings and economic growth, moreover they identified that inflation has an adverse impact on savings. However, it improves foreign inflow of capital which increases investment. Thus, the net impact of inflation is growth promoting. The debate on inflation growth nexus has been part of literature for many decades. The structuralists recognized that inflation is necessary for economic growth while monetarists believe inflation is harmful for growth. Until 1970s the effect of inflation was found to be insignificant or sometimes it was positive (Sarel, 1996), but after 1970s, many studies empirically proved that inflation has a negative impact on growth after a certain threshold level. Inflation acts like a tax on human and physical capital; as price level increases the rate of return to capital decreases and tends to lower growth (Lopez and Mignon, 2011).

After 1990's inflation targeting was adopted by many countries New Zealand was the first to start inflation targeting around 1-3 percent[1]. For inflation targeting it is necessary to see at what point inflations starts to disturb economic growth for each country. There are sufficient number

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[1] Source: RBNZ monetary policy 2016.

of studies that show the turning point of inflation for industrialized and developing countries. Chaudhary and Ahmad (1996) assert that moderate inflation may be desirable but if it crosses a certain limit it is growth injurious. Different empirical findings on threshold level of inflation [Ghosh and Phillips, (1998); Sapehri and Moshiri (2004); Khan and Senhadji, (2001); Mubarik, (2005); Ibarra and Trupkin, (2011 & 2015); Danladi, (2013)] detected average inflation rate of 3 to 5% for industrialized countries and 9% to 19% for developing countries. Sapehri and Moshiri (2004) estimated the threshold level which is usually found to be 15% per year for the lower middle income countries to 11% for the low income countries, and 5% for the upper middle income countries. Mubarik (2005) found 9% for Pakistan, Thanh (2015) investigates 7.8% for ASEAN countries and Dunaway et.al (2004) found 3% for New Zealand. Inflation has non-linear and negative affect on growth through money growth, interest rate, investment, consumption, labor supply, government deficit and inefficient tax system.

Many studies identified that how the role of institutions is important for output growth [Redek and Susjan (2005); Hall et.al (2010); Khan and Khawaja (2011); Compton and Giedeman (2011)] and the second strand in the literature is high level of institutional quality is helpful to control inflation rate [Aisen and Veiga (2008); ABM Nasir (2011); and Neyapti (2012). Ibarra and Trupkin (2015)] argue that the effect of inflation is smooth on industrialized economies, while it has disruptive effect on non-industrialized economies.

Haider, Din, and Ghani (2011) found that in developing countries rapidly rising budget deficit cause inflation because governments may choose to use seigniorage to finance government expenditure and budget deficit which eventually leads to higher inflation and inhibit growth. Telartal et al., (2010) point out that country with strong institutions have efficient tax system, so there is no need to finance government expenditure through seigniorage.

Very few studies have been persuaded to find the impact of institutional quality on inflation-growth nexus. This study postulates that institutional quality is the main factor besides other traditional macro-economic factors for achieving optimal inflation-growth nexus in any economy. The central bank plays a key role if institutions are working quite perfectly by adopting best monetary policy which encompasses inflation to a certain level reducing volatility in monetary and fiscal policies. But monetary policy is not the solution of all economic problems because transparency is the main issue for the implementation of a policy (Raoof and Hassan, 1999); so a quality institutional framework is necessary for that purpose. A stable macroeconomic system is necessary but not sufficient condition for economic development. Then what is the main obstacle for achieving price stability in the economy? Why countries with same capital, technology, labor and geography have large gap in terms of growth? Are there any macro-economic factors? Acemoglu et al (2003) and Fabro and Aixala (2009) argues by incorporating institutions as the main determinant of growth we are able to answer these questions because policy makers know how to control interest rate, credits, money supply, in different business cycle scenarios to hinder any panic. So, we can say that institutional variables are responsible for inflation differentials and it is necessary to make institutional reforms.

Effective rule of law, low level of corruption, protection for future investment creates a favorable environment for development. Better institutional framework distribute the resources in an efficient way and provide better social infrastructure which release the burden from government; less will be the budget deficit therefore government borrowing reduces and reliance on seigniorage is not required which results in price stability in the economy. Therefore, to understand the variables that drive the inflation is the concern of policymakers in short and long run. In the presence of weak institutions there are low tax revenues; Dimakou (2008) argues in

this scenario government forces the central bank to adopt expansionary monetary policy, so it is difficult for monetary authorities to keep inflation low. Furthermore, for sustainability in price level and economic growth, the government has to control deficits in total budget as that spending's in emerging economies are often preliminary to stress inflationary pressure.

Our study tries to estimate the effect of intuitional quality, which is helpful to shrink the negative effects of inflation on GDP across countries. Thus, the study mainly focuses on, what role institutions can play in reducing the inflation generally and the threshold level of inflation particularly of a country? Secondly, do institutions matter for macroeconomic stability? Thirdly, which institutions are vital for GDP growth and inflation relationship?

Threshold level of inflation is measured by remarkable number of studied through different techniques. Mostly, smooth transition regression model has been used (for instance see Ibarra and Trupkin, 2015; Lopez and Mignon, 2011). Sarel (1996) and Sapehri and Moshiri (2004) used OLS regression model to estimate inflation dummies. Khan and Senhadji (2001) and Saima and Iqbal (2009) estimated threshold inflation through non-linear least square method. We have measured threshold inflation rate using Hansen (1993) methodology of threshold regression.

Rest of this study is organized as follow. Chapter 2 reviews of literature. In Chapter 3 we discuss the methodology of this study, along with the data description and data sources. Chapter 4 describes the estimation results and discusses those results. Moreover, the estimation results of the impact of institutional quality on countries threshold level are discussed and compared with the results of previous studies. Chapter 5 provides conclusion. Based on these conclusions some policy recommendations are suggested.

Chapter 2

Literature review

2.1 Introduction

The review of literature consists of two main parts as literature on inflation growth nexus and the second on role of institutions in the relationship of inflation and growth. The first section (2.2) includes historical background on inflation and growth. The sub section (2.2.1) consists of theoretical review and sub section (2.2.2) represents empirical review on inflation and growth. Section (2.3) discusses the definition of institutional quality while sub section (2.3.1) presents the literature on impact of intuitional quality on economic performances.

2.2 Relationship between Growth and Inflation

This study describes that inflation is one of the most crucial variables to affect GDP growth. The top priority of governments is to smoothen the rise in general price level. During high inflationary regimes there is high risk involved in future investment project due to the uncertainty about expected profitability. Almost every school of economics thought emphasizes on the importance of inflation-growth relationship. In Keynesian school of thought supply and demand pressures is the cause of inflation in the economy, and effected by the elasticity of interest rate and wages. Price changes at different proportions, that cause differences in real wages and this has sufficient effects on real growth in the long run. According to Monetarists inflation is always and everywhere a monetary phenomenon. They believe growth of money supply is the most important factor to manipulate. However, fiscal policy is unsuccessful to control inflation. In spite of that classicals suggest prices are adjusted according to demand and supply condition and role of money is neutral and affect nominal variables but not the real

variables. In Mundell's model, a rise in expectations about inflation directly diminishes people's wealth. Developing countries often have low growth rate with excess demand; this leads to inflationary pressures in the economy. Here, central banks could have to increase interest rates which make borrowing costly and saving become attractive and further reduction in consumer spending. Rise in interest rate tends to increase exchange rate, that decrease inflationary pressure and imports become cheaper.

2.2.1 Theoretical review

There are numerous studies which theoretically and empirically explored the different aspects of association among inflation and economic growth. This section provides theoretical review on the impact of inflation on economic growth. The new classical school of thought believed that persistent inflation can always affect the real growth rate in positive or a negative way. In Keynesian framework, Phillips curve illustrates that higher level of inflation reduces unemployment and has positive impact on growth. The Tobin-Mundell hypothesize a rise in prices would enhance investment on fixed capital which have a positive impact on growth. Grimes (1991) inspect which of all these school of thought are stable with the empirical evidence; the study will try to answer whether inflation rate or a change in it have any systematic real effects on economic growth across countries. Fischer (1993) made a growth accounting framework to investigate the main channels through which inflation reduces growth. Inflation obstructs growth through investment and the rate of productivity growth, but large surplus in budget accumulate more capital and productivity growth and associated with a rapid rise in growth. The turning point in the link between inflation and growth was also identified by Sarel (1996), which preliminary identify the probability of non-linear properties in inflation-growth nexus and verify a structural break in the model that connect inflation to economic development.

If the presence of this turning point has been neglected, the estimated outcome of higher inflation on economic growth declines. There are a number of reasons that why governments need to attain low inflation, possibly the most persuasive one is for the prospective of rapid output growth. Gosh and Phillips (1998) focused on a problem, that the adverse relationship between inflation-growth take place only at high inflation rates, or further it falls down to a single-digit range by using a lager sample size then Sarel (1996). The association is nonlinear, first at low inflation rates it is positive and second, at higher rates this relationship is quite robust and obstructive. But Bruno and Easterly (1998) argue that only high frequency data identify the relationship between inflation and economic growth, while in the presence of extreme inflation values the cross-sectional correlation between inflation and growth doesn't exist. Policy makers acknowledged during the last two decade that lesser inflation is conducive to economic growth. Khan and Senhadji (2001) argue that now it is widely known that inflation has distortionary effect on medium as well as long run growth. They explore the issue of threshold level in the correlation between inflation and output. As higher inflation is detrimental to growth, then what is the break point of inflation which significantly disturbs growth? Is that effect is same across developed and developing countries? And in long-run is this relationship is a non-linear one? The result is quite robust with respect to the estimated results and inflation hit significantly and negatively to growth after a specific threshold level. This methodology is used by Mubarik (2005) to inspect the turning point of inflation in Pakistan; the estimates of the model suggest that inflation is inimical for growth. Saima and Iqbal (2009) explored the link between inflation and growth with the probability of two threshold levels for Pakistan by using the methodology of Khan and Senhadji (2001). The presence of two thresholds divides the data into three groups low, moderate and high degrees of inflation. Second, they explore the non-linear association

between inflation and growth and illustrate that investment is the prominent channel through which it affects growth. Another similar work done by Danladi (2013), to examines the problem of the break point in the relationship between inflation and economic growth for West African countries. They justify that investment is a key variable through which inflation hinders economic growth. Price stability is a symbol for macroeconomic stability and generates an investment promoting environment. West African countries accommodate easily in the situation of higher inflation than industrialized countries. The ongoing literature signifies that the negative effects of high inflation always wipe out the stimulating effect of low inflation. Sapehri and Moshiri (2004) scrutinize a non-linear model examined the turning point of inflation for a family (effect of inflation at various levels) and divide the data into four different sets of countries according to various stages of development across countries. There are three main attributes of the relationship between inflation and output growth. First, the relationship between inflation and economic growth varies for every category of countries. In low-income and lower-middle-income economies, inflation has negative effect on growth. Similarly, for upper-middle-income economies the threshold level observed to be quite low. In case of OECD countries, no association has been appeared at any level of inflation. This indicates that inflation affects growth differently in OECD countries as compare to developing countries. Lopez and Mignon (2011) study the effects of inflation for panel data of advanced and emerging economies and their findings also proof that inflation has non-linear effect on growth. The estimates show higher value for the turning point of inflation for emerging countries, which may be the result of policies that cause depreciation in exchange rate.

2.2.3 Empirical Review

Grimes (1991) uses annual data from the period of 1961 to 1987 for 21 developed countries. The data set was estimated through OLS and SUR model. The results propose that even a low inflation rate is detrimental for development process. Approximately GDP growth has been reduced by 1 percentage point due to 9 percent rise in inflation. Therefore, cost of even a low inflation rate is much higher because it reduces the growth rate, not only level of output. The cross-sectional regression methodology had been implied by Fischer (1993) which is linked with the new growth theory. The panel regression has been included to extend this study, whose results support the results of the simple cross-sectional regressions. Low level of growth is not purely the cause of high inflation while the evidence implied that there is a strong correlation between small deficit and growth. Uniformly, in the long run the result indicates low inflation and small budget deficit is not necessary for high growth but very high inflation is consistent with growth. These findings are stated over in the sense of aggregative approach not for individual countries and with lack of structural model. Sarel (1996) explores the threshold level of inflation from simple growth model. The analysis show at low levels of inflation it would not have any significant adverse effect on growth. The panel dataset consists of GDP, population, CPI, investment, government expenditures and terms of trade, for 87 countries, during the period of 1970-1990. The threshold level had been measured at 8 percent rate of inflation. Inflation under 8% may have positive affect on growth. While above that rate it has a strong and very dominant impact on growth rate. Another contribution of this paper is that when inflation rate doubles, the growth rate has to be decline by 1.7 percentage points. This is much higher than identified by former studies. Now a well-known number of studies and policy makers documented that to pull down inflation is conducive for growth and development. Sapehri and

Moshiri (2004) examine data of 92 countries for the time period of 1960 to 1996. It includes 24 OECD countries, 14 upper-middle-income countries, 26 lower-middle-income countries and 28 low-income countries. The turning point in inflation-growth nexus differs through four sets of countries. After 7% inflation rate per year it is detrimental for growth in low income countries. For lower-middle-income countries this rate is about 10%. Similarly, in case of upper-middle-income countries the break observed to be at 2% rate of inflation. But for OECD countries, no association has been appeared at any level of inflation. This indicates inflation distress growth in a different way in OECD as compare to developing countries. The threshold level for these four stages varies as 21% for lower-middle-income countries to 11% for the low-income countries, and 5% for the upper-middle-income countries. The study point out that this association has to be further explored by incorporating economic, political and institutional factors.

The ongoing literature signifies that the negative impact of high inflation always wipe out the promising effect of low inflation. Khan and Senhadji (2001) argued it is generally accepted now that inflation has a negative effect on medium and long-term growth. They explore the fact of threshold level in the correlation between inflation and output. The data obtained from world economic outlook by covering 140 economies for the span of 39 years. Non-linear least square has been used to calculate the break point of inflation. The results strongly suggest 1-3 percent threshold level for industrial countries and 11-12 percent for developing countries after that it has a significant negative affect on output. The estimated values of yearly data are close to the estimates of threshold level by using five year averaged data i.e. 3 percent for industrial economies and 12 percent for developing ones. These results follow the results of Bruno and Easterly (1998); exerts that inflation is destructive for growth at high frequencies but causality between them is still unproven, while it is unambiguous that discrete high inflation hinder

growth. Similarly, their results propose that link between inflation and growth is stronger when five years averaged data has been used. There is no confirmation that different supply shocks like war, aid and term of trade identified negative linkage between inflation and growth. The methodology of Khan and Senhadji (2001) is used by Mubarik (2005) to identify the structural break in the association between inflation and growth in case of Pakistan. The estimates of the model through uni-directional granger causality test suggest 9 percent threshold level after this it is growth injurious. Saima and Iqbal (2009) explored the viability of double threshold for inflation in case Pakistan while, the link between inflation and investment is also investigated. At first threshold inflation has a positive but insignificant impact and at inflation rate of (6% to 11%) inflation has a strong negative affect on growth. Inflation above 11% diminishes growth both negatively and significantly. They identify the non-linear association between inflation and investment at 7% threshold; above that rate inflation is unfavorable for investment. This indicates that central bank has to keep the inflation below 6% then there may be possibility to achieve exceptional rise in economic growth. Inflation below the first threshold would be helpful to reduce the reservations in financial market which encourages investment in the economy. Another similar work done by Danladi (2013) find out the turning point in the perspective of West African countries for the period of 1980–2009. The turning point estimated to be 9% above that inflation is detrimental for growth. With these findings, this study supported the ways through which inflation can affect investment and then in turn influence growth. The association is found to be significant between investment and growth. Inflation rates higher than the threshold level will be at the cost of output growth.

There are a number of motives that monetary authorities want to attain low inflation; the most convincing is for the prospective of rapid economic growth and to remove uncertainties

from financial markets. Gosh and Phillips (1998) focused on a problem, that the adverse relationship between inflation-growth take place only at high inflation rates, or further it falls down to a single-digit range. The data set consists of 3603 annual observations corresponding to 145 countries, over the period 1960-96. By analyzing non-linear model; they find much destructive effect of inflation on economic growth. They also identify that correlation among inflation and growth is negative in both time and cross-section measurements of the data. At low inflation rates the correlation is positive and at higher rates this relationship is quite robust and obstructive. But this study has been failed to show how far exactly this negative association prolongs. Lopez and Mignon (2011) estimated the gernalized method of moments (GMM) model to study the effects of inflation for panel data of advanced and emerging economies and their results provide strong indication that inflation non-linearly affects output growth. This threshold value is 2.7 percent for developed countries and 17.5% for non-industrialized ones.

2.3 Institutional Quality and Economic Performances

Definition of Institutions

Institutions are basically the kinds of structures that allow a system to establish according to social rules and norms for social and economic interactions in a community**.**

Currently, almost every economist has been committed that inflation is terrible and need to be controlled entirely. They recommend policy measures and better institutional quality for the assurance of low inflation. There is now a sufficient amount of literature available showing the positive impact of institutions on growth. Institutions are considered to be a wide scope of subject in the past literature there are number of indicators use as a proxy for institutions to explain their role in the growth process. Barro (1991) investigating some regularities about the connection between investment and growth for 98 economies to1960-1985. The growth rate is

positively related to human capital. This implies if meager nations have skilled human capital they should always succeed to catch up rich nations after some time period, not otherwise. Nations that contain skilled human capital might have low fertility rates and high capital investment to GDP. Measures of political instability are adversely related to growth and investment. These linkages explain the negative impact of political instability on property rights and the association between property rights and private investment. On the other hand this paper couldn't explain the weak growth performances in sub-Saharan Africa and Latin America that tends to lower economic growth. Empirically the effect of property rights on economic growth by using different institutional variables has been examined by Knack and keefer (1995) the indicators include contract enforceability and risk of expropriation. The result shows enforceability and risk of expropriation are found to have more influence on growth as compare to political instability and civil liberty. The focus of this paper is on institutional variables collected by International Country Risk Guide (ICRG) and Business Environmental Risk Intelligence (BERI). This is firmly interconnected with those institutions highlighted by North (1990) and Olson (1982) on the dimensions of property rights. Two other variables corruption and quality of bureaucracy are used to measure the efficiency of government services. Countries that lack to score in these dimensions, introduce the criteria other than efficiency into the allocation of public goods, and would probably award agreements and business without any criteria and credibility. In governments where corruption is at higher levels are likely to provide less protection against infringements on property rights. Secondly, institutions that protect property rights are essential for investment and economic growth. This recommends that the protections of property rights not only necessary for the magnitude of investment, but also for the efficacy with which inputs are distributed. Political and institutional factors are the main reason

of inflation differential across countries. Acemoglu and Johnson (2005) examine which institutions matter more for long run economic performance, despite the importance of contracting institutions and the security of property rights. This study provides a direction that there is a strong relationship between legal origin and process of contracting institutions and on the other hand between colonization strategy and property rights institutions. The instrumental approach found indication that institutional measures have a central impact on growth, investment, and financial development of an economy. Moreover, the individuals can make contracts to reduce the negative effects of contracting institutions.

The proposition is generally accepted that high inflation rates create inadequacies that decrease society's welfare and development, Aisen and Veiga (2006). Using the dynamic panel dataset for 178 countries, they scrutinize the political factors of inflation. The main institutional variables are government crises, polity scale, economic freedom and cabinet changes. The analyses propose that a large amount of political instability is related to higher inflation. When every new cabinet goes to take charge they may have different preferences, this contradictory kind of mechanism significantly upset the way authorities conduct monetary and fiscal policies. According to Telartal et.al (2010) this situation is more obstructive and stronger in developing countries due to inefficient tax system. Moreover inflation hit severely here and the governments have to rely on seigniorage to finance their budget deficit and expenditures in the light of the study by Cukierman et al. (1992) and identified that political instability had positive relation with seigniorage. The results imply that reforms are needed which would surely help to reduce inflation otherwise, price stabilization efforts may be only vibrant for the time being.

Countries which were colonized by Euoropian powers before five centuries were relitively rich as compared to now. Acemoglu, Johnson and Robinson (2002), argued that

Euoropean settlers have formed an institutional reversal between previously poor societies and their prospective is to introduce institutions which encourage investment in those societies. European colonization leads to institutional reversal due to profitability of colonization strategies in different enviroments. In densely areas they introduced attractive institutions to force local population and took over prevailing tax system. On the other hand, in meagrely areas they settled institutions to secure private property and encourage commerce and industry. While societies with extractive institutions could exploit their available technologies relatively at high rate.

The progress in Western Europe after 1500 is due to extensive trade via Atlantic with other parts of the world. This trade exaggerated Europe by inducing institutional change. Acemoglu, Johnson and Robinson (2005), explored the patterns of economic growth in Western Europe after 15th century. There is a key interaction between institutions and access to the Atlantic. The trade through Atlantic contributed to European growth directly as well as indirectly via institutional change. This change triggers massive profits in countries which have easy entrance to Atlantic and initially have independent institutions. These revenues reduce inequality and transformed away the power from political autonomy which generates more secure property rights. However, Spain and Portugal gain a lot through transferring resources over trade activities, but they can't establish political institutions and not even experienced sustained development. On the other hand, Britain and Netherland took relatively more advantage due to good political institutions and smoothen the path for more inventions.

Hall and Jones (1999) explain why countries produce high levels of output per worker? They assert that the social infrastructure is at high level in these countries due to the long run economic performance and liberty of institutions and growth oriented government policies. The differences in social infrastructure across countries are the main cause of income differences

across countries. Another seminal work done by Acemoglu et al (2003) by showing the impact of inflation on macroeconomic variables, that high inflation rate, low growth rates and large budget deficits were not caused by macroeconomic policies but should be the result of poor institutional quality in those countries and they argued even better macroeconomic policies are insufficient in the presence of weak institutional framework.

Aisen and Veiga (2008) postulate that political and institutional factor would have a direct influence on inflation volatility rather than indirect effects. They identify that central bank freedom and economic freedom play a key role to wipe out the destructive effects of political instability on inflation volatility. Their baseline model consist of variables i.e. cabinet changes which is proxy for political instability, ethnic homogeneity index proxy for lower social polarization in a country, polity scale as a proxy for greater democratic regime in a country. Analyzing a panel data set of 160 countries from 1960 to 1999, the estimates of GMM technique shows all variables are positive and statistically significant. It shows that higher degrees of political instability and social polarization, less democracy, and lower central bank independence lead to higher inflation volatility. The Cabinet Changes affect inflation volatility directly, and furthermore their result shows due to the addition of Ethnic Homogeneity Index and the Polity Scale the results related to Cabinet Changes wouldn't change and are also statistically significant. A rise of one percentage in Ethnic Homogeneity reduces inflation volatility by 46%, however a rise in Polity Scale diminishes it by 2%. They also hypothesized that if the turnover frequency of central bank president is greater it will tend to higher inflation volatility. This entails that higher central banks independence can succeed to sustain inflation even at the time of political instability. By adding Index of Economic Freedom the result shows that economic freedom indirectly affects inflation volatility through inflation levels.

Central bank plays a key role as a measure of institution for economic growth. Loungani and Sheets (1997) analyze the dataset of emerging countries to inspect the pattern of central bank on inflation and the effect of inflation on output growth. First they take 12 transition economies and find that central bank independence (CBI) has a negative relationship with inflation. This shows economies where political factors are less influencive to central bank independence have lower inflation rate than its other counter parts. The second index they use is SIB which is the similarities in the characteristics of central bank of these countries and German Bundesbank. CBI and SIB both have negative coefficients that show economies with independent central banks can achieve price stability for long time. But SIB has strong significant impact to control inflation than CBI. To check the inflation-growth relationship they use data of 25 transition economies for the year 1991-1994. The result of robustness has a positive and significant sign which suggests improved reforms should enhance growth. Moreover, results suggest inflation more sensitively reduce investment in overall real economic activity. During 2000s, the number of independent central banks, members of monetary union countries which adopted inflation targeting regime has been on the rise. Neyapti (2012) presents an empirical investigation of the impact on price stability of formal monetary institutions during the past decade by using cross-sectional data on up to 166 countries. The average inflation rate around the world has been reduced to 7.5% in the 2000s. By analyzing main structural characteristics of countries, he showed that countries that adopted either inflation (IT) or currency boards (CB) regimes had lower than average inflation rates during the 2000s. In addition, both CBI and MU show notable positive associations with IT. Then by regressing inflation (D) on each of the institutions separately exhibit that above mentioned monetary institutions are associated to control inflation rates during 2000s except CBI. In addition, he argued that the quality of governance may be related to low inflation rates

rather than of only monetary institutions. The result indicates that D is higher in the developing countries where governance is smaller than the rest of the country groups.

Nasir (2011) argues that institutional stiffness are the cause of price variability in Bangladesh by integrating new determinants of institutional inflexibilities by using data from period 1982-2005 by OLS and ARDL technique. They build three new indicators which stated as 'RIGHT', 'EFFGOV' and 'GOVERN, the first indicator built as the ratio of property rights, civil liberty and law and order indices. The 'EFFGOV' includes index of efficiency and effectiveness of government performance. The third index 'GOVERN' measures the overall efforts of government institutions. One standard deviations rise in corruption could reduce inflation by 1.64% and 2.64% through two different estimation techniques. By regressing money supply discretely from institutional variables in the inflation model the estimated results were insignificant. They also estimated the money supply growth without the institutional variable to explain inflation rates. M2 was found to be slightly significant. According to this evidence money growth not has any major effect on inflation for Bangladesh. So, institutional rigidities would obstruct economic growth. Ibarra and Trupkin (2015) find out the threshold level as 19.2% for non-industrialized countries. However, the set of countries that have relatively better democratic environment have 11.3% threshold level of inflation which is lower than they estimated for the entire set of data. They examined the threshold level as19.2% for non-industrialized countries for an average ICRG measure higher than 0.50, however by including only those countries which has an average ICRG measure of 0.65, the threshold level decreases to 7.6%.

2.4   Conclusion

Inflation is one of the most crucial variables to affect GDP growth. The top priority of governments is to smoothen the rise in general price level. During high inflationary regimes there is high risk involved in future investment project due to the uncertainty about expected profitability. Almost every school of economics thought emphasizes on the importance of inflation-growth relationship. A large number of studies have been made since to identify the threshold level of inflation and many of them also detect how inflation non-linearly effect growth through different channels. Prominently investment is the key economic variable through which inflation obstruct growth [Fischer (1993); Khan and Senhadji (2001); Saima and Iqbal (2009); Danladi (2013)]. Monetary authorities try to control inflation rate under certain level to attain sustainability and prosperity in economic growth. The threshold level in industrialize countries is low as compare to emerging and non-industrialize one's; the threshold level has been differ for each country, according to different studies it is 3 to 5% for industrialized and 9% to 19% for developing countries; below that level inflation has no effect on economic growth and after that threshold level it has significant negative effects on output growth.

Institutions are now considered to be one of the main determinants in growth process of any country. Independence of institutions and social infrastructure are the major reasons in countries growth differences. Less influencive central banks and effective tax system are supportive to achieve the desire goals in time and may be helpful to hinder irregularities and uncertainties from the economy. Political instability is positively related to higher inflation and seigniorage. Higher inflation rate, low growth rates and large budget deficits were not caused by macroeconomic policies but might be the result of poor institutional quality and in this scenario even better macroeconomic policies are insufficient to boost economic development. To understand the

variables that promptly drive the inflation is the central concern of monetary authorities in short and long run. Better institutional framework distribute the resources in an efficient way which release the burden from government; less will be the budget deficit therefore government borrowing reduces and reliance on seigniorage is not required which results in price stability in the economy.

Literature Gap

There is enormous amount of studies which shows how much the role institutions is important for an economy many of them identified that how the role of institutions is important for output growth [Redek and Susjan (2005); Hall et.al (2010); Khan and Khawaja (2011); Compton and Giedeman (2011)] and the second strand in the literature is high level of institutional quality is helpful to control inflation rate [Aisen and Veiga (2008); ABM Nasir (2011); and Neyapti (2012). Ibarra and Trupkin (2015)] they argue that the effect of inflation is smooth on industrialized economies, while it has disruptive effect on non-industrialized economies. The role of institutions besides other macroeconomic variables for the set of developed and developing countries which are helpful to shrink the negative effects of inflation on GDP across countries and their threshold level of inflation are not being much studied empirically. We also provides theoretical framework for the construction of our model which is rarely used in previous studies.

Chapter 3

Data and Methodology

3.1   Introduction

This chapter discusses model's specification, data description and the variables construction which are required for our empirical analysis. In section 3.2 we presents theoretical framework. Section 3.3 deals with model specification and its significance. We describe econometric methodology in section 3.4. In section 3.5 data and variables construction has been discussed.

3.2   Theoretical Framework

Stable and low level of inflation with prosperity in economic growth is related to the sustainable macroeconomic framework. The important issue is to identify the variables which are most crucial for economic growth and with respect to inflation. We construct the model to find out the threshold level of inflation by incorporating the best possible variables according to different economic theories. Bruno and Easterly (1998) measures that inflation-growth relationship is only reliable in the presence of high frequency data while it couldn't explain the causality between them. Khan and Senhadji (2001) and Saima and Iqbal (2009) estimated threshold inflation through non-linear least square method. We have measured threshold inflation rate by using econometric techniques initially constructed by Hansen (1993) methodology of threshold regression. Endogenous growth theory suggest that rate of return on capital is the only variable which is affected by the rise in inflation. Inflation reduces the rate of return which tends to decline the capital accumulation and economic growth. Price stability is necessary for successful monetary policy. Real outcomes like unemployment and real GDP growth rate are the

concern of policy makers if central bank is confident about conduct of monetary policy. According to the International Monetary Fund, inflation is an important economic indicator because it affects the value of money and describes the overall stability of a country's economy. According to neo-classical growth model investment and population growth are necessary for growth analysis. A rise in investment with a decline in population growth rate is positively correlated with growth. If any country adopts efficient physical capital it would ultimately increase the productivity of human capital. To empirically observe the economic growth of a nation it is important to see that they spend enough on capital goods according to their population. International trade theory suggests including trade openness in linear growth regression model which is a successful tool to spur economic growth. Trade is effective for any modern economy to accomplish its goals and necessary to show its competitiveness in the long run. It is now widely accepted that sustainability in economic growth and development can be achieved through policies that are beneficial for an economy and investment projects with the rest of the world. Similarly, many other studies also highlight the importance of trade openness as a way of transfer technical progress. The empirical model uses the control variables as taken by [Khan and Senhadji (2001); Mubarik (2005); Iqbal and Nawaz (2009); Lopez and Mignon (2011); Qayyum and Haider (2012), Daud & Podivinsky (2014)].

A lot of studies use competitiveness, governance, property rights and others as a proxy for institutions. Thus, a set of institutional indicators which precisely offer the suitable definition of institutions to find out their impact on threshold level of inflation is another important task. The role of government is necessary to take different measure in both developed and developing countries. For global competition government's stability and credibility is vital to pursue its fiscal and political responsibilities. Government institutions can participate in the economic

growth by providing the suitable opportunities for investment and accomplish the needs of its citizens. About more than 80,000 multinational corporations are operating worldwide with more than 800,000 foreign affiliates and around nearly 80 million employees are working in them worldwide[2]. Therefore investment profile of a country is the most crucial indicator to measure institutional quality. It depends on the security and feasibility of investment projects and it directly affects the foreign direct investment in an economy. Investment decisions of an entrepreneurship depend upon its expectations and soundness of their property rights in the society. Corruption discourages investment, demoralize the ethical values, deteriorate public's belief on government institutions and foreign investors doesn't make investment which further reduce employment. Corrupt practices in a society thrown away the money from requisite projects like, education, health, infrastructure, etc. which creates more in-equality. Representatives of the society make laws and implement them on the people to ensure security and protection to their lives and property and punish those who are involved in unlawful activities. The policies run smoothly towards its desire goals, the governments and monetary authorities should focus on state and real economic activities under the situation of better law and order conditions. Inflation targeting in now adopted by many countries, central banks of those countries mostly have a similar framework to design their monetary policy but their accountability procedures may differ from each other. If central banks are accountable for their decision about inflation, they made more transparent and precise monetary policies as in the case of industrialized economies. The accountability of policymakers allows them to provide justification that why inflation is away from the target? What are the causes and under what circumstances we will bring it back to the desired level. Different studies suggest quality of bureaucracy is a key determinant variable in a country's open macroeconomic framework. Poor

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[2] Source: World Investment Forum, Xiamen China (2010).

quality of bureaucracy involves low tax revenues and more capital controls. In developing countries bureaucrats influenced the decision of policy makers for the sake of their own interests and there is no control on inflation and in this respect monetary authority has to tighten monetary policy which tends to reduce employment and investment in the economy.

3.3 Model Specification

In order to estimate the association between inflation and growth and the threshold level of inflation for each country we specify the following model.

$$Y_{it} = \alpha_0 + \alpha_1 \pi_{it} + \alpha_2 D (\pi_{it}\text{-}k)_{it} + \alpha_3 I_{it} + \alpha_4 P_{it} + \alpha_5 TO_{it} + U_{it} \ldots\ldots 3.1$$

Where $i = 1\ldots N$ stand for countries and $t = 1\ldots T$ for time period, the dependent variable Y_{it} is the growth rate of gross domestic product in the i_{th} country for some time period, the intercept α_0 is the country specific affect, π_{it} is the rate of inflation, D is the dummy variable, k is threshold level of inflation, P_{it} is log of total population, I_{it} gross fixed capital formation, TO_{it} trade openness (percentage of exports to GDP plus percentage of imports to GDP), while U_{it} is the error term which captures the country specific random effect.

3.3.1 Central Bank Response to Inflation and Institutional Quality

As inflation is pivotal for every central bank, the threshold level of inflation varies across countries; therefore, response of central bank also varies towards inflation across countries. The advanced economies react more aggressively when it exceeds a certain targeted or threshold level. Similarly, institutional quality also affects the response of central bank to inflation. In the presence of weak institutions i.e. government instability, poor law and order condition, corruption, and poor bureaucratic quality, governments heavily rely on borrowing due to inefficient tax collection which provides way for more inflationary pressure in the economy.

24

As Cukierman et al. (1992), Telartal et.al (2010); and Haider, Din and Ghani (2011) identified that in the situation of weak and unstable political system there is no well-balanced tax structure, which is the cause of dependence on seigniorage in those economies. Besides where institutions are less influenced by politicians for their own benefits, independence of central bank, budgetary process is more stiff and transparent and the rule of law impartial for everyone then reliance on seigniorage has been reduced, high tax revenues, low budget deficit and stability in inflation rate. In the same way, in the presence of weak institutions excessive government spending would create inflation, and due to deficit financing the share of government investment projects is much smaller in amount. When spending is larger than government revenues, the borrowing from central bank creates more inflation and vice-versa; this inflation reduces the real tax revenues. Therefore, high inflation is the consequence of excessive government spending. Consequently, at the stage of deficit financing, if central bank is less autonomous from government pressure, it will print more money to meet the demand of the government which comes out to be the result of immediate inflation.

Money supply (M2) is a key economic indicator to forecast inflation; for country's financial development, money supply is an important indicator. According to quantity theory of money there is a strong relationship between inflation and money growth, ceteris paribus. Thus, money supply growth rate might be equal to inflation rate. So we can say government expenditure and money supply are the best control variables for any economies inflation threshold level. Countries with high institutional quality, the central banks respond to inflation more promptly and their threshold level is also low due to smaller political constraint. The model can be specified as:

$k = f$ (institutional quality; other economic variables)

Here k is the threshold level of inflation at which the response of central bank changes.

Institutional quality also affects the response of central bank towards inflation. Central banks free from political pressure respond to central bank more aggressively when it exceeds from a certain level. While in many countries central bank have to keep in view the choice of politicians and bureaucracy and do not respond towards inflation even it exceeds to certain limits. Lack of institutions may increase public and political pressure for central bank if it tightens the monetary policy to curb high inflation. Many studies indicate that central bank faces more political pressure when it tightens monetary policy to prevent inflation rather than when it eases monetary policy to hinder unemployment.

In the next section we discuss econometric methodologies to estimate our model.

3.4   Econometric Methodology

This study describes how the negative effect of inflation on growth can be reduced by incorporating institutions. Thereby, a sufficient level of institutional quality overcomes this negative effect, to some extent, over time for both developed and developing economies. In order to estimate the association between inflation and growth and the threshold level of inflation, we assign dummies to each value of inflation for every country, then we find residual sum of square, after finding threshold level of inflation we regress it on institutional quality to see its effect on it.

3.4.1   Threshold level of Inflation

To estimate the threshold level for 55 developed and emerging & developing economies we find the inflation rate by taking the growth rate of consumer price index for each country then we arranged the inflation data into ascending order to disappear the variability in the data. Upper and

lower 5% values have been omitted to search inflation threshold in remaining values; therefore we assign dummies to remaining values. As threshold level is unknown we estimate the model through threshold regression model with other parameters of the model, which imply ordinary least squares to estimate residual sum of square, as Khan and Senhadji (2001) estimated the threshold level (k) in a non-linear way. The main idea of this method is to estimate the minimum residual sum of square (RSS) by regressing model with each dummy one by one. The value of inflation corresponding to minimum RSS among others is the threshold level of inflation (k*).

So that we can write the optimal threshold level (k*) which minimize the value of RSS as:

$$k^* = \text{argmin}\ \{RSS\ (\pi_i)\} \qquad \pi_i = \pi_{1.........}\ \pi_{19}$$

Here k* is the estimated threshold level, and π_i is the value of inflation which ranges from 1to 19.

Our variables of interest are threshold rate of inflation and level of institutional quality. After finding threshold level of inflation for each country we take the averages (mean) of each institutional indicator to see the impact of institutions on threshold level of inflation.

3.4.2 Threshold Level of Inflation and Institutional Quality

To examine the linear relationship between thresholds level of inflation and institutional quality we specified the following econometric model as:

$$k_i^* = \beta_0 + \beta_1 IQ_i + \beta_2 GE_i + \beta_3 M_{2i} + E_i \qquad\qquad i = 1\ldots..55 \quad\ldots\ldots\ldots\ 3.2$$

The expected signs of β_0 & $\beta_1 > 0$; here k_i^* is the threshold level for each country where central bank aggressively responds to inflation, IQ_i is institutional quality (government stability, investment profile, corruption, law and order, democratic accountability, bureaucratic quality). Government expenditure and money supply are taken as control variables.

Subsequently after determining the threshold level of inflation for each single country as described in section (3.3.1). We take the averages of the entire institutional indicators as well as for government expenditure and money supply for the data set of each country to find out the empirical results of eq. (3.2) by ordinary least square method.

After examining the aggregate impact of institutional variables, now we distinguish the impact of a single institutional indicator one by one. In eq. (3.3) we determine the effect of government stability on threshold level and it has been expecting that sign of coefficient is going to be negative.

$$k_i{}^* = \beta_0 + \beta_1 GS_i + \beta_2 GE_i + \beta_3 M_{2i} + E_i \qquad i = 1……..55 \quad …………\ 3.3$$

Eq. (3.4) represents the impact of investment profile on threshold level with government expenditure and money supply as control variables. The coefficient of investment profile is expected to be appearing with negative signs.

$$k_i{}^* = \beta_0 + \beta_1 IP_i + \beta_2 GE_i + \beta_3 M_{2i} + E_i \qquad i = 1……..55 \quad …………\ 3.4$$

Eq. (3.5) shows the effect of corruption on inflation threshold and its sign of coefficient is expected to be positive.

$$k_i{}^* = \beta_0 + \beta_1 CORP_i + \beta_2 GE_i + \beta_3 M_{2i} + E_i \qquad i = 1……..55 \quad …………\ 3.5$$

Eq. (3.6) identifies the impact of law and order on threshold level and the negative sign of the coefficient has been predicted.

$$k_i{}^* = \beta_0 + \beta_1 LO_i + \beta_2 GE_i + \beta_3 M_{2i} + E_i \qquad i = 1……..55 \quad …………\ 3.6$$

Eq. (3.7) examines how much democratic accountability is useful to control the threshold level and its sign of coefficient is expected to be negative.

$$k_i^* = \beta_0 + \beta_1 DA_i + \beta_2 GE_i + \beta_3 M_{2i} + E_i \qquad i = 1\ldots\ldots55 \quad \ldots\ldots\ldots 3.7$$

Eq. (3.8) shows the influence of bureaucratic quality on inflation threshold and its coefficient is also predicted to be appearing with negative sign. While in all of these cases the coefficient of government expenditure and money supply has been forecasted to be appear with positive signs.

$$k_i^* = \beta_0 + \beta_1 BQ_i + \beta_2 GE_i + \beta_3 M_{2i} + E_i \qquad i = 1\ldots\ldots55 \quad \ldots\ldots\ldots 3.8$$

To estimate the above linear cross-sectional models we use OLS for analysis and in the same way we estimate the model by taking only single institutional indicator one by one to check which indicator is more crucial to effect threshold level of inflation.

3.5 Data and variables construction

In this section we discuss the data and variables and the sources of data.

3.5.1 Variables

The analysis for the threshold level of inflation requires GDP growth rate, inflation rate, population, investment, and trade openness. Construction of the variables are given below

3.5.1.1 GDP Growth

Gross domestic product is the market value of all finished goods and services produced in a country in a specific time period. Real GDP growth rate of a nation is the change in GDP from one time period to another. It shows how much GDP has been rose or deflates in a nation during a time period.

GDP Growth = $(Y_t - Y_{t-1}) / Y_{t-1} * 100$

Here Y_t is the current year GDP and Y_{t-1} is the previous year GDP.

3.5.1.2 Inflation rate

Inflation is an increase in the general price level of goods and services in an economy over a time period and ultimately, the purchasing power of the currency declines.

It is calculated as percentage change in consumer price index as:

Inflation rate = $(CPI_t - CPI_{t-1})/ CPI_{t-1} * 100$

3.5.1.3 Investment

Gross fixed capital formation is used as a proxy for investment. It is define as the net capital accumulation in an accounting period for a particular country. It is essentially net investment which includes spending on land improvements, plants, machinery, and equipment, the construction of roads, railway, and commercial and industrial buildings. Disposal of fixed assets are taken away from the total.

I = gross fixed capital formation to GDP

3.5.1.4 Population

The number of people who are inhabit in a particular territory or state. We take the log of population to omit the variability from the data.

P = ln of total population

3.5.1.5 Trade Openness

It is a measure of economic policies that either restrict or invite trade between countries.

The indicator is defined as follows (at current prices, current exchange rates):

TO = Total exports percentage to GDP + Total imports percentage to GDP

The higher the value of that index the larger is the influence of trade on domestic activities and the stronger should be that country's economy.

3.5.1.6 Government Expenditure

Government expenditure includes all government consumption, investment, and transfer payments. In national income accounting the governments provide goods and services for current use, to directly satisfy the individual and fulfill the collective needs of the community.

3.5.1.7 Money Supply

Money supply is the total stock of currency and other monetary and liquid assets circulating in an economy at a specific time period. It involves assets such as currency, coins, balances in deposit accounts and other liquid assets that individuals and businesses can easily use to make payments.

3.5.1.8 Institutional quality

The key issue is to use the set of institutional indicators which truly measures the level of economic development for the panel set of developed and developing countries. For the construction of composite index of institutional quality we used variables from international country risk guide (ICRG) that covers both social and political attributes. The ICRG index ranges from 0 to 100; the lowest value shows the lower level of institutional quality and highest value shows higher level of institutional quality. Some key variables which we use in our analysis are as follow:

3.5.1.9 Government stability

Government's stability in a country is defined as the durability and integrity of a current government and its ability to carry out its declared programs and its ability to stay in office. It has three sub-components: government unity, legislative strength and popular support. It ranges from 0 to 12.

3.5.1.10 Investment profile

Investment profile is the judgment of factors affecting investment that are not covered by other components such as political, economic and financial risk components. It ranges from 0 to 12.

3.5.1.11 Corruption

Corruption index refers to the level of corruption in the political system. This is a form of dishonest or unethical conduct by a person charged with a position of authority, often to acquire personal benefit. It ranges from 0 to 6.

3.5.1.12 Law and order

Law and order index measures the impartiality of legal system, judicial quality and enforceability of contracts. It ranges from 0 to 6.

3.5.1.13 Democratic accountability

Democratic accountability index is the measure of how responsive government is to its people. In ethics accountability is answerability, liability and expectation from governing bodies. It has been centrally related to problems in the public, private and individual contexts. It ranges from 0 to 6.

3.5.1.14 Bureaucratic quality

Quality of bureaucracy is the measurement to tendency that minimizes the revision of policy when governments change. In low-risk countries, the bureaucracy is somewhat autonomous from political pressure and adopts such policies which are beneficial for democracy. It also ranges from 0 to 6.

3.5.2 Sample

Our sample comprised of 55 countries covering annual data set of time period 1986-2014. According to IMF's criteria, our sample consist of 23 developed and 32 emerging and developing economies selected on the basis of data availability for each country.

3.5.3 Sources of data

The data has been collected from two different sources as: data on GDP growth, Consumer price index, investment, population, trade openness and government expenditure is taken from World Development Indicators (WDI). The data on institutional quality is taken from International Country Risk Guide (ICRG) of Political Risk Services (PRS) Group.

Chapter 4

Empirical Findings

4.1   Introduction

This chapter discusses estimation and results that we carried out and the interpretation of these results. In section (4.2) we give the description of results which includes the estimation of non-linear relationship between inflation and growth and the threshold level of inflation and in section (4.3) the estimation of our second model, in which we examine the impact of institutional quality on threshold level of inflation, is discussed.

4.2   Estimation of results

We estimate non-linear association between inflation and growth and the turning point in their relation where inflation significantly affects growth for 55 developed, emerging and developing economies. As we find the relationship in non-linear way, the threshold regressive model is the best suitable method in sense of minimizing the residual sum of square. We also find out the impact of institutional quality on the threshold level that at what extent institutions matter to control inflation.

4.2.1   Threshold Regressive Model and Results

The Threshold Regression (TR) model describes a simple form of nonlinear regression featuring piece wise linear specifications. To estimate TR model, we have to arrange the data of inflation rate in ascending order and skipping the 15% of observation from top and bottom. Then we assign the dummies i.e. 0 or 1 to the remaining data set, and treat each observation as threshold

value. The value of dummy variable is 0 if value of inflation rate was less than the corresponding threshold value of inflation and vice-versa. Then we estimate our regression by including each dummy one by one to our model. From here, we get residual sum of square for each dummy. The results with minimum sum of squared residual hold the threshold value of inflation at which the response of central bank towards inflation has been changed. Fig. 4.1 shows residual sum of square and threshold level of inflation of USA. Here the minimum sum of squared residual for USA is 32.62 at which the inflation level is 2.67% which is also shown by figure (4.1). Hence, when inflation level exceeds from 2.67% the Fed's response toward inflation changes. This procedure has been done for each country to find out the threshold level of inflation.

Figure 4.1 Residual Sum of Square and Threshold Level of Inflation Rate for USA
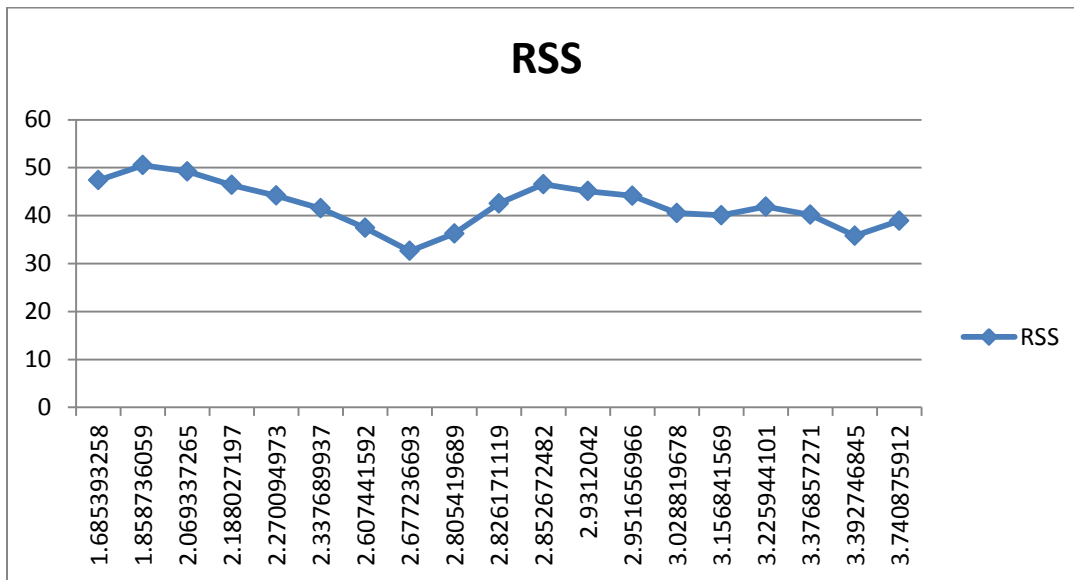
The estimation result of equation (3.1) for USA shows that the response of Fed is different from below and above 2.67% inflation rate. The response coefficient above the threshold level is -0.0194 with p-value 0.951 while response below the threshold is 0.8747 with p-value 0.073.

Table 4.1   Estimation Results of Threshold Regression

Nos.	Country	Threshold	Response coefficient above threshold	p-value	Response coefficient below threshold	p-value
1	Australia	4.38	-0.1556	0.4245	-0.4454	0.0948
2	Austria	2.4	0.2467	0.4219	0.7304	0.1539
3	Bangladesh	7.49	-0.0096	0.885	-0.092	0.337
4	Belgium	2.54	-0.7845	0.0095	-1.158	0.0163
5	Bolivia	3.35	-0.0256	0.000	-0.523	0.035
6	Botswana	8.02	-0.6243	0.218	-1.456	0.141
7	Brazil	147.1422	-0.0008	0.378	0.0399	0.049
8	Cameroon	4.786239	0.0096	0.914	0.6046	0.108
9	Canada	4.022667	-0.6198	0.034	-0.0362	0.918
10	China	7.219986	0.1632	0.01	-0.2433	0.161
11	Colombia	22.84786	0.2211	0.084	-0.3653	0.022
12	costa Rica	17.52249	-0.3025	0.026	-0.4601	0.03
13	Denmark	1.714031	-1.3909	0.01	-3.81	0.002
14	Dom. republic	7.572805	-0.130	0.005	0.3661	0.142
15	Ecuador	29.504	-0.0717	0.032	-0.156	0.068
16	Egypt	7.118156	-0.187	0.007	-0.380	0.076
17	el Salvador	3.750821	0.0366	0.727	-0.542	0.158

36

18	Finland	1.485033	0.5018	0.342	3.984	0.004
19	France	1.529639	0.3557	0.338	1.3068	0.089
20	Gabon	0.036683	0.3055	0.084	-0.252	0.553
21	Greece	2.895001	-0.7068	0.0005	-2.0299	0.002
22	Guatemala	5.98	-0.0175	0.607	-0.228	0.092
23	Honduras	11.41	-0.0093	0.902	0.2359	0.252
24	Iceland	3.85	-0.1903	0.44	0.9145	0.046
25	India	8.97	-0.1930	0.228	-0.4554	0.094
26	Indonesia	6.42	-0.3910	0	-0.8354	0
27	Ireland	3.12	-0.0224	0.942	1.0459	0.011
28	Italy	4.48	0.2856	0.288	-0.3498	0.3493
29	Japan	0.24	-0.8574	0.235	0.6287	0.638
30	Kenya	14.45	-0.0831	0.37	0.102	0.236
31	Korea	5.7	-1.4818	0.0004	-1.8796	0.002
32	Mexico	6.38	-0.0477	0.097	-0.9456	0.029
33	Morocco	5.14	0.4882	0.345	2.072	0.05
34	Netherland	2.32	0.1765	0.553	1.0962	0.056
35	New Zealand	3.96	-0.4484	0.002	-1.019	0.134
36	Norway	2.02	-0.4384	0.091	0.5214	0.456
37	Pakistan	9.69	0.0372	0.72	0.3816	0.025
38	Panama	0.391667	0.0766	0.876	-19.436	0.015
39	Peru	23.74	-0.0018	0.004	0.4334	0.015
40	Philippines	3.79	-0.2126	0.155	0.2521	0.585

41	Portugal	2.29	-0.0126	0.917	1.68	0.101
42	Senegal	0.73	-0.1786	0.036	-0.4908	0.276
43	Singapore	3.1	0.4047	0.249	2.6333	0.0001
44	south Africa	7.13	-0.6934	0	-0.9705	0
45	Spain	4.57	0.2808	0.139	-0.2814	0.26
46	Sri Lanka	12.18563	0.1438	0.135	0.3609	0.242
47	Sweden	1.16	-0.3124	0.197	2.546	0.037
48	Switzerland	0.23	-0.1482	0.544	3.268	0.07
49	Thailand	3.27222	-1.323	0.002	0.268	0.711
50	Togo	4.124615	0.5055	0.0002	0.12	0.984
51	Turkey	44.96	-0.0566	0.213	0.1102	0.352
52	UK	2.04	-0.554	0.001	0.1021	0.577
53	United States	2.67	-0.0194	0.951	0.8747	0.073
54	Uruguay	28.34	-0.0434	0.321	0.1503	0.225
55	Zambia	51	0.0428	0.069	0.1968	0.12

The threshold level of inflation is consistent with the empirical literature for developed countries and the targets they set for inflation threshold except Brazil and turkey. On the other hand, results of inflation threshold are stable for developing countries as compare to previous studies, while in some cases it comes out to be much higher as targeted by those countries. In case of Pakistan inflation targeting rule is not implemented by monetary authorities but the motive of

central bank is to keep the inflation in single digit range[3]. Chaudhry and Choudhary (2006) suggest that state Bank of Pakistan would not adopt inflation targeting, due to the growth rate of import prices which is one of the main determinant of inflation in Pakistan.

4.3 Threshold level of inflation and Institutional Quality

The estimated result of threshold regressive model yields the rate of inflation where the central bank response to inflation changes. Some monetary authorities response to inflation at very low rate whereas some respond until it crosses the certain level. A linear model has been estimated to find out how much institutional quality influenced the threshold level of inflation. We regress it by conceded inflation threshold as dependent and institutional variables, government expenditure and money supply as independent variables. The results are given in table (4.2). The regression analysis represents that institutional quality is helpful to hinder inflation threshold while government expenditure in insignificant but money supply is significantly affect inflation.

Table (4.2) presents the estimated results of eq. (3.2).

The above table provides the various institutional determinants which could explain the threshold level of inflation for world representative sample of countries. The coefficient of government stability and investment profile appear with negative sign which implies that both these determinants lowers the inflation threshold level, nevertheless the coefficient associated with government stability is insignificant thus, it has no significant effect on the threshold level of inflation. But investment profile significantly affects threshold level. Similarly, the coefficient of corruption is positive but it has also insignificant affect in determining the threshold level of inflation, while the law and order and democratic accountability has negative affect on the

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[3] Source: SBP Research Bulletin, 2009, vol. (5).

threshold level, and have insignificant effect on threshold level. Quality of bureaucracy yet has positive affect on threshold level which is something different from the previous studies while its coefficient is insignificant. Government expenditure has a positive effect on inflation threshold but insignificant. On the other hand money supply positively and significantly affects the threshold level.

Table 4.2 Estimation of inflation threshold and institutional quality

Variables	Coefficient	Standard Error	p-value
Constant	130.2316	36.36251	0.0008
Government stability	-1.706000	4.376418	0.6985
Investment profile	-7.319754	3.071540	0.0214
Corruption	6.013875	5.286225	0.2612
Law & order	-4.838381	3.837095	0.2137
Democratic Accountability	-2.282211	3.943268	0.5656
Bureaucratic quality	7.797797	5.579245	0.1689
Government expenditure	0.017676	0.698559	0.9799
Money supply	2.314054	0.485416	0.0000
R^2	Adj-R^2	F-Stat	Mean
0.452701	0.357519	4.756143	10.49421

In the second step we examine the impact of institutional quality on inflation threshold by taking single institutional indicator one by one.

Table 4.3 shows the empirical findings of eq. (3.3) the coefficient of government stability has negative but insignificant effects on the threshold level of inflation. Hence this determinant lowers the threshold level.

Table 4.3: Estimation Results of Government stability on Inflation Threshold

Variables	Coefficient	Standard Error	p-value
Constant	94.82245	26.31364	0.0007
Government stability	-2.569475	3.498301	0.4660
Government expenditure	0.297372	0.508194	0.5610
Money supply	2.294958	0.482730	0.0000
R^2	Adj-R^2	F-Stat	DW
0.344178	0.305600	11.41764	1.922954

Table 4.4 shows investment profile is negatively and significantly affecting the threshold level while government expenditure and money supply is positively associated with threshold level, but, only money supply has significant value.

Table 4.4: Estimation Results of Investment Profile on Inflation Threshold

Variables	Coefficient	Standard Error	p-value
Constant	98.85479	16.63319	0.0000
Investment profile	-4.642073	1.978997	0.0229
Government expenditure	0.395593	0.576520	0.4957
Money supply	2.213963	0.452435	0.0000
R^2	Adj-R^2	F-Stat	DW
0.401780	0.366591	11.41764	1.908378

Table 4.5 shows the coefficient of corruption is positive but it has also insignificant affect in determining the threshold level of inflation, and in the same way government expenditure and money supply is positively associated with threshold level, but only money supply is significant.

Table 4.5: Estimation Results of Corruption on Inflation Threshold

Variables	Coefficient	Standard Error	p-value
Constant	78.17220	15.06111	0.0000
Corruption	1.607557	2.793008	0.5674
Government expenditure	0.104916	0.715248	0.8840
Money supply	2.323564	0.479795	0.0000
R^2	Adj-R^2	F-Stat	DW
0.341518	0.302784	8.816949	1.992336

Table 4.6 represents that law and order has negative but insignificant sign to affect the inflation threshold and government expenditure and money supply is positively linked with threshold level.

Table 4.6: Estimation Results of Law and Order on Inflation Threshold

Variables	Coefficient	Standard Error	p-value
Constant	76.57941	14.96505	0.0000
Law & order	-2.855803	2.352469	0.2304
Government expenditure	0.159907	0.670556	0.8125
Money supply	2.201244	0.487031	0.0000
R^2	Adj-R^2	F-Stat	DW
0.355854	0.317963	9.391528	2.012893

Table 4.7 explains democratic accountability is negatively associated with threshold level but it is also insignificant and government expenditure and money supply are positive effects.

Table 4.7: Estimation Results of Democratic Accountability on Inflation Threshold

Variables	Coefficient	Standard Error	p-value
Constant	82.77717	15.60638	0.0000
Democratic accountability	-1.953666	2.282013	0.3959
Government expenditure	0.118568	0.590242	0.8416
Money supply	2.369624	0.467063	0.0000
R^2	Adj-R^2	F-Stat	DW
0.346630	0.308197	9.018962	2.003611

Table 4.8 shows Bureaucratic quality is also negative effect on threshold level which is similar to our theory but government expenditure has positive but insignificant results while money supply is positively and significantly affects threshold level.

Table 4.8: Estimation Results of Bureaucratic Quality on Inflation Threshold

Variables	Coefficient	Standard Error	p-value
Constant	77.73487	15.18838	0.0000
Bureaucratic quality	-1.556310	3.001334	0.6063
Government expenditure	0.190715	0.640707	0.7672
Money supply	2.311499	0.488655	0.0000
R^2	Adj-R^2	F-Stat	DW
0.340717	0.301935	8.785569	2.002819

As our results related to threshold level are ambiguous, therefore we again find out the threshold level of inflation by taking GDP per capita of each country instead on GDP growth and also drop down the variable of population from our growth regression model. So, our new model is:

$$GDP\_PC_{it} = \alpha_0 + \alpha_1\pi_{it} + \alpha_2 D\,(\pi_{it}\text{-}k)_{it} + \alpha_3 I_{it} + \alpha_4 TO_{it} + U_{it}$$

Table 4.9 Estimation Results of Threshold Regression

S.No.	Country	K	S.No.	Country	K
1	Australia	4.47	29	Japan	0.66
2	Austria	2.66	30	Kenya	14.02
3	Bangladesh	8.12	31	Korea	5.7
4	Belgium	2.78	32	Mexico	4.15
5	Bolivia	3.34	33	Morocco	5.14

6	Botswana	11.39	34	Netherland	2.32
7	Brazil	6.64	35	New Zealand	3.96
8	Cameroon	4.41	36	Norway	2.02
9	Canada	2.91	37	Pakistan	9.69
10	China	1.82	38	Panama	1.5
11	Colombia	22.84	39	Peru	3.65
12	Costa Rica	13.42	40	Philippine	3.79
13	Denmark	2.35	41	Portugal	2.29
14	Dom republic	7.57	42	Senegal	3.07
15	Ecuador	5.15	43	Singapore	3.1
16	Egypt	11.76	44	South Africa	7.13
17	El Salvador	4.49	45	Spain	4.57
18	Finland	4.08	46	Sri Lanka	12.18
19	France	2.37	47	Sweden	2.28
20	Gabon	5.03	48	Switzerland	1.54
21	Greece	4.77	49	Thailand	3.27
22	Guatemala	6.82	50	Togo	4.12
23	Honduras	6.76	51	Turkey	8.89
24	Iceland	2.29	52	UK	2.04
25	India	8.79	53	USA	2.67
26	Indonesia	9.68	54	Uruguay	8.09
27	Ireland	4.05	55	Zambia	13.39
28	Italy	4.02			

The above table shows the threshold level of inflation for our entire set of sample countries, here we can clearly see that the ambiguity has been disappeared and our results are consistent with the previous empirical studies. Previously diversification in threshold level occurs due to the size of population. In this context, in our sample size there are countries that have large number of population and on the other side there countries like Panama, Zambia, Togo and other which have very small population size.

Table 4.10 Threshold level of developed countries in ascending order

S.No.	Country	k	S.No.	Country	K
1	Japan	0.66	13	USA	2.67
2	Switzerland	1.54	14	Belgium	2.78
3	China	1.82	15	Canada	2.91
4	Norway	2.02	16	New Zealand	3.96
5	UK	2.04	17	Italy	4.02
6	Sweden	2.28	18	Ireland	4.05
7	Iceland	2.29	19	Finland	4.08
8	Portugal	2.29	20	Australia	4.47
9	Netherland	2.32	21	Spain	4.57
10	Denmark	2.35	22	Greece	4.77
11	France	2.37	23	Korea	5.7
12	Austria	2.66			

The threshold level of inflation for developed countries shows that Japan, Switzerland and china have very low inflation rate and Korea, Greece and Spain have slightly high inflation rate in the entire group of countries.

Table 4.11 Threshold level of inflation for developing countries in ascending order

S.No.	Country	K	S.No.	Country	K
1	Panama	1.5	17	Guatemala	6.82
2	Senegal	3.07	18	South Africa	7.13
3	Singapore	3.1	19	Dom republic	7.57
4	Thailand	3.27	20	Uruguay	8.09
6	Peru	3.65	22	India	8.79
7	Philippines	3.79	23	Turkey	8.89
8	Togo	4.12	24	Indonesia	9.68
9	Mexico	4.15	25	Pakistan	9.69
10	Cameroon	4.41	26	Botswana	11.39
11	El Salvador	4.49	27	Egypt	11.76
12	Gabon	5.03	28	Sri	12.18
13	Morocco	5.14	29	Zambia	13.39

14	Ecuador	5.15	30	costa Rica	13.42
15	Brazil	6.64	31	Kenya	14.02
16	Honduras	6.76	32	Colombia	22.84

The threshold level of inflation for developing countries shows that panama, Senegal and Singapore have very low inflation rate and Colombia, Kenya and Costa Rica have slightly high inflation rate in the entire group of countries.

Table 4.12 Estimation of inflation threshold and institutional quality for developed countries

Variables	Coefficient	Standard Error	p-value
Constant	26.28876	8.283789	0.0068
Government stability	-1.097228	0.599610	0.0886
Investment profile	-0.531391	0.302093	0.0104
Corruption	0.250529	0.616746	0.6907
Law & order	-1.012550	0.874957	0.2665
Democratic Accountability	-0.423799	0.580593	0.4775
Bureaucratic quality	-1.105811	0.840565	0.2095
Government expenditure	0.125955	0.081518	0.1446
Money supply	0.356677	0.115713	0.0081
R^2	Adj-R^2	F-Stat	Mean
0.645337	0.442672	3.184259	2.983478

Again a linear model has been estimated to find out how much institutional quality influenced the threshold level of inflation. We regress it by conceded inflation threshold as dependent and institutional variables, government expenditure and money supply as independent variables. The results are given in above table. The regression analysis represents that institutional quality is helpful to hinder inflation threshold while government expenditure in insignificant but money supply is significantly affect inflation.

The above table provides the various institutional determinants which could explain the threshold level of inflation for world representative sample of developed countries. The coefficient of government stability and investment profile appear with negative sign and also significant, which implies that both these determinants lowers the inflation threshold level. Similarly, the coefficient of corruption, law and order, democratic accountability and quality of bureaucracy have a sharp effect on inflation threshold but they are insignificant. Government expenditure has a positive effect on inflation threshold but insignificant. On the other hand money supply positively and significantly affects the threshold level.

Table 4.13 Estimation of inflation threshold and institutional quality for developing countries

Variables	Coefficient	Standard Error	p-value
Constant	-2.272173	11.26097	0.8419
Government stability	0.422272	1.432518	0.7708
Investment profile	1.255965	1.106895	0.2682
Corruption	1.581732	1.844877	0.4001
Law & order	-1.114108	1.247811	0.3812
Democratic Accountability	0.871330	1.262930	0.4971
Bureaucratic quality	0.449253	1.659228	0.7890
Government expenditure	0.297631	0.236640	0.2211
Money supply	0.270675	0.142306	0.0698
R^2	Adj-R^2	F-Stat	Mean
0.242811	-0.020559	0.921937	7.543438

Similarly, now we regress the impact of institutional quality on threshold level of inflation for developing countries. The coefficient of government stability and investment profile appear with negative sign but in case of developing countries they are insignificant. The direction of the coefficient of corruption and law and order are consistent with our results but they are also insignificant. Government expenditure has a positive effect on inflation threshold but insignificant. On the other hand money supply positively and significantly affects the threshold level. Democratic accountability and quality of bureaucracy have positive signs which implies better Democratic accountability and bureaucratic quality accelerate the inflation rate, which is ambiguous the reason should be that developing countries have not pay any attention to these institutions and they might not exist in these economies.

Chapter 5

Conclusion

This study estimated the effect of intuitional quality, which is helpful to contract the adverse effects of inflation on economic growth across countries. The main objective is tried to capture the role of institutions in reducing the inflation generally and the threshold level of inflation. For this purpose we estimated the threshold level of inflation for 55 developed and developing economies. The threshold regressive model has been estimated for each country's data set. The threshold value is the level of inflation at which the response of central bank towards inflation changes. In the next step we estimate the linear model to find out the impact of institutional quality on threshold level of inflation in aggregative way as well as each institutional indicator individually.

There is huge debate among policy makers and economists that the most crucial objective of the monetary policy is keep price stability as long as possible. The reaction of monetary authorities towards inflation changes when it crosses a certain limit. The empirical findings indicate the threshold level as 1-5 percent on advance economies while for emerging and developing economies it reaches to 28 percent which is little bit deviating from former studies.

After estimating threshold level of inflation we find the role on institutional quality and at what extent institutions are supportive to pull down the threshold level of inflation. Our results suggest government stability, investment profile, corruption, law and order, democratic accountability and bureaucratic quality have appropriate signs of coefficient according to our theory but only investment profile has a significant impact. The results are consistent in both ways when institutions have been taken together and when taken individually in linear threshold model.

These results are consistent to the theory of our model but variables are insignificant except investment profile and money supply. Other institutional indicators except investment profile are insignificant because they are important for the economic development of an economy they might be crucial for the perspective of output growth from previous studies. The sign of their coefficients are appropriate according to the theoretical framework of the study. Investment profile is significant hence, it is the most crucial institutional indicator to control inflation; while government stability, corruption, law and order, democratic accountability and bureaucracy quality also have other dimensions and these have social impacts on the economy. Thus, this is the reason these indicators have insignificant impact on threshold level of inflation.

Policy implications

With respect to the empirical findings to this study there are following policy implications that can be drawn from the results.

For policy makers the results indicates the importance of improving quality of political institutions in the presence of high quality of institutions; efficient bureaucracy maintaining law and order situations, low level of corruption central banks will be able to bring price low and stable and central bank respond to very low level of inflation without fiscal interference. High quality of institutions ensures high tax revenues and less reliance of government on borrowings. In the same way high quality of political institutions central bank will respond more strictly if inflation exceeds the target level. Stability of government and better conditions for investment plays the key role to control the inflation rate and also have significant impact on other real variables.

Future Research

We concluded the study on the impact of institutional quality in inflation growth nexus in which we analyze the effect on institutional indicators on inflation threshold level. However, this relationship can be analyzed in different ways. Future study can be conducted by increasing the sample size and with different group of countries like countries which have large and small population size, economies that use inflation targeting what is the difference in their institutional structure and other countries etc. we can also estimate the impact of institutional quality in the case of each single country.

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