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Abstract

As countries have become increasingly integrated in their capital accounts and moved away from fixed exchange rates, pressures mount on central banks to maintain an independent monetary policy. Amidst the constraints imposed by this monetary policy trilemma, the ability of central banks to take decisions independent of domestic political pressures becomes crucial. The literature suggests that the trilemma choices when opted carefully render the independence of central banks unnecessary in stabilizing macroeconomic outcome. For a sample of 42 high and middle income countries analyzed over a period of 30 years ranging from 1982 till 2011, this paper shows that while an efficient trilemma policy choice can help lower inflation and improve growth, the independence of central banks from the domestic political pressure, as measured in terms of the actual number of turnover of central bank governors, still matters. This is especially true of middle income countries. A less independent central bank can worsen the outcome derived from an effective trilemma policy choice. In addition, this paper shows that the institutional changes such as Inflation Targeting (IT) helps lower inflation without depending upon the level of Central Bank Independence (CBI) in a country as is suggested in the literature while the occurrence of general elections (ELEC) in any country exacerbates the macroeconomic outcome if a country grants lower autonomy to its central bankers.

Keywords: Central Bank Independence, Trilemma, Monetary Independence, Exchange Rate Stability, Capital Account Openness, Inflation Targeting, Elections

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1 Introduction

CBI has become the buzzword of the modern monetary policy institutions post the Global Financial Crisis (GFC) of 2008. The aftermath of the GFC has brought renewed interest in CBI as an institutional change in central bank regimes when the political interference in the monetary policy of the Federal Reserve was identified as one of the important factors responsible for the onset of the GFC. A vast amount of literature carried out over the last three decades lends credence to CBI as an effective strategy aimed at achieving a favorable macroeconomic outcome. However, with increasing integration of the global economy, both the high as well as middle income countries are struggling to cope with the problem of impossible trinity. Central banks world over operate within this monetary policy trinity that makes it difficult for them to achieve a stabilized macroeconomic outcome. Thus, it becomes important to grant sufficient autonomy to central banks from political pressure so as to allow an effective monetary policy decision making. While CBI forms a part of a country's domestic policy towards controlling inflation, its volatility and attaining higher growth, the trilemma policy choices form a part of external policy that has implications for outcomes pertaining to both inflation and output. Literature suggests that each of the trilemma policies can either be complementary or substitute to CBI thus raising doubts about the relevance of CBI within an efficient trilemma policy. In view of this argument, the purpose of this paper is to show that even though trilemma policies have a favorable impact on the macroeconomic outcome, CBI is very important in lowering inflation and improving growth. Infact, when combined with an efficient trilemma policy choice, a greater CBI is is successful in improving the overall macroeconomic performance of an economy. A less independent central bank can reverse the benefits arrived at using an effective monetary policy trilemma strategy.

What do we infer from the idea of central bank Independence? The notion underlying the concept of CBI is the freedom that a central bank has in pursuing its monetary policy with no interference from politics. Howells (2009) states that in practice the degree of independence is usually measured by the bank's freedom in setting the policy instrument without political interference. These definitions, however, do not preclude the accountability of central banks to the public. One of the main rationales for central bank independence is that elected officials are generally motivated by short-run electoral considerations and thus may value short-run economic expansions highly at the cost of longer run inflationary consequences of expansionary policies (Walsh 2005). Thus politicians have a tendency to either suppress or expel those central bank governors from their office whose objectives interfere with that of the government. A glance at the recent instances in different countries shows how central bankers face constant pressures from their incumbent governments over determining the stance of monetary policy. These cases, although, are more prevalent post GFC, there exist many such cases prior to GFC as well. For instance, in 2001, the Thai government sacked the governor of its central bank following a dispute over monetary policy claiming that he was not satisfied with the bank's policy of keeping interest rates low[1]. Post GFC, in 2009, the former governor of Iceland's central bank drew hatred from both government and people after being blamed for the island nation's spectacular financial meltdown last autumn [2]. In 2010, the governor of Argentina's central bank resigned on account of constant political pressures to hand over reserves to pay off debt[3]. Very recently in early 2014, Turkish Central

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[1]http://news.bbc.co.uk/2/hi/business/1357039.stm

[2]http://www.telegraph.co.uk/nance/newsbysector/banksandnance/5231082/Former-Iceland-bank-governor-David-Oddsson-defends-role-in-meltdown.html.

[3]www.ft.com/cms/s/0/91e7bf84-0d40-11df-af79-00144feabdc0.html.

Bank governor faced severe criticism from the Turkish Prime Minister for keeping high interest rates. It was feared that the Turkish government was eager to maintain its economic growth levels and propel investments ahead of the presidential election in August and parliamentary polls in 2015, which are the root causes of political polemics over decisions of the Bank[4].

In the light of this argument, the motivation for granting independence to central banks is to insulate the conduct of monetary policy from the political interference, that is, the interference motivated by the pressures of elections to deliver short-term gains such as maintaining overly ambitious levels of employment or to finance budget deficits irrespective of long-term costs. The idea of granting greater autonomy to central bank is not to allow central bankers to pursue any policy they prefer but to ensure that they are able to credibly commit to their goals – goal of price stability being the primary objective.

The theoretical underpinnings of the idea of CBI were discussed for the first time by Kydland and Prescott (1977) in their theory of time-inconsistency. Ricardo in 1824 identified the three pillars of central bank independence: institutional separation of the power to create money from the power to spend it; a ban on the monetary funding of the State budget; and the central bank's obligation to give an account of its monetary policy, however, not much institutional protection was given to central banks (Rossi, 2014). It was Keynes (1913, 1914), however, who was the first to put across the idea of central bank independence by suggesting that the banking business must be undertaken by experts. In the early 1930s, Keynes discussed the possibility of central bank independence in the case of the Bank of England, thereafter Keynes' view on CBI gained recognition and were widely accepted especially in the aftermath of the World War II. Thus, Keynes's (1932) proposal is an original contribution to the issue of central bank independence that is relevant to modern discussions (Arestis and Sawyer, 2006).

A more prominent debate regarding the independence of central banks started when the world confronted the collapse of Bretton Woods system in the beginning of 70s, followed by two oil shocks in the 70s. Among the number of explanations offered to explain this great inflation, the most significant was that of Kydland and Prescott's (1977) and Barro and Gordon's (1983) theory of time inconsistency that demonstrated monetary authority's policy decisions are often time-inconsistent because of rational expectations that is the policies that were observed to be optimal when they were announced are no longer be perceived to be optimal when the time comes to implement them thus generating an inflation bias. They argue that the central bank needs some commitment technique to achieve optimal monetary policy over time Rogoff (1985) in his seminal work suggested that central banks should be independent to deal with the inflationary bias due to the time inconsistency problem which is possible by hiring a 'conservative' central banker, putting greater weight on stabilization of inflation than society does. This was followed by the period of 'Great Moderation' in much of the industrialized world starting early 80s until 2007 just before the GFC which was the result of central banks' greater focus on price stability, and their increased independence that was seen as a crucial to limit inflation bias.

Does the independence of a central bank matter? This is one area in the field of monetary economics that has sparked as much debate yielding as little consensus. Several authors including Bade and Parkin (1982), Alesina (1988, 1989), and Grilli, Masciandaro, and Tabellini (1991) found that more independent central banks are associated with lower levels of inflation. Alesina

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and Summers (1993) pointed out that greater CBI reduces the level of inflation with no cost or benefits in terms of real macroeconomic performance. They also cautioned that CBI may also be an endogenous variable and the resulting low inflation could also be because of a country's aversion to inflation. Some studies such as (Cukierman, 1992; Posen, 1995; Campillo and Miron, 1997; Forder, 1998b) demonstrated that the relationship between CBI and inflation is not robust with regard to control variables and the choice of countries. Hayo (1998) argued that some countries have preference for low inflation rates and thus it's the preexisting inflation culture that determines whether independent central banks will be set up. As far as more recent literature is concerned, Zervoyianni, Anastasiou and Anastasiou (2012) showed that CBI has no favorable effect on employment growth, it, however, increases output volatility following supply-side shocks. Alpanda and Honig (2014) argued that CBI is not a prerequisite to experience significant decline in inflation for the countries following the practice of IT.

Despite the mixed results shown in the existing literature, there are evidence that indicate that the countries that conferred lower autonomy to their central banks also experienced greater inflation during those periods. Some of the developing countries, Latin American countries in particular, are a case in point. For instance, in countries such as Brazil, France, India, Turkey etc, the years that witnessed a high rate of turnover of central bank governors (de facto measure of CBI) coincided with the high inflationary years (See Figure 1 in 2 for more details). From figure 1 it is evident that a lower CBI as measured by the turnover of central bank governors can prove detrimental in containing inflation which is the prime mandate of the central banks. Evidently, some of the countries such as Brazil, Hongkong etc do not even specify any legal tenure for their central bank governor. This also hints at the convenience that the government enjoys in firing any central bank governor in case they do not abide by the government's orders.

Besides the challenges faced by the central bankers on the domestic front that interferes with the ability of central banks to use their monetary policy in order to stabilize the economy as observed above, the challenges faced by the central banks on the international front as a result of the gradual dismantling of controls on capital flows and the associated widening of international capital markets leading to greater dependence on international market conditions, greater monetary policy coordination across countries and increased volatility of exchange rates pose the problem of monetary policy trilemma that exacerbates the problems of central bankers in stabilizing their macroeconomic outcome. These external challenges impact both inflation and growth depending upon the domestic and the international macroeconomic conditions. These challenges are even more pronounced in case of middle income emerging market economies owing to their incapacity in dealing with the shocks emanating from the external as well as domestic environment due to their relatively small economic size (Chinn 2014). Central banks operate within the constraints of trilemma, thus the ability of central banks to take independent decisions become crucial within these constraints. This operational constraint imposed by monetary policy trilemma, the fundamental contribution of the Mundell-Fleming framework in the early 1960s, restricts the ability of central banks in their inability to simultaneously achieve the following three factors: - exchange rate stability (ERS), capital account openness (KAOPEN) and monetary independence (MI)[5] as

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[5]The definition of Central Bank Independence (CBI) in this paper refers to the freedom that central banks have in pursuing their policy independent of political interference. Due to the lack of data on a more comprehensive measure, this paper uses a partial measure of CBI - actual turnover of central bank governors (number of governors changed in a year) as a de facto measure of CBI. The notion of CBI differs from MI which is one of the monetary policy trilemma indicators and refers to the ability of the central bank of a country to pursue its monetary policy irrespective of the changes in the global interest rates (this paper uses U.S. as the base country that the monetary

seen in the figure 2. The trilemma induces a trade-off, that is, increasing the weightage of one trilemma variable lead to a drop in the weighted average of the other two. For instance, if a country has fixed exchange rate and open capital markets, its interest rate must follow that of the base country (U.S. in this paper) leading to a loss in its monetary autonomy. In other words, a nation cannot have it all. This trilemma in the monetary policy is explained in the figure 2. Each of the corners of the triangle above represents one of the three policy choices. A government can choose to be on any of the sides of the triangle: a floating exchange rate with free capital flows and capital mobility (side a); monetary autonomy with capital mobility but floating exchange rates (side b); or monetary autonomy and a pegged exchange rate, but with capital controls (point c).

Aizenman, Chinn, and Ito (2008) showed that major crises in the last 4 decades - the collapse of Bretton Woods system, the debt crisis of 1982 and the Asian crisis of 1997-78 - caused structural breaks in the configuration of the trilemma indices. Similarly, the GFC of 2008 has also led developed, emerging and developing economies to opt for a variety of trliemma policy configurations to ensure greater macroeconomic stability. For instance, the developed economies that enjoyed greater capital account openness along with monetary policy autonomy before GFC opted for greater exchange rate stability post GFC sacrificing autonomy of their monetary policy. Similarly, some of the emerging and developing economies achieved the intermediate levels of all three factors in order to solve the problem of impossible trinity in the aftermath of GFC. However, the problem remains as all countries are striving to achieve the best combination of all three trilemma policy choices to be able to achieve greater macroeconomic stability. The three indices that form monetary policy trinity – MI, ERS and KAOPEN have implications for macroeconomic outcomes – inflation, inflation volatility and growth along with their possible interaction with CBI as suggested in the literature. For instance, there are mixed evidence in the literature about the relationship between CBI and ERS. While there is one strand of literature that suggests complementarity between the two, the other supports substitutability between them (Bodea 2006, Bearce 2008, Plumper and Neumayer 2008). Similarly, there exist interaction between CBI and KAOPEN. Higher KAOPEN increases the financial vulnerability of the economy because foreign and local investors can easily shift their investments abroad when political pressures affect central bank policy. Therefore, one might expect a positive correlation between KAOPEN and CBI (Klein 2004). Thus, as per existing literature, while the relation between CBI and ERS can be of either substitutes or complements, there is a positive relation between CBI and KAOPEN as a country with greater levels of CBI makes it attractive for investors (Bodea and Hicks, 2015). And as far as the relation between CBI and MI are concerned, although both measures represent independence of central banks – CBI being the measure of domestic independence and MI being a measure of independence from international pressure strictly with respect to interest rates, that is, the freedom to decide domestic interest rates that may or may not be in line with the interest rates of base country – base country being USA in this paper, there may or may not be any correlation between the two. However, theoretically, monetary policy independence should follow from domestic CBI.

Against this backdrop, the purpose of this paper is to empirically examine if the independence of central banks from the political pressure on the domestic front help stabilize the economy in terms of lower inflation and inflation volatility and improved growth within the open economy challenges thrown by the problem of impossible trinity for a sample of 42 high and middle income countries for the period 1982-2011. Using fixed effects methodology, this paper finds that given

policies of the rest of the world are linked with).

the monetary policy trilemma, a lower CBI, as measured by the actual number of turnover of the central bank governors, leads to higher inflation and low growth; however, it has no impact on inflation volatility except when the periods of very high inflation are included in the sample, although, the results are mostly driven by middle income economies as most of the high income countries had already conferred greater autonomy on their central banks. The results are robust to the exclusion of hyper-inflationary periods and this finding contradicts the findings in the existing literature that postulates that higher CBI lowers inflation only when periods of very high inflation are included. This paper concludes that a trilemma policy choice aimed at producing a favorable macroeconomic outcome accompanied by lower CBI produces inferior outcome as opposed to a policy that combines an average level of stable exchange rates and monetary independence with an average level of CBI. Greater focus on achieving higher ERS and MI while neglecting CBI will not help achieve a favorable macroeconomic outcome and thus CBI is relevant and even more so for middle income economies. The results are however ambiguous in case of KAOPEN. The results also show that institutional changes such as the adoption of Inflation Targeting (IT) regime leads to an improved macroeconomic outcome without depending upon the level of CBI whereas the occurrence of general elections leads to greater inflation for those economies that confer lower autonomy to their central bankers.

Most of the existing studies that combine CBI and monetary policy trilemma - two different strands of literature – are theoretical in nature, however, this paper empirically examines the importance of CBI and the possible interaction between CBI and the monetary policy trilemma. The rest of the paper is organized as follows. Section 2 presents the theoretical and empirical literature. Section 3 goes on to discuss the data used, review the methodology used to carry out the evaluation, and presents the model and its results, as well as robustness checks (introduces alternative measure of CBI). Section 4 concludes.

2   Literature

The period of 1990s marks the beginning of the revolution that occurred when the monetary policymaking institutions altered the conventional ways of conducting central banking. There was a growing consensus on the increased significance of central bank independence (CBI) in ensuring low and stable inflation rates as well as reduced volatility of both inflation and growth. Earlier central banks were functioning as a part of the government used the policy instruments necessitated by the very government to achieve myriad objectives such as low inflation, low unemployment, greater output and financial stability besides acting as a lender of last resort to the government. Price stability objective was one among several other objectives in the charter of the Bank and had no particular status. In some cases, like Spain and Norway, it did not even appear in the charter (Cukierman, 2007). However, the hyperinflationary periods in the past induced a greater quest for price stability. In fact, it was during this period that the countries realized the importance of granting greater independence to their central banks as an effective institutional device for achieving stability in prices. Inflation Targeting was one step in this direction initiated by the Reserve Bank of New Zealand that formally announced a specific target for inflation in 1990s, followed by Canada in 1991, United Kingdom in 1992 and so on under persistently high inflation. Some countries such as UK, Sweden, and Finland etc introduced inflation targeting along with abandoning their fixed exchange rate regime, because of its failure to control inflation, to adopt

a floating exchange rate system. The objective was to ease the political pressure on the central banks to allow them to focus on controlling inflation along with sending a more credible signal to the public while keeping them accountable in case the inflation targets are not achieved. The developing countries, especially Latin American countries such as Brazil, Mexico, and Venezuela etc followed suit in late 1990s. Infact, from 1989 to the present, around 35 CB laws were revised or rewritten, and all in one direction, namely strengthening the independence of the CB. It is true about the industrial countries, Latin American countries, East European countries and finally the East Asian countries. The steps taken By India such as the agreement in 1994 between the Government of India and the Reserve Bank of India (RBI) on the termination of the system of automatic monetization of the fiscal deficit (adhoc treasury bills) from 1997 and the introduction of a system of Ways and Means Advances, the introduction of the Fiscal Responsibility and Budget Management Legislation (FRBM Act 2003), which aims at the medium-term management of the fiscal deficit, revenue de cit and prohibition of CB lending to the government, greatly adds to RBI's independence from the fiscal authority (Jiji Matthew).

There is an extensive literature that suggests various finer definitions of CBI covering a variety of aspects affecting the autonomy of a central bank. The pioneering contribution in constructing the indices of CBI was made by Bade and Parkin (1988) as they codified the legal independence of central banks of 12 industrial countries on the basis of following measures: whether the final authority on the conduct of monetary policy is the government or the central bank, how much leverage does the government exercise via control over the appointment and removal of the members of the monetary policy board and the financial and budgetary relations between the central bank and the government. This index was further used by Alesina (1988, 1989) as he included four more countries to their sample. Grilli, Masciandaro and Tabellini (1991) also constructed a legal index of CBI that was an aggregate of political and economic independence where political independence refers to the appointment and dismissal procedures of the governors and board members and political independence relates to the influence of the government in implementing monetary policy. A more comprehensive definition of CBI comprises following three aspects personnel independence (influence of government in appointment procedures of central bank), financial independence (pressures on central bank to finance government expenditures through central bank credit) and policy independence (maneuvering room that a central bank has in the formulation and execution of its monetary policy) (Eij nger and Haan, 1996). Drawing on these aspects, Cukierman (1992) and Cukierman, Webb and Neyapti (1992) developed another comprehensive measure of legal independence based on 16 legal characteristics of central banks that they found was a better indicator of CBI in industrial nations. However, given the inherent problem that what is mandated by law may be very different in practice a de facto measure based on the turnover of central bank governors was developed on the basis that frequent turnover may reflect the ring of those who choose to challenge the government (Cukierman, Webb and Neyapti, 1992, and Sturm and de Haan, 2001). The turnover rate also reflects the extent to which the government complies with the law's specification of the governor's term of office (Cukierman, Webb and Neyapti, 1992). Most of the literature afterwards used these existing indicators - either individually or taking a weighted average of these indicators in order to measure CBI - by extending them over a larger sample of countries as well as over recent years.

Several authors including Bade and Parkin (1982), Alesina (1988, 1989), and Grilli, Masciandaro, and Tabellini (1991) found that more independent central banks are associated with lower levels of inflation. Alesina and Summers (1993) pointed out that greater CBI reduces the level of inflation

with no cost or benefits in terms of real macroeconomic performance. They also cautioned that CBI may also be an endogenous variable and the resulting low inflation could also be because of a country's aversion to inflation. The Germany during its hyperinflationary periods is a case in point. However, the relation between inflation and CBI or output and CBI depends a great deal on the measure of CBI used. For instance, Cukierman (1992) argues that legal independence measures is a better proxy for actual independence in industrial countries and is a significant determinant of price stability in these countries. As an alternative, Cukierman (1992) and Cukierman et al. (1992) have therefore developed a yardstick for central bank autonomy which is not based on central bank laws but on the actual average term of o ce of the central bank governor. This indicator is based on the presumption that, at least above some threshold, a higher turnover of central bank governors indicates a lower level of independence. The indicator based on turnover of central bank governors contributes significantly to explaining inflation in developing countries. This indicator is also less than perfect, as it suffers from the limitation that central bank governors can last a long time in their positions simply by being subservient to political leaders (Brumm, 2000).

There also exists a huge literature that casts doubt on CBI as an effective policy measure that lowers inflation and produces a favorable macroeconomic outcome. Sturm and de Haan (2001) examined the role of influential observations in determining the relation between CBI and inflation for developing countries using turnover rate of central bank governors as indicator for CBI in a multivariate model. They concluded that the well-known significant relationship between CBI and in flation generally disappears in our sample of developing countries. The influential observations appear to be mostly high inflation countries. Hayo and Hefeker (2001) argued that CBI is neither necessary nor sufficient for reaching monetary stability. CBI is just one potentially useful monetary policy design instrument among several and it should not be treated as an exogenous variable. By taking the endogeneity of CBI into account, there is no reason to believe the correlation between CBI and low inflation tells us anything about causality. Zervoyianni, Anastasiou and Anastasiou (2012) suggest that lower inflation should be seen as resulting from a broad-range of institutional and structural factors, with CBI failing to play the key role and that that central-bank independence has no favorable effect on employment growth, while it increases output volatility following supply-side shocks. Alpanda and Honig (2013) examined the impact of inflation targeting (IT) on inflation in both advanced and emerging economies by differentiating the impact of IT on the basis of degree of CBI a country enjoys. Their study, however, finds that CBI is not a prerequisite for countries to experience significant declines in inflation following the adoption of inflation targeting. They also provide evidence that one channel through which inflation targeting lowers inflation more in countries with low central bank independence is the reduction of budget deficits following the adoption of an inflation target. Martin (2015) also found that increasing the independence of a central bank from political influence, although ex-ante is socially beneficial and initially successful in reducing inflation, would ultimately fail to lower inflation permanently. The smaller anticipated policy distortions implemented by a more independent central bank would induce the fiscal authority to decrease current distortions by increasing the deficit leading to increase in inflation to accommodate a higher public debt.

As far as the impact of trilemma indices on the macroeconomic variables is concerned, Aizenman, Chinn and Ito (2008) examined the impact of policy choices on macroeconomic outcomes such as the volatility of output growth and inflation, and medium term inflation rates with greater monetary autonomy dampening output volatility and causing higher levels of inflation and greater

ERS and KAOPEN lowering the inflation level. These results, however, contrast from the results obtained in this paper. In addition, there are country-specific studies, for instance, Hsing (2012) concluded that in case of Greece more ERS does not affect the inflation rate, the growth rate, inflation volatility and output volatility. Higher MI reduces output volatility and more financial integration reduces inflation, inflation volatility and output volatility.

The literature provides evidence of interaction between CBI and the trilemma indices. Bodea and Hicks (2015) posit that besides domestic factors, reforms to increase CBI are driven by several mechanisms that can be linked to countries' perceived need to be more attractive to capital investors. They, however, considered only one trilemma policy choice, that is, KAOPEN as opposed to all the trilemma indices considered in this paper. They argue that greater CBI attracts international capital. Bearce (2008) in his paper explored whether fixed exchange rate commitments and CBI have functioned more as institutional complements or as substitutes in achieving exchange rate stability. Focusing on the advanced industrial democracies in the post-Bretton Woods era and using different measures of exchange rate regimes, he concluded that these two monetary institutions should have functioned in a non-complementary, but substitutable, manner with regards to this external policy goal. His conclusion contrasts with that of the argument presented in this paper that CBI and ERS are complementary as long as there exist average level of both CBI and ERS, however, ERS will be complementary to CBI at a very high level of CBI. Plumper and Neumayer (2008), however, claimed that CBI (using turnover rate of central bank governors as the measure of CBI) and de facto fixed exchange rates are complements since independent central banks care more than governments about imported inflation. Bernhard, Broz and Clark (2001) state that since the collapse of the Bretton Woods monetary system in the early 1970s, countries have experimented with a variety of monetary institutions, including alternative exchange rate arrangements and different levels of CBI and these both can be thought of as alternative forms of monetary delegation. However, in practice, countries often adopt intermediate institutions that fall between the extremes: cases of completely independent or dependent central banks are as rare as cases of pure floating or perfectly fixed exchange rate regimes. This argument is in line with the conclusion arrived at in this paper that an efficient policy choice for a country is to maintain an average level of both monetary institutions – CBI and ERS. This conclusion, however, is more robust in the context of middle income countries.

The next section would discuss the empirical data and the methodology used in the paper to assess if CBI matters in achieving a stable macroeconomic outcome and how does monetary policy trilemma interacts with CBI.

3   Empirical Analysis

3.1   Data

This paper uses annual time series data for 42 high and middle income countries over the period 1982 - 2011. The reason a mix of countries – high and middle income countries – is chosen is to be able to assess if the results differ across both categories. The high income countries in the sample are mostly those countries that enjoy greater CBI and have also adopted IT. This helps assess if CBI is important in achieving an effective economic outcome and if the adoption of IT,

that is a movement towards achieving greater CBI has any effect on macroeconomic outcomes. One set of countries in the middle income category are Latin American countries. Most of the Latin American countries have sufficiently independent central banks and also adopted IT either in later 90s or early 2000s. In addition, most Latin American countries also went through a period of hyper-inflation in the 90s and the literature argues that the negative impact of CBI on inflation is significant due to the inclusion of hyper-inflationary years experienced by the Latin American countries. This paper, however, shows that the result still holds even after correcting for outlier years that is the years that experienced very high inflation. Some other middle income countries are those that have granted partial independence to their central banks and are on the way to adopting IT. The sample time period starts from 1980s as most of the industrialized countries went through period of great moderation and it was during this period that central banks were granted greater autonomy in these countries after which rest of the countries followed suit. The data post 2011 is not available for all the variables in the sample.

The dependent variables considered are the rate of inflation, volatility of inflation and the growth rate of real per capita Gross Domestic Product (GDP) as these three variables are either directly or indirectly impacted by the central bank decisions. While the reason for choosing rate of inflation and inflation volatility as the dependent variables is straightforward: stabilizing inflation is the prime mandate of the central banks of any country, the choice of growth rate of per capita GDP, however, is not so straightforward. Cukierman (1993) posits that a-priori considerations do not produce a clear cut relationship between CBI and growth. Where on the one hand, by reducing inflation and associated nominal uncertainty, CBI may enhance the efficiency of resource allocation and encourage investment and thus can have a positive impact on growth, greater CBI may reduce the long run growth by reducing the score for policies to maintain full employment and to encourage investment directly on the other. Thus, it is ambiguous a-priori which way CBI will affect real growth. The rate of inflation is the annual growth rate of consumer price index, inflation volatility is the annual standard deviation of the monthly rates of inflation and output growth is the annual growth rate of per capita GDP. The data for monthly and annual CPI has been taken from International Financial Statistics (IMF) and annual per capita GDP from the World Bank World Development Indicators (WDI).

Using Fixed Effects panel data approach to control for omitted variable bias[6], this paper empirically examines if the independence of central banks matters in producing a favorable macroeconomic outcome within the external constraints imposed by problem of the monetary policy trinity. The variable representing CBI is measured as number of actual turnover of governors of the central banks constructed by Dreher, Sturm and Haan (2012) for a very large sample of countries. The CBI indicator based on turnover rate of central bank governors would entail actual independence experienced by the governors of central banks as opposed to legal indicators available that may or may not coincide with reality. In order to ensure the robustness of the results, this paper also uses an additional indicator of CBI -Irregular Turnover of central bank Governors (IRTD) that takes into account the removal of governors before their legal term is finished, that is, only the irregular component of the governor turnovers as opposed to the indicator - actual turnover of governors (ATO) - that also takes into consideration the legal turnover (regular component) along with the

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[6]In this paper, the omitted variable bias arising out of unobserved heterogeneity can be attributed to difference in the characteristics of the countries, for instance, the literature suggests that some countries can have lower inflation due to their inherent aversion to inflation. The inherent nature of the countries can differ which is reflected in the different objective functions of the countries and this can be taken care of by a Fixed Effects model.

irregular turnover of governors (irregular component). The irregular turnover is a dummy variable also constructed by Dreher, Sturm and Haan (2012) that assigns a value 1 to the years when the governor was removed before his legal term and 0 to the rest of the years.

The external constraint that interacts with CBI comes from the impossible trinity that represents the inability of the countries to choose all the three available trilemma choices simultaneously – MI, ERS and KAOPEN. The two of the three trilemma indicators - MI and ERS are based on the measures formulated by Aizenman, Chinn, and Ito (2008) as follows – MI is measured as the reciprocal of the annual correlation of the monthly interest rates between the home country and the base country (U.S.)

In order to calculate MI indicator, monthly money market interest rates are used, the data for which has been obtained from Global Financial Database (World Bank). ERS is measured as the annual standard deviations of the monthly

$$MI = 1 - \frac{corr(i_i, i_j) - (-1)}{1 - (-1)}$$

Exchange Rate Stability (ERS) is measured as the annual standard deviations of the monthly exchange rate between the home country and the base country normalized between zero and one:

$$ERS = \frac{0.01}{0.01 + stdev(\triangle(log(exch.rate))}$$

The monthly exchange rates data is used to calculate the annual ERS indicator which has been obtained from Global Financial Database (World Bank). This paper uses de facto measure of KAOPEN which is measured as the sum of portfolio, FDI, debt and other capital outflows and inflows as a percentage of GDP. The data for outflows has been taken from Lane and Milesi - Ferretti (2011). All the three indices are normalized between 0 and 1.

Besides, this paper also examines if the introduction of IT regime and the occurrence of elections have any impact on the macroeconomic outcome. The GFC of 2008 has also led a debate about the success of IT as a strategy in controlling inflation and its volatility. However, there are very few studies (Alpanda and Honig, 2014) that empirically assess the success of IT as a monetary policy strategy in the presence of the political pressures that the central bankers face. Most of the studies do not distinguish between de facto CBI and IT. Legal CBI and IT, however, may be similar to some extent – legal CBI takes into account the independence central banks have in deciding their own policy (mostly inflation) targets. Infact, CBI can be perceived as a necessary pre-condition for the central bankers to target inflation. This paper examines if the adoption of IT regime helps control inflation and improve growth and if the presence of political pressure on central banks as measured by the number of turnovers of central bank governors act as a constraint on achieving the benefits from IT.

As far as the impact of elections is concerned, this paper examines the existence of political monetary cycle. Nordhaus (1975) argued that within an incumbent's term in office there is a predictable pattern of policy, starting with relative austerity in early years and ending with the potlatch right before election. This trend is evident in figure 2 in Appendix 2 not only for middle income but also for high income economies. It is apparent from figure 2 that in the periods immediately before

the election years, the incumbent government pressurized central banks to loosen their monetary policies, which is evident in the inflation spurt either immediately before or during election period, in order to stimulate the economy. For instance, in case of Australia, this phenomenon is evident for the following years - 1983, 1989, 1995, 2000 and 2006 - the years when the spurt in inflation almost coincided with election years and in year 2009, the spurt in inflation is visible immediately before the year of election. A similar phenomenon can be seen for other countries – Austria, Brazil and South Korea in the figure 3. The existence of these political monetary cycles interferes with the objectives of central banks in achieving a stabilized outcome and the outcome is worse if a central bank is not independent. Infact, most of the irregular turnovers of the central bank governors coincide with the election periods as the incumbent governments expels those governors who do not abide by the objectives of the government. Figure 3 in Appendix 2 elucidates this trend for various countries such as Australia, Austria, Brazil, and South Korea. The irregular removal of the governors, that is, the removal of governors before the completion of their legal term took place almost immediately after the year general elections occurred in these countries. For Austria, the general elections in the years 1989, 1998 and 2007 almost immediately preceded or coincided the expulsion of its central bank governors. The idea is to say that for most countries, the removal of governors before their legal tenure took place immediately after the elections thus suggesting pressure on the governors to be submissive to the governments. Thus, there exist interaction between the CBI and elections. A low CBI worsens the negative impact of elections on the macroeconomic outcome. Thus, the purpose overall is to ascertain how other institutional factors such as IT and occurrence of elections interact with CBI. Both these factors interfere with monetary policy that is the prerogative of central banks in affecting the overall macroeconomic outcome. This paper shows that CBI is not important in order to improve the benefits achieved from IT while a lower CBI can exacerbate the negative effects of elections. Both these variables – IT and elections (elec) are dummy variables where IT takes a value of 1 from the year countries introduced IT till the time a country revokes it and zero otherwise and the elec[7] takes a value of 1 in the years in which general elections occurred in a country and 0 otherwise. The data concerning the years when the countries in the sample adopted IT regime has been pooled from the websites of some of the central banks and from various papers (see references).

3.2   Methodology

In order to assess the significance of CBI in achieving a favorable macroeconomic outcome, this paper uses fixed effects panel data estimation technique in order to control for unobserved heterogeneity as explained above. The following regression equations have been estimated for this purpose:

$$Y_{it} = \beta_0 + \beta_1 \; CBI_{it} + \beta_2 \; TIME \; DUMMIES_{it} + \alpha_i + \epsilon_{it} \tag{1}$$

$$Y_{it} = \beta_0 + \beta_1 \; MI_{it} + \beta_2 \; ERS_{it} + \beta_3 \; KAOPEN_{it} + \beta_4 \; TIME \; DUMMIES_{it} + \alpha_i + \epsilon_{it} \tag{2}$$

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[7]The data with respect to formulating election dummy has been sourced from www.electionguide.org.

$$Y_{it} = \beta_0 + \beta_1 \; CBI_{it} + \beta_2 \; MI_{it} + \beta_3 \; ERS_{it} + \beta_4 \; KAOPEN_{it} + \beta_5 \; TIME \; DUMMIES_{it} +$$
$$\alpha_i + \epsilon_{it}$$
$$(3)$$

In addition to above, we also examine the interaction of CBI with each of the trilemma indices – MI, ERS and KAOPEN in order to examine if CBI matters within the presence of monetary policy trilemma. Equation 4 includes CBI, each of the trilemma indices and the interaction of each of the trilemma indices with CBI. However, for our purpose, we will be sequentially adding the interaction of CBI with each of the trilemma indices to understand how the results change with each addition.

$$Y_{it} = \beta_0 + \beta_1 \; CBI_{it} + \beta_2 \; MI_{it} + \beta_3 \; ERS_{it} + \beta_4 \; KAOPEN_{it} + \beta_5 \; CBI_{it} * MI_{it} + \beta_6 \; CBI_{it} * ERS_{it}$$
$$+\beta_7 \; CBI_{it} * KAOPEN_{it} + \beta_8 \; TIME \; DUMMIES_{it} + \alpha_i + \epsilon_{it}$$
$$(4)$$

where Y is the dependent variable - rate of inflation measured as the y-o-y growth of consumer price indices, inflation volatility measured as the annual standard deviation of monthly rate of inflation and growth rate of per capita GDP is the y-o-y growth of per capita real GDP. The CBI is the index representing independence of central banks measured as the number of actual turnovers of central bank governors (ATO). The MI, ERS and KAOPEN are the trilemma indices measuring Monetary Independence, Exchange Rate Stability and Capital Account Openness respectively. The CBI*MI, CBI*ERS and CBI*KAOPEN are the interaction terms indicating the interaction between the index of central bank independence and each of the trilemma indicators. The interactions between CBI and the three trilemma indices help assess if the significance of CBI persists over change in the stance of a country with respect to its choice of trilemma policy, that is, whether CBI matters within the constraints of trilemma.

Besides controlling for country-specific fixed effects, all regression specifications mentioned above control for time specific effects (TIME DUMMIES) as well and these time effects take into account structural breaks - all financial, banking and currency crisis that have taken place over the sample period. In each of the specifications, the variables are added sequentially to examine the robustness of each explanatory variable included in the model. The models have been estimated using fixed effects approach as it is assumed that the country specific heterogeneity (individual effect) is correlated with the regressors in which case Fixed Effects model is more adequate instead of Random Effects model that assumes that there does not exist such correlation. The Hausman Test also validates the use of fixed effects. The standard errors obtained are heteroscedasticity and autocorrelation consistent. Correcting for heteroscedasticity also controls for any potential problems that may arise as a result of outliers in the sample by allocating lower weights to outliers. In addition, the sample is restricted to observations with annual inflation of less than or equal to 60 percent in order to handle outliers. Restricting the sample to a higher inflation cut-off of 100 percent leads to relatively robust results.

The estimations have been conducted separately for high and middle income countries as the middle income countries that have been known to experience periods of hyper-inflation and thus make a case for separate analysis.

4   Estimation Results

The purpose of this paper is to examine if CBI is significant in improving macroeconomic outcome within the presence of monetary policy trilemma. In addition, it also examines the impact of IT and ELEC – two additional institutional factors that interfere with monetary policy on the macroeconomy and how does this impact vary with the level of CBI.

Section 4.1 presents the results for the baseline scenario. In this section, the paper shows that CBI matters within the trilemma constraints and even when the trilemma combinations contribute towards stabilizing inflation as well as output, loss of CBI can exacerbate the economic outcome. Thus, having an independence central bank matters and especially for middle income countries that experienced a very high inflation over the sample period 1982-2011. This section also shows CBI interacts with each of the three trilemma indices – MI, ERS and KAOPEN. Lastly, in this section, we also examine how the results obtained for the entire sample of countries change when the sample is divided into high and middle income countries. Section 4.2 presents additional analysis for other institutional factors – IT and ELEC that interfere with monetary policy to examine how their interaction with CBI can affect the macroeconomic outcome. Section 4.3 presents robustness checks. In this section, we use a different indicator of CBI – Irregular turnover of central bank governors and show that the results obtained in section 4.1 hold good.

4.1   Baseline Results

4.1.1   Rate of Inflation

Table 1 presents the results obtained by estimating equation 1-4 above for all countries when the rate of inflation is the dependent variable for the period 1982-2011.

[Insert Table 1 here]

The significant positive coefficient of the measure of CBI index in table 1 suggests that an increase in the number of turnovers of central bank governors (lower CBI) worsens inflation on an average by about 2-5 percent, that is, lower is the CBI, higher is the increase in the rate of inflation. This effect is positive and significant across almost all specifications (Model 1-7) ensuring the robustness of the CBI indicator. The magnitude of the coefficient of CBI increases by a great extent once the interaction of CBI with the trilemma indices is included in the regression (Model 4-7), the highest when all the interactions are included in the model (Model 7). Considering all countries together, however, ignores the heterogeneity in the sample. Table 2 shows that the impact of CBI on inflation differs across middle and high income countries. The literature suggests that impact of CBI on inflation does not exist for high income countries. The CBI coefficient becomes significant only when the interaction term CBI*MI is included as evident from model 4 and 7 in table 2. This indicates that CBI may not be significant in explaining the changes in inflation for these countries which is possible as most of the high-income countries had already granted sufficiently higher levels of independence to their central banks especially post great moderation years of 1980s. However, as far as middle income countries are concerned, the CBI indicator is significant across almost all specifications with a very high coefficient (5-9 percent) suggesting that lower CBI

worsens inflation in middle income countries, it may, however, be not so much of a problem when it comes to high income countries. This result is likely as most of the middle income countries granted significant independence to their central banks post mid 1990s. Cukierman, Webb and Neyapti (1992) obtained a similar result using the turnover rate of central bank governors as a measure of CBI. In Latin American countries central bank reform became, during the 1990s, a key component of the new economic agenda in most Latin American countries. The objective of the reform was to restore confidence in monetary policy and thereby wage a successful war on inflation. As a result of the reforms, Latin American central banks became more independent from their governments—to a greater degree in some countries than in others (Carstens and Jacome H., 2005). Figure 1 in Appendix 2 reveals that for countries like Brazil, India, Turkey etc the high rate of turnover of central bank governors coincided with the high rate of inflation clearly suggesting that a low CBI can make the inflation outcome worse. For instance, from the year 1988 till the year 1999, Brazilian Central Bank had a new governor almost every year and this was also the hyper-inflationary period in Brazil. Although Brazil is one of the countries where the central bank act does not define any legal term of office for their central bank governors, but the turnover of the governors at such a high rate is evidence to the fact that there existed a huge political pressure on the Brazilian monetary policy to comply with the government's objectives. And thus there is a positive correlation between high turnover of governors (low CBI) and high inflation. Similar trend is apparent in Turkey as well. In the period of high inflation that is from the year 1992 till 1998, the Turkish central bank had three new governors within a short span of time. The central bank act of Turkey defines the legal term of their central bank's governor as 3 years before 1994 which was extended to 5 years from 1995 onwards. Such a rapid change in the governors points out to the existing political pressure on central bankers in Turkey9[8]. Figure 3 in Appendix 2 shows that similar trend exists for other countries such as India and even for a developed country like France.

[Insert Table 2 here]

The difference in the results for high and middle income countries can also be attributed to the presence of relatively stronger accompanying institutional framework in the high income countries that ensure stability of prices. For instance, the presence of currency boards, a conservative treasury and stable exchange rates might have led to more stable prices in these countries.

As far as the impact of trilemma indices on the rate of inflation is concerned, Table 1 for all countries shows that while increase in both MI and ERS seem to have a significant negative impact on inflation, the impact of ERS being consistent across all models (increase in ERS leads to a decline in inflation by about 4-6 percent on an average), increase in KAOPEN, however, leads to an increase in inflation by about 2-3 percent. The literature shows mixed evidence with respect to the impact of MI and KAOPEN on inflation; greater ERS, however, consistently seem to play an important role in reducing inflation. The impact of KAOPEN on inflation on an average depends upon the degree of sterilization undertaken by any country. Countries may sterilize because of their concern about the ability of the domestic banking system to intermediate and manage the extra liquidity prudentially and/or because the increased liquidity may lead over time to economic

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[8]The period from 1988 till the year 1992, although, was in inflationary, there was, however, no change in Turkey's central bank's governor for 6 years (from the year 1987 to 1993) while their legal term was only 3 years which might indicate that a central banker could remain in o ce by being subservient to the ruling government. However, this doesn't deny the possibility of political pressure on central bankers.

overheating and a buildup of inflation pressures (Glick and Hutchison, 2008). Sterilization is used as a popular policy by many countries that aims to mitigate inflationary pressures, the real exchange rate appreciation and to avoid the loss of capital flows over the domestic money stock (Doojav, 2008).

[Insert Table 1 here]

Table 2 shows that after controlling for country-specific and time effects, trilemma indices have no impact on inflation in case of high income countries, however, when it comes to middle income countries, both MI and ERS (ERS being consistently significant across all models) have a negative impact on inflation with KAOPEN having no impact on inflation. While MI leads to a decline in inflation on an average by about 3 percent and ERS by about 4-6 percent across models 1-7. Thus, it appears that the case that the results in table 1 are mostly driven by middle income countries.

[Insert Table 2 here]

Countries strive to choose a trilemma policy combination that yields most stable macroeconomic outcome. However, the interaction between CBI index and trilemma indices in table 1 reveal that even though different trilemma combinations manage to produce benefits in terms of lowering inflation over decreasing values of CBI, lower CBI will lead to worsening of the overall economic outcome. This is evident in the significant positive coefficient of CBI index even after controlling for possible interaction between CBI and trilemma indices. While the coefficients of both interactions, that is, CBI*MI and CBI*ERS have a significant negative impact on inflation, lowering it by about 4 percent in case of CBI*MI which is much higher than the coefficient of MI alone (about 1 percent) and about 6 percent in case of CBI*ERS which is also greater than the coefficient of ERS alone (about 4-6 percent), suggesting that there could be a possible substitutability between CBI and trilemma indices, the coefficient of CBI index, however, is still significant and positive and causing a significant increase in inflation by about 4-5 percent leading to the conclusion that CBI matters and a lower autonomy to central bank governors might lower or reverse the positive benefits of choosing an efficient trilemma policy combination (greater MI or ERS). This suggests that a policy combination of an average level of CBI along with an average level of ERS might lead to a more favorable outcome than choosing either policy measure alone. (Bernhard, Broz and Clark, 2001) mentioned that while CBI and ERS may not be perfect complements, they partially complement each other. In practice, countries often adopt intermediate institutions that fall between the extremes: cases of completely independent or dependent central banks are as rare as cases of pure floating or perfectly fixed exchange rate regimes. Analyzing a pooled cross-section of 106 countries over the period 1974 to 2005, Plumper and Neumayer (2008) also claimed that central bank independence (using turnover rate of central bank governors as the measure of CBI) and de facto fixed exchange rates are complements since independent central banks care more than governments about imported inflation. The complementarity can also be suggested between CBI and MI as CBI forms a part of the independence of central banks from the political pressure (domestic independence) and MI frees the central banks from necessarily following the base country's interest rates (external independence) and domestic independence is a pre-condition to achieving external independence.

[Insert Table 1 here]

Table 1 also reveals that greater capital account openness leads to an increase in inflation while the coefficient of the interaction term CBI*KAOPEN is insignificant. Literature presents mixed evidence as the impact of KAOPEN on inflation. Rodrik (1998) showed that there is no evidence that economies with greater capital account convertibility have lower inflation whereas Grilli and Miles-Ferretti (1995) find a negative relationship between KAOPEN and inflation. Thus, it is difficult to say with certainty if greater KAOPEN leads to increase in inflation as resulted in table 1. Moreover, the insignificant term -CBI*KAOPEN suggests that there does not exist any interaction between CBI and KAOPEN whereas literature suggests that a higher level of CBI makes a country appear attractive to investors (Klein 2004).

The interactions between CBI and trilemma indices also produce slightly different results when estimated separately for high and middle income countries (refer table 2 here). The interactions CBI*MI and CBI*KAOPEN are significant in reducing inflation for high income countries while CBI*ERS plays no role in containing inflation in these countries (Even though ERS is an important monetary institution in the hands of policy makers). In case of middle income countries, however, the interactions – CBI*MI and CBI*ERS have been found to be significant in reducing inflation. This difference between high and middle income countries may be useful in selecting an appropriate country-specific monetary institution that can help control inflation. One of the reasons why CBI has no impact on inflation in case 0f high income countries is the presence of a strong alternative institutional mechanisms such as currency boards, an conservative treasury that lends support to monetary policy in controlling inflation and reduce the need for granting greater autonomy to the central banks.

[Insert Table 2 here]

4.1.2 Inflation Volatility

Table 3 below shows the results when inflation volatility is the dependent variable.

The CBI in table 3 has no impact on the volatility of inflation when the sample is restricted to a rate of inflation of 60 percent, however, when the sample is expanded to included rate of inflation below 100 percent, the increase in turnover of central bank governors (low CBI) lead to an increase in inflation volatility. Out of the three trilemma indices, only increase in KAOPEN leads to deteriorate volatility of inflation. Again, the literature presents mixed evidences regarding the impact of KAOPEN on inflation volatility. This result does not change when analyzed separately for high and middle income countries.

[Insert Table 3 here]

4.1.3 Growth Rate of Per Capita GDP

This paper also examines the impact of CBI on the growth rate of per capital GDP; however, it seems unlikely that CBI will have a direct impact on the growth. CBI promotes economic growth

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not directly but through fostering a stable price environment conducive to long-term investment required for growth (Obben, 2006). Results are shown in table 4.

[Insert Table 4 here]

As evident from table 4, lower CBI (increase in the turnover of central bank governors) leads to reduction in growth by about 1-2 percent. The magnitude of the coefficient of CBI once again increases when the interaction of CBI with the trilemma indices is included in the model (Model 4-7), the highest being in model 7 when the interaction of CBI with each of the trilemma indices is included in the model. This effect is consistent across all models 1-7 in case of middle income countries, however, only in few models in case of high income countries (results not shown). This result is almost similar to what we obtained when inflation was the dependent variable (Lower CBI increased inflation by a much greater extent in case of middle income countries as compared to high income countries).

Among the trilemma indicators, MI has no effect on growth, greater ERS has a significant positive impact on growth, and greater KAOPEN has a significant negative impact on growth. With regard to the impact of exchange rates on growth, Dubas (2005) develop an effective de-facto classification of exchange rate regimes to investigate the growth effects of these de facto regimes and the deviations of declared and actual exchange rate policies. He found that developing countries with de facto regimes of fixity grow relatively faster. For the period 1973-1998, Bailliu (2003) found that fixed rates are associated with higher growth for a sample of 60 countries. As far as the impact of KAOPEN on growth is concerned, institutional quality has played a very important role in explaining the causal link between capital account liberalization and economic growth (Saidi, 2013). Lee and Jayadev (2005) found little evidence that capital account liberalization can spur growth in cross-country regressions. They presented partial evidence that capital controls can spur growth in more homogeneous countries, and countries with better institutions, and higher corporate debt ratio. Eichengreen and Leblang (2003) suggested that effects of capital account liberalization on growth are contingent and context specific. The impact of capital account liberalization on growth is more likely to be positive when the domestic financial markets are well developed and regulated and the operation of the international financial system is smooth and stable. It is more likely to be negative when domestic and international financial markets are subject to crises. Thus, the impact of KAOPEN on output growth is ambiguous. Comparing this result over high and middle income countries reveals that ERS seem to have a significant positive impact on growth in case of both middle income countries with KAOPEN having a negative impact on growth only in case of middle income countries. MI doesn't have any impact on growth in case of both high and middle income countries (The results with respect to growth have not been shown separately for high and middle income countries. Only consolidated results for all countries are shown in table 3.)

The interaction terms - CBI*MI and CBI*ERS although have a positive coefficient indicating that over decreasing CBI, MI and ERS lead to an improved per capita growth, once again suggesting a possible substitutability between CBI and trilemma indices – MI and ERS, however, the coefficient of CBI is still negative once again showing that CBI matters for improved growth, albeit indirectly. Thus, once again, even though trilemma configurations strive to achieve an improved real economic activity, lower CBI leads to reduced growth. In case of high income countries only CBI*ERS has a significant positive impact on growth, however, in case of middle income countries, while the

coefficient CBI*ERS is consistently significant and positive in explaining growth, the coefficient of CBI*MI is significant and positive only in model 4, the coefficient of CBI*KAOPEN is significantly negative in all the models. Literature suggests that the impact of KAOPEN on growth depends upon the presence of strong institutions and one of these is CBI. Low CBI may lead to a decline in the attractiveness of a country from the investment point of view. However, more research needs to be undertaken in this area by taking into account the sterilization interventions undertaken by any economy in response to capital flows.

4.2 Additional Analysis

This paper undertakes additional analysis by examining the effects of IT and ELEC on the macroeconomic outcome and how does these interact with CBI. In this section, we estimate the following two equations:

$$
\begin{aligned}
Y_{it} = \beta_0 + \beta_1\ CBI_{it} + \beta_2\ MI_{it} + \beta_3\ ERS_{it} + \beta_4\ KAOPEN_{it} + \beta_5\ CBI_{it} * MI_{it} + \beta_6\ CBI_{it} * ERS_{it} \\
+ \beta_7\ CBI_{it} * KAOPEN_{it} + \beta_8\ IT_{it} + + \beta_9\ CBI_{it} * IT_{it} + \beta_{10}\ TIME\ DUMMIES_{it} + \alpha_i + \epsilon_{it}
\end{aligned}
$$

$$(5)$$

$$
\begin{aligned}
Y_{it} = \beta_0 + \beta_1\ CBI_{it} + \beta_2\ MI_{it} + \beta_3\ ERS_{it} + \beta_4\ KAOPEN_{it} + \beta_5\ CBI_{it} * MI_{it} + \beta_6\ CBI_{it} * ERS_{it} + \\
\beta_7\ CBI_{it} * KAOPEN_{it} + \beta_8\ ELEC_{it} + \beta_9\ CBI_{it} * ELEC_{it} + \beta_{10}\ TIME\ DUMMIES_{it} + \alpha_i + \epsilon_{it}
\end{aligned}
$$

$$(6)$$

where the IT and ELEC are the dummy variables representing years of IT and the years of elections respectively where CBI*IT and CBI*ELEC reflect the interaction of thee index of central bank independence with IT and ELEC respectively. The rest of the variables are same as the previous equations.

4.2.1 Inflation Targeting (IT)

4.2.1.1 Rate of Inflation Table 5 shows that the adoption of IT regime as a means to empower central banks to focus on inflation does have a positive outcome in terms of reducing inflation and this is true for both high and middle income countries although the impact is much bigger in case of middle income countries. While the IT reduces inflation by about 6 percent on an average in case of middle income countries, it is about 3 percent in case of high income countries. Alpanda and Honig (2014) do not detect significant effects in advanced economies and only found small benefits in emerging economies. This, however, differs from the results obtained here that show the impact of IT being sufficiently large and significant for both high and middle income countries. Alpanda and Honig (2014) also find that when they differentiate the impact of inflation targeting based on the degree of central bank independence, there are large effects in emerging economies with low central bank independence. Low CBI may strengthen the impact of IT as a result of the improvement effect, i.e. that IT may bring about greater fiscal or institutional changes in low CBI countries, which substantially improve macroeconomic conditions. However,

we find that the interaction term CBI*IT is insignificant and thus the impact of IT on inflation is not dependent on the level of CBI. Thus, IT, which is a step in the direction of granting greater autonomy to central banks from the policy perspective, does have a favorable impact in terms of reducing inflation, however, it doesn't interfere with CBI in affecting inflation. In addition, even after controlling for the effects of IT on inflation, the coefficient of CBI is still significant implying that CBI still matters even if a country adopts IT regime.

[Insert Table 5 here]

Lastly, IT doesn't seem to have any significant impact on the volatility of inflation and since IT is purely a monetary phenomenon, it is unlikely that it will have any significant effect on growth.

4.2.2 ELECTIONS (ELEC)

The occurrence of elections, as suggested in the literature, coincides with the spurts in inflation. This phenomenon is captured in the political monetary cycles that explain the increase in inflation immediately before the elections. Table 6 shows that while the occurrence of elections have no direct impact on inflation, occurrence of elections when the central bank is not independent exacerbates inflation (the coefficient of the interaction term CBI* ELEC in table 6 is positive and significant to the tune of 2 percent), although this result is induced by middle income countries. The elections exacerbate the inflation outcome by about 5 percent when the central banks have low autonomy from in case of middle income countries. This suggests the existence of political monetary cycles in middle income countries. This result is in line with Alpanda and Honig (2009) that examines the extent to which monetary policy is manipulated for political purposes during elections. They do not detect political monetary cycles in advanced countries or developing nations with independent central banks. They do find evidence, however, in developing countries that lack central bank independence.

[Insert Table 6 here]

4.3 Robustness Checks

This paper also explores the robustness of the results obtained in the section 4.1 and 4.2 only when the dependent variable is inflation since this is the prime mandate of central banks. Although the results hold even when we use per capita GDP as the dependent bariable. For this purpose, an alternate CBI indicator - Irregular Turnover of central bank governors Dummy (IRTD) is used that takes a value 1 if the governor of a central bank was expelled before he finished his legal tenure and a value of 0 otherwise. This indicator only takes into account the irregular component of the governor turnover as opposed to actual turnover of governors variable that that takes into account both regular (legal turnover) and irregular component of the turnover of central bank governors. There are very few papers that use IRTD as an index of CBI. Most of the papers use ATO - the de-facto measure of CBI.

4.3.1   Rate of Inflation

Table 7 and 8 in Appendix 1 present the estimation results when the dependent variable is rate of inflation. The analysis in the previous sections holds true even if a variant of CBI indicator is used. As table 6 shows, the coefficient of IRTD is significant across all models suggesting that on an average IRTD leads to an increase in inflation. Even the magnitude of the coefficient is almost similar to what is obtained in table 1 when actual turnover of governors was used as the CBI index.

[Insert Table 7 here]

The results differ slightly when analyzed separately for high and middle income countries. Table 7 shows that when IRTD is used as a measure of CBI, it is no longer significant in any of the models (1-7) in case of high income countries. This implies that the irregular removal of central bank governors is not so much of a problem with high income countries. However, the result is almost similar in case of middle income countries as it was when ATO was used as CBI indicator corroborating the fact that central banks face political pressure in these countries thus enjoying low autonomy leading to worsening of inflation outcome. This result confirms that CBI is important in ensuring low inflation.

[Insert Table 8 here]

As far as the impact of trilemma indices on inflation is concerned, once again the results are similar as the ones obtained when ATO was used as a measure of CBI (see table 9). While increased in both MI and ERS has a significant negative impact on inflation (the impact of ERS being consistent across all models), KAOPEN leads to an increase in inflation. Table 6 would show that these results are mostly driven my middle income countries. As far as the interaction of IRTD with trilemma indices is concerned, the results are slightly different for this measure of CBI. While table 8 shows that only IRTD*MI and IRTD*ERS have a significant negative impact on inflation, however, only IRTD*MI is significant in case of high income and IRTD*ERS is significant in case of middle income counties.

[Insert Table 9 and 10 here]

Even if we use a different indicator for CBI, the IRTD*IT remains insignificant implying that IT doesn't interact with CBI while IT coefficient remains significant and has a negative impact on inflation. The same holds for both high and middle income countries. As far as impact of ELEC on inflation is concerned, the coefficient of ELEC remains insignificant, however, the interaction effect – IRTD*ELEC no longer exists. This result, however, contradicts with the trend evident in figure 4 in Appendix 2 where the irregular removal of central bank governors coincided with the election years. However, when ATO was used as an indicator for CBI, the interaction term CBI*ELEC has a significant positive impact on inflation. This points to the fact that a shorter legal duration for central bank governors (the regular portion of the the indicator - ATO that comprises the legal duration of the central bank governors) leading to much faster increase in their turnover can have a worsening impact on inflation especially during elections. One policy

improvement that can be done in this direction is to allow a sufficiently longer legal duration for central bank governors. Politicians sometimes, for their convenience, choose to specify a shorter term of office for the governors of central bankers. A central bank is considered more politically independent the longer the governor's term in office, and the less dependent from the government are the procedures for his appointment and dismissal (Jacome and Vazquez, 2005).

We also used a legal measure of CBI which is a more comprehensive indicator than the de facto indicator - ATO - use in this paper and measures independence granted to central banks on the basis of legal documents. This indicator was developed by Cukierman, Webb and Neyapti (1992) and data for this indicator is compiled by Bodea and Hicks (2015) till the year 2008. The results show that this measure of CBI has no impact on neither inflation nor growth for both high as well as middle income countries. This was predicted as legal independence may not translate into actual independence. This is especially true of middle income countries.

5   Conclusion

There has been a recurrent demand for greater autonomy from politics by the central bankers all over the world especially post the GFC of 2008. Against this view, this paper is aimed at examining if the independence of central banks matters in improving the macroeconomic outcome that is reducing inflation, volatility of inflation and improving growth and how does CBI interacts with the monetary policy trilemma. This question is important from the policy point of view. The trilemma indices have been found to have an impact on the macroeconomic outcome and the existing literature debates that these indices interact with CBI either acting as a constraint on it or by complementing it and consequently affect the economic outcome. This paper attempts to examine these debates.

The empirical estimation in this paper shows that given the monetary policy trilemma, CBI is an important determinant of the macroeconomic outcome especially inflation and indirectly contributes towards improving the per capita GDP growth. Low CBI also exacerbates the volatility of inflation although only when the periods of very high inflation are included in the sample. Restricting the sample to an inflation rate of 60 percent does not show any significant impact of CBI on inflation, however, when the sample is expanded to include rate of inflation upto 100 percent, the coefficient of CBI becomes significant, that is low CBI leads to increase in the volatility of inflation.

One of the primary goals of this paper is to assess the importance of CBI in the presence of external monetary policy constraints thrown by the impossible trinity. While the trilemma indices MI, ERS and KAOPEN also have strong influence on inflation and output growth with no impact on inflation volatility, low CBI, however, leads to the reversal of the positive outcome achieved by an efficient trilemma policy combination leads us to conclude that an effective combination of a policy that includes an average level of CBI and average level of trilemma indices - MI and ERS would enable a better macroeconomic outcome instead of a policy that has either greater CBI or greater MI and ERS. It is true that when both MI and ERS are at their maximum limits (1 in this case since their values lie between 0 and 1), there would be maximum reduction in inflation, however, according to the monetary policy trilemma, when there is capital account openness, either there will be loss of monetary policy independence or the exchange rates will have to float. Thus, the

solution in this case is to attain a middle ground - an average level of both MI and ERS along with an average level of CBI.

The analysis is also carried out separately for high and middle income countries, however, suggests that the impact of both CBI and trilemma choices is in fact stronger for middle income countries but is not completely insignificant for the high income countries. While MI and ERS out of the three trilemma indices lead to better economic outcomes in case of middle income countries, only MI seem to be a significant factor in explaining the macroeconomic outcome in case of high income countries. However, out of the three trilemma indices, ERS seem to have a consistent impact in improving the economic outcome in terms of lowering inflation and improving output especially for middle income countries. The result that a combination of an average level of CBI and ERS would lead to an improved outcome is in line with the literature that claims that CBI as measured in terms of the number of turnovers of central bank governors and fixed exchange rates are complements since independent central banks care more than governments about imported inflation (Plumper and Neumayer, 2008). The same can be said about a policy that combines an average level of CBI and MI, however, the impact of KAOPEN on macroeconomic policy is ambiguous. The end result, however, on the basis of empirical estimations in this paper is that greater CBI is essential in lowering inflation and to contribute indirectly to a greater economic growth.

Lastly, this paper also shows that IT contributes positively towards lowering inflation and improving output growth in both high and middle income countries. However, the level of IT is not dependent upon the existing level of CBI, as measured by the number of turnovers of central bank governors, in a country as opposed to what literature suggests. But even after controlling for IT, CBI still matters and a low CBI can lead to high inflation. The election years do induce a spurt in inflation especially in middle income countries and this effect worsens if a country doesn't have central banks that are free from political pressures.

The results in this paper are robust even after controlling for country fixed effects and time effects that may capture all currency, banking and financial crises in addition to any other structural breaks that may have happened during the sample period. The results also hold true when a different indicator of CBI is used. These results, however, are contrary to a volume of previous literature that proved that central bank independence is not important. A potential argument could be the difference in the control factors used in previous literature as opposed to this paper as well as the use of different CBI indicators. The results in this paper are in agreement with the seminal paper by Cukierman (1992) who also concluded that the indicator based on turnover of central bank governors contributes significantly to explaining inflation particularly in developing countries.

Given the empirical evidence in this paper, it is clear that the political pressures on central banks is a problem for all the countries, middle income countries in particular, and this presents a case for granting greater freedom to central banks by reducing the constant turnovers of central bank governors if their objectives and monetary policy actions differ from that of governments'. Governments' should refrain from pressuring central banks to change their policy stance towards achieving their short term gains of getting reelected. In addition, the central bank governors should enjoy a sufficiently large term in office. In most countries, the term in office of the central bankers as well as their appointments are specified by the governments so politicians can easily replace central bank governors at their convenience. And a shorter term in office indicates lower

autonomy for central banks (Jacome and Vazquez, 2005). Not only this, it appears that trilemma configurations and the CBI are complementary to each other and together over a more improved solution in stabilizing the macroeconomic outcomes. Lastly, the move towards IT of both high and middle income countries in the decade of 1990s and still continuing is a welcome step towards reducing inflation and pulling growth up.

The impact of KAOPEN on inflation and other macroeconomic outcomes has been shown to be ambiguous in this paper as the impact of KAOPEN on macroeconomic variables also depends on the degree of sterilization undertaken by any economy which has not been considered in this paper. In addition, how does CBI interacts with KAOPEN is not very clear at the moment. Literature also presents ambiguous results in this direction. There are a very studies that have been carried out in this area recently- Bodea and Hicks, 2015, however, more research needs to be done in order to examine the impact of openness of capital accounts on inflation and related macroeconomic variables.

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Appendices

Appendix 1

Table 1: Rate of Inflation: All Countries, 1982-2011 (CBI Indicator - Actual Turnover of Governors)

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Actual Turnover of Gov. (ATO)	1.452**		0.902*	2.616**	3.002*	0.758	5.217***
	(0.61)		(0.50)	(1.14)	(1.50)	(0.85)	(1.82)
Monetary Independence (MI)		-1.201*	-1.136*	-0.389	-1.089*	-1.124*	-0.366
		(0.60)	(0.62)	(0.60)	(0.61)	(0.63)	(0.59)
Exchange Rate Stability (ERS)		-5.719***	-5.591***	-5.606***	-4.205***	-5.572***	-4.267***
		(2.09)	(1.97)	(1.91)	(1.45)	(1.89)	(1.49)
Capital Account Openness (KAOPEN)		2.899*	2.904*	2.829*	2.835*	2.822	3.019*
		(1.61)	(1.64)	(1.62)	(1.62)	(1.78)	(1.74)
ATO * MI				-4.193**			-4.269***
				(1.79)			(1.51)
ATO * ERS					-6.308*		-6.358**
					(3.49)		(2.97)
ATO * KAOPEN						0.348	-1.1
						(2.36)	(1.84)
Constant	9.846***	11.86***	11.60***	11.16***	11.10***	11.63***	10.55***
	(0.99)	(1.16)	(1.12)	(1.10)	(1.03)	(1.19)	(1.09)
Observations	1,147	1,123	1,079	1,079	1,079	1,079	1,079
Number of countries	42	42	42	42	42	42	42
Adjusted R squared	0.232	0.209	0.22	0.227	0.226	0.219	0.232

[a] Note: Robust standard errors in parentheses
[b] Note: ***p <0.01, **p <0.05, *p <0.1

Table 2: Rate of inflation: High and Middle Income Countries, 1982-2011 (CBI Indicator - Actual Turnover of Governors)

Variables	High Income Countries							Middle Income Countries						
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Actual Turnover of Gov. (ATO)	0.461		0.0333	1.008*	1.524	0.646	3.901*	2.64**		2.004*	4.896*	5.720**	0.875	8.740**
	(0.62)		(0.24)	(0.51)	(1.11)	(0.45)	(2.01)	(1.16)		(1.07)	(2.47)	(2.22)	(1.80)	(3.39)
Monetary Independence (MI)		-0.433	-0.327	0.109	-0.319	-0.389	0.145		-3.262***	-3.102***	-1.81	-3.014***	-3.003***	-1.87
		(0.62)	(0.66)	(0.59)	(0.65)	(0.68)	(0.59)		(0.91)	(0.86)	(1.25)	(0.92)	(0.91)	(1.25)
Exchange Rate Stability (ERS)		-3.484	-3.712	-3.86	-2.322	-3.797	-2.433		-6.765**	-6.246**	-6.137**	-4.293*	-6.196**	-4.253*
		(2.72)	(2.76)	(2.76)	(3.33)	(2.76)	(3.33)		(3.03)	(2.67)	(2.56)	(2.24)	(2.60)	(2.31)
Capital Account Openness (KAOPEN)		1.705	1.968	2.079	1.986	2.28	2.597		1.885	1.867	1.587	1.655	1.189	1.672
		(2.48)	(2.57)	(2.57)	(2.56)	(2.62)	(2.62)		(1.45)	(1.63)	(1.67)	(1.61)	(2.01)	(1.81)
ATO * MI				-2.445*			-3.111**				-6.825			-6.256**
				(1.27)			(1.44)				(3.96)			(2.89)
ATO * ERS					-4.988		-5.724					-9.706**		-9.504**
					(3.87)		(4.03)					(4.11)		(3.42)
ATO * KAOPEN						-1.607*	-2.407**						2.412	-0.955
						(0.88)	(1.15)						(3.86)	(2.46)
Constant	9.646***	10.14***	10.22***	10.02***	9.822***	10.09***	9.313***	10.33***	14.77***	13.83***	12.92***	12.96***	14.15***	12.02***
	(0.998)	(1.182)	(1.221)	(1.254)	(1.304)	(1.233)	(1.400)	(2.010)	(2.238)	(2.118)	(2.114)	(2.002)	(2.241)	(2.134)
Observations	758	774	738	738	738	738	738	389	349	341	341	341	341	341
Number of countries	27	27	27	27	27	27	27	15	15	15	15	15	15	15
Adjusted R squared	0.286	0.259	0.264	0.268	0.266	0.266	0.273	0.222	0.205	0.221	0.231	0.238	0.221	0.244

[a] Note: Robust standard errors in parentheses
[b] Note: ***p <0.01, **p <0.05, *p <0.1

Table 3: Inflation Volatility: All Countries, 1982-2011 (CBI Indicator - Actual Turnover of Governors)

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Actual Turnover of Gov. (ATO)	2.438		2.462	5.734	1.44	5.464	10.27
	(1.768)		(2.041)	(4.603)	(1.348)	(4.961)	(8.751)
Monetary Independence (MI)		-1.068	-1.039	0.385	-1.062	-1.284	0.49
		(1.161)	(1.112)	(0.362)	(1.136)	(1.326)	(0.390)
Exchange Rate Stability (ERS)		-0.13	0.531	0.503	-0.143	0.143	-0.115
		(1.582)	(1.867)	(1.808)	(1.344)	(1.712)	(1.338)
Capital Account Openness (KAOPEN)		0.557	0.346	0.204	0.38	2.068**	2.330**
		(1.470)	(1.596)	(1.689)	(1.573)	(0.814)	(0.908)
ATO * MI				-8.006			-10.35
				(6.334)			(8.236)
ATO * ERS					3.069		0.558
					(4.482)		(3.134)
ATO * KAOPEN						-7.283	-9.141
						(7.278)	(8.445)
Constant	1.019	2.234***	1.244	0.417	1.487**	0.574	-3.429
	(0.761)	(0.590)	(0.883)	(1.414)	(0.660)	(1.502)	(3.033)
Observations	1,147	1,123	1,079	1,079	1,079	1,079	1,079
Number of countries	42	42	42	42	42	42	42
Adjusted R squared	0.0319	0.0043	0.026	0.0458	0.0263	0.0487	0.232

[a] Note: Robust standard errors in parentheses
[b] Note: ***p <0.01, **p <0.05, *p <0.1

Table 4: Growth Rate of Per Capita GDP: All Countries, 1982-2011 (CBI Indicator - Actual Turnover of Governors)

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Actual Turnover of Gov. (ATO)	-0.585**		-0.329	-1.216**	-1.644***	0.0909	-2.246***
	(0.28)		(0.28)	(0.45)	(0.56)	(0.34)	(0.80)
Monetary Independence (MI)		0.345	0.335	-0.0521	0.305	0.301	-0.0548
		(0.32)	(0.33)	(0.34)	(0.33)	(0.33)	(0.34)
Exchange Rate Stability (ERS)		2.385**	2.220*	2.230*	1.345	2.164*	1.399
		(1.09)	(1.11)	(1.11)	(1.05)	(1.13)	(1.05)
Capital Account Openness (KAOPEN)		-2.981***	-2.992***	-2.949***	-2.971***	-2.759***	-2.870***
		(0.71)	(0.72)	(0.71)	(0.70)	(0.73)	(0.70)
ATO * MI				2.172***			1.976***
				(0.76)			(0.72)
ATO * ERS					3.968***		3.690***
					(1.24)		(1.27)
ATO * KAOPEN						-1.017	-0.276
						(0.87)	(0.72)
Constant	0.676	0.466	0.62	0.843	0.935	0.527	1.091*
	(0.506)	(0.512)	(0.553)	(0.556)	(0.558)	(0.542)	(0.540)
Observations	1,142	1,118	1,074	1,074	1,074	1,074	1,074
Number of countries	42	42	42	42	42	42	42
Adjusted R squared	0.225	0.267	0.264	0.271	0.273	0.265	0.08

[a] Note: Robust standard errors in parentheses
[b] Note: ***p <0.01, **p <0.05, *p <0.1

Table 5: Impact of Inflation Targeting (IT) on the Rate of inflation: All Countries Countries, 1982-2011 (CBI Indicator - Actual Turnover of Governors)

Variables	All Countries	High Income Countries	Middle Income Countries
Actual Turnover of Gov. (ATO)	4.893***	3.601*	8.556**
	(1.80)	(1.82)	(3.43)
Monetary Independence (MI)	0.0081	0.535	-1.492
	(0.55)	(0.43)	(1.23)
Exchange Rate Stability (ERS)	-5.604***	-6.147**	-4.358**
	(1.22)	(2.38)	(1.50)
Capital Account Openness (KAOPEN)	2.52	2.864	2.60
	(1.62)	(2.43)	(1.98)
ATO * MI	-4.158***	-3.343**	-5.816*
	(1.49)	(1.48)	(2.95)
ATO * ERS	-6.343**	-5.263	-9.547**
	(2.88)	(3.66)	(3.24)
ATO * KAOPEN	0.0089	-1.559	-0.731
	(1.96)	(0.96)	(2.39)
Dummy for Inf. Targeting Years (IT)	-4.077***	-3.217*	-6.276**
	(1.26)	(1.57)	(2.42)
ATO * IT	-1.424	-0.816	-0.384
	(1.35)	(0.74)	(1.90)
Constant	11.28***	10.50***	12.23***
	(1.05)	(1.209)	(1.421)
Observations'	1079	738	341
Number of countries	42	27	15
Adjusted R squared	0.283	0.317	0.296

[a] Note: Robust standard errors in parentheses

[b] Note: ***p <0.01, **p <0.05, *p <0.1

Table 6: Impact of Elections (ELEC) on the Rate of inflation: All Countries Countries, 1982-2011 (CBI Indicator - Actual Turnover of Governors)

Variables	All Countries	High Income Countries	Middle Income Countries
Actual Turnover of Gov. (ATO)	4.391**	3.914*	5.925*
	(1.66)	(2.16)	(3.23)
Monetary Independence (MI)	-0.37	0.144	-1.987
	(0.59)	(0.59)	(1.28)
Exchange Rate Stability (ERS)	-4.222***	-2.435	-4.26*
	(1.44)	(3.34)	(2.28)
Capital Account Openness (KAOPEN)	3.043*	2.603	2.05
	(1.74)	(2.62)	(1.78)
ATO * MI	-4.135***	-3.108**	-4.94*
	(1.49)	(1.43)	(2.64)
ATO * ERS	-5.699**	-5.717	-7.24*
	(2.79)	(4.02)	(3.50)
ATO * KAOPEN	-1.426	-2.405**	-2.11
	(1.69)	(1.14)	(2.69)
Dummy for Election Years (ELEC)	-0.209	0.0608	-0.756
	(0.22)	(0.21)	(0.61)
ATO * ELEC	2.335*	-0.0632	5.236*
	(1.35)	(0.92)	(2.54)
Constant	10.44***	9.303***	12.23***
	(1.12)	(1.392)	(1.421)
Observations'	1079	738	341
Number of countries	42	27	15
Adjusted R squared	0.237	0.271	0.257

[a] Note: Robust standard errors in parentheses

[b] Note: ***p <0.01, **p <0.05, *p <0.1

Table 7: Rate of Inflation: All Countries, 1982-2011 (CBI Indicator - Irregular Turnover of Governors)

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Irregular Turnover of	1.686**		0.924*	2.266*	3.466**	0.828	5.024**
Governors Dummy (IRTD)	(0.698)		(0.529)	(1.162)	(1.396)	(1.006)	(2.347)
Monetary Independence (MI)		-1.201*	-1.181*	-0.788	-1.135*	-1.177*	-0.747
		(0.601)	(0.605)	(0.577)	(0.589)	(0.611)	(0.575)
Exchange Rate Stability (ERS)		-5.719***	-5.641***	-5.642***	-4.398**	-5.630***	-4.443**
		(2.094)	(2.072)	(2.038)	(1.826)	(2.039)	(1.814)
Capital Account Openness (KAOPEN)		2.899*	2.875*	2.830*	2.911*	2.840*	2.955*
		(1.613)	(1.639)	(1.623)	(1.618)	(1.662)	(1.638)
IRTD* MI				-3.252*			-3.286*
				(1.905)			(1.891)
IRTD * ERS					-7.162**		-7.057**
					(2.800)		(2.659)
IRTD * KAOPEN						0.269	-0.673
						(2.029)	(2.180)
Constant	10.13***	11.86***	11.74***	11.56***	11.42***	11.74***	11.23***
	(1.029)	(1.155)	(1.188)	(1.156)	(1.125)	(1.191)	(1.125)
Observations	1,174	1,123	1,106	1,106	1,106	1,106	1,106
Number of countries	42	42	42	42	42	42	42
Adjusted R squared	0.227	0.209	0.213	0.215	0.219	0.212	0.22

[a] Note: Robust standard errors in parentheses
[b] Note: ***p <0.01, **p <0.05, *p <0.1

Table 8: Rate of inflation: High and Middle Income Countries, 1982-2011 (CBI Indicator - Irregular Turnover of Governors)

Variables	High Income Countries							Middle Income Countries						
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Irregular Turnover of Governors Dummy (IRTD)	0.536		-0.0147	1.276	1.548	0.192	3.969	3.224***		2.139*	3.595	8.538**	1.996	11.32**
	(0.844)		(0.339)	(0.755)	(1.386)	(0.716)	(2.783)	(1.064)		(1.033)	(3.018)	(2.898)	(2.167)	(5.010)
Monetary Independence (MI)		-0.433	-0.378	0.0278	-0.349	-0.39	0.102		-3.262***	-3.276***	-2.832**	-3.294***	-3.273***	-2.672**
		(0.616)	(0.616)	(0.526)	(0.598)	(0.631)	(0.503)		(0.907)	(0.882)	(1.096)	(0.899)	(0.888)	(1.190)
Exchange Rate Stability (ERS)		-3.484	-3.517	-3.427	-2.476	-3.547	-2.465		-6.765**	-6.394**	-6.371**	-3.981	-6.389**	-3.861
		(2.715)	(2.780)	(2.821)	(3.106)	(2.772)	(3.162)		(3.032)	(2.887)	(2.835)	(2.489)	(2.851)	(2.474)
Capital Account Openness (KAOPEN)		1.705	1.917	1.933	2.024	1.975	2.275		1.885	1.812	1.758	1.837	1.751	1.944
		(2.476)	(2.524)	(2.509)	(2.516)	(2.541)	(2.579)		(1.446)	(1.510)	(1.518)	(1.458)	(1.644)	(1.607)
IRTD * MI				-3.366*			-4.127*				-3.187			-4.539
				(1.787)			(2.324)				(4.783)			(4.252)
IRTD * ERS					-5.304		-5.397					-14.30***		-14.92***
					(4.490)		(4.751)					(4.554)		(4.618)
IRTD * KAOPEN						-4.831	-5.479						0.349	-1.051
						(4.498)	(4.793)						(4.321)	(3.308)
Constant	9.762***	10.14***	10.15***	9.983***	9.944***	10.17***	9.777***	10.61***	14.77***	13.96***	13.59***	12.73***	14.00***	12.03***,
	(1.085)	(1.182)	(1.267)	(1.288)	(1.292)	(1.270)	(1.318)	(2.026)	(2.238)	(2.174)	(2.059)	(1.975)	(2.395)	(2.180)
Observations	779	774	759	759	759	759	759	395	349	347	347	347	347	347
Number of countries	27	27	27	27	27	27	27	15	15	15	15	15	15	15
Adjusted R squared	0.283	0.259	0.26	0.264	0.261	0.259	0.266	0.213	0.205	0.213	0.212	0.238	0.221	0.237

[a] Note: Robust standard errors in parentheses
[b] Note: ***p <0.01, **p <0.05, *p <0.1

Table 9: Impact of Inflation Targeting (IT) on the Rate of inflation: All Countries Countries, 1982-2011 (CBI Indicator - Irregular Turnover of Governors)

Variables	All Countries	High Income Countries	Middle Income Countries
Irregular Turnover of Governors Dummy (IRTD)	4.573*	3.566	10.90**
	(2.267)	(2.457)	(5.055)
Monetary Independence (MI)	-0.429	0.395	-2.517*
	(0.541)	(0.383)	(1.234)
Exchange Rate Stability (ERS)	-5.854***	-5.981**	-4.234**
	(1.488)	(2.420)	(1.713)
Capital Account Openness (KAOPEN)	2.649*	2.532	3.494*
	(1.505)	(2.343)	(1.922)
IRTD * MI	-2.858*	-4.037*	-4.115
	(1.653)	(2.051)	(3.940)
IRTD * ERS	-6.876**	-4.831	-14.04***
	(2.867)	(4.498)	(4.595)
IRTD * KAOPEN	-0.247	-1.789	-3.028
	(2.461)	(1.901)	(3.819)
Dummy for Inf. Targeting Years (IT)	-4.297***	-3.260**	-6.762**
	(1.252)	(1.585)	(2.363)
IRTD * IT	-0.292	-0.423	3.20
	(1.597)	(1.144)	(2.442)
Constant	11.95***	10.88***	12.32***
	(1.052)	(1.215)	(1.661)
Observations‘	1,106	759	347
Number of countries	42	27	15
Adjusted R squared	0.271	0.343	0.293

[a] Note: Robust standard errors in parentheses
[b] Note: ***p <0.01, **p <0.05, *p <0.1

Table 10: Impact of Elections (ELEC) on the Rate of inflation: All Countries Countries, 1982-2011 (CBI Indicator - Irregular Turnover of Governors)

Variables	All Countries	High Income Countries	Middle Income Countries
Irregular Turnover of Governors Dummy (IRTD)	4.682**	4.146	9.579**
	(2.089)	(2.950)	(4.106)
Monetary Independence (MI)	-0.762	0.0995	-2.728**
	(0.579)	(0.503)	(1.212)
Exchange Rate Stability (ERS)	-4.375**	-2.467	-3.609
	(1.731)	(3.166)	(2.433)
Capital Account Openness (KAOPEN)	2.940*	2.301	2.043
	(1.636)	(2.599)	(1.644)
IRTD * MI	-3.159*	-4.145*	-3.687
	(1.805)	(2.379)	(3.722)
IRTD * ERS	-6.966**	-5.479	-14.16***
	(2.637)	(4.793)	(4.474)
IRTD * KAOPEN	-0.781	-2.385	-1.143
	(2.173)	(2.277)	(3.223)
Dummy for Election Years (ELEC)	0.0486	0.0548	-0.207
	(0.234)	(0.200)	(0.658)
IRTD * ELEC	1.305	-0.877	3.874
	(1.802)	(1.112)	(2.452)
Constant	11.18***	9.757***	11.72***
	(1.119)	(1.313)	(2.378)
Observations'	1,106	759	347
Number of countries	42	27	15
Adjusted R squared	0.22	0.265	0.293

[a] Note: Robust standard errors in parentheses
[b] Note: ***p <0.01, **p <0.05, *p <0.1

Appendix 2

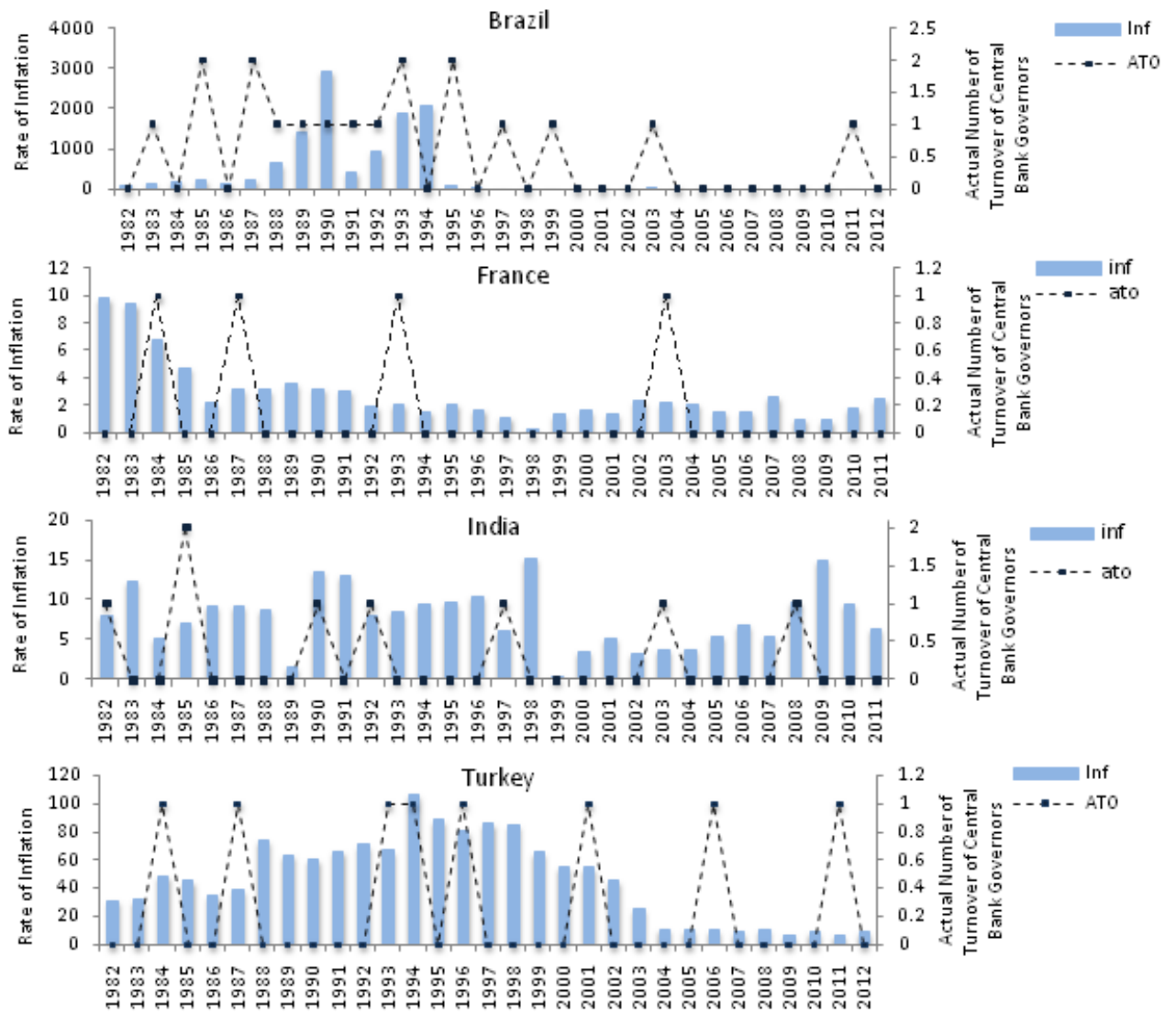Figure 1: Increased Turnover of Central Bank Governors coincides with High Inflation Years

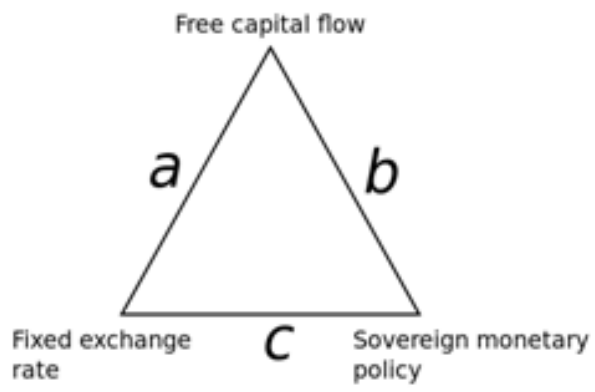Figure 2: The International Macroeconomic Policy Trilemma

Figure 3: Irregular Turnover of Central Bank Governors either precedes or coincides with Election Years
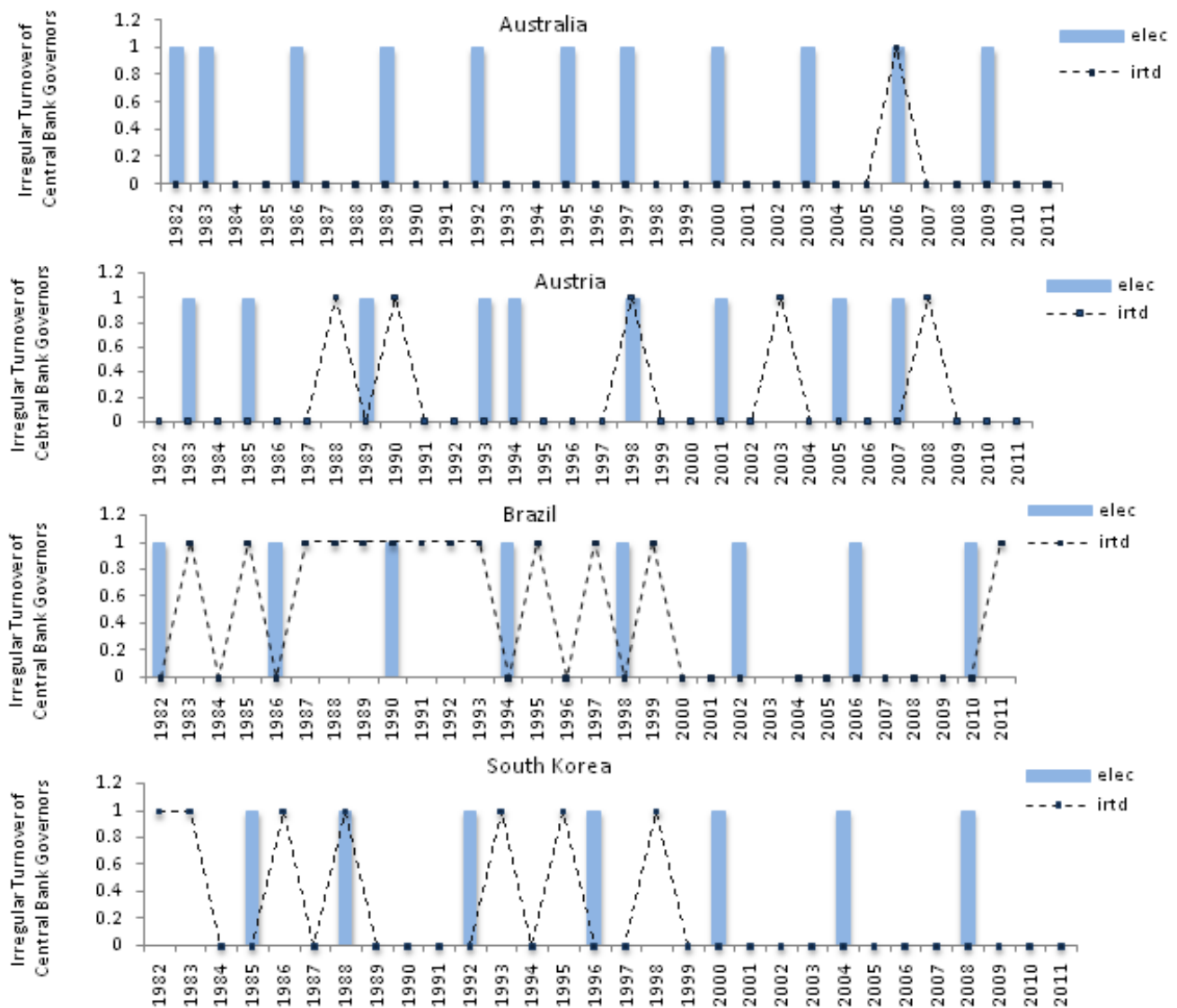
Figure 4: Increase in Inflation either precedes or coincides with Election Years