Pakistan Institute of Development Economics

Monetary Policy
Crafting a Path for Pakistan's Economic Stability

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C O N T E N T S

PREFACE

In the ever-evolving economic narrative of Pakistan, the triumvirate of inflation, monetary policy, and exchange rates stands as pillars shaping the nation's financial landscape. This edited collection serves as a compendium of scholarly insights, a treasury of knowledge illuminating the intricate interconnections among these pivotal elements within Pakistan's economic tapestry. As we embark on this scholarly voyage, we seek to decipher the nuanced dance of these factors, unravelling their impact on the nation's economic equilibrium and charting pathways toward sustainable growth and stability.

Central to our exploration is the canvas of monetary policy, the brushstrokes of which sketch the contours of Pakistan's economic stability. The decisions made by monetary authorities resonate far beyond boardrooms and policy chambers; they reverberate in the markets, homes, and industries, determining interest rates, money supply, and the trajectory of economic growth. This collection delves into the corridors of policy formulation, offering insights into the challenges, strategies, and implications inherent in steering the ship of monetary policy within Pakistan's complex socio-economic fabric.

At the heart of Pakistan's economic discourse lies the intricate puzzle of inflation. The persistent ebb and flow of prices across goods and services exert a profound influence on the daily lives of every Pakistani citizen. Inflation isn't just a statistical metric; it's the heartbeat of economic realities, shaping purchasing power, altering investment decisions, and influencing policy directions. Within these articles, we navigate through diverse lenses - from empirical studies dissecting inflationary trends in various sectors to theoretical frameworks elucidating the underlying drivers - all to comprehend the multifaceted nature of inflation within Pakistan's economic context.

Moreover, amidst the ebbs and flows of global finance, the exchange rate regime emerges as a crucial facet defining Pakistan's economic standing on the international stage. The valuation of the Pakistani rupee against other currencies isn't merely a numerical index; it's a reflection of trade dynamics, global market sentiments, and the nation's economic competitiveness. These articles delve into the nuances of exchange rate mechanisms, exploring the impacts of fluctuations, policy interventions, and external forces on Pakistan's trade balance, investment climate, and overall economic resilience.

In Pakistan's diverse and dynamic landscape, the pursuit of economic stability isn't a solitary endeavour confined to economic models and policy papers; it's a pursuit that intricately weaves together the aspirations, livelihoods, and future of millions. The effectiveness of monetary policy decisions, the ripples of inflationary pressures, and the sway of exchange rate volatilities aren't distant abstractions; they are palpable forces that mould the daily experiences of individuals, the success of businesses, and the course of national development.

The book is also divided into three main sections, each focusing on a crucial aspect of Pakistan's economic landscape, taking into consideration inflation, exchange rates, and interest rates.

In **Part 1, entitled 'Monetary Policy and Interest Rate**,' we delve deeply into the complex relationship between money and interest rates within the framework of Pakistan's monetary policy. This segment meticulously dissects the roles played by monetary

aggregates and interest rates as tools for managing inflation. It rigorously evaluates their efficacy and advocates for a comprehensive approach that integrates both money and interest rates to foster a more resilient and effective monetary policy.

Then book includes an article 'Monetary Policy in Pakistan: Addressing Fundamental Issues', which delves deep into a comparative analysis, exploring how the Central Bank of Pakistan, the State Bank of Pakistan (SBP), has transformed over the past three decades in relation to its counterparts- the other central banks- globally. They used to keep things secret, but now they are more open and clear about what they do. This change has helped them do better at controlling how prices go up and down and making sure they stay stable. The SBP has also been changing. People looked at how much it has changed compared to other central banks. They found that the SBP still needs more changes to be good at keeping prices stable, which is super important for making the economy grow well. To change and get better at this, the SBP needs to make some legal changes. They need to update the laws that control how the bank works. They should make sure that keeping prices stable is the most important thing for the bank to do. They also need a clear way to check if the bank is doing a good job of keeping prices steady. Plus, they should stop the government from having too much say in how the bank makes decisions about the money supply. Other things need attention too. The people working at the SBP need better education and experience to do their jobs well. If they improve in these areas, it will help them make better decisions about money supply. This change won't just help them use what they already know but also learn new things that can help them make better plans for the country's money. It could also help change how people at the SBP think, making the bank even better.

Part 2 of the book, entitled **'Exchange Rate'** delves deeply into the intricacies of currency devaluation and the uncertainties prevailing in Pakistan's foreign exchange market. The exchange rate plays a crucial role in stabilizing Pakistan's economy. Within this section, we extensively explore various facets such as exchange rate depreciation, undervaluation, the impact of exchange rate changes on prices, and instances of currency crises. By thoroughly examining these critical issues, this section aims to provide readers with a comprehensive understanding of how exchange rates are managed in Pakistan.

Moreover, the book emphasizes the importance of maintaining an undervalued target exchange rate as a means to stimulate economic growth and prevent financial crises resulting from currencies being overvalued. It deeply investigates the dynamics of exchange rate changes and provides insights into how adopting market-driven exchange rate policies can help avert currency crises. The book places particular emphasis on evaluating how the exchange rate influences the transmission of monetary policy, especially in the context of Pakistan's challenges, such as weak fiscal and monetary institutions, currency substitution, and susceptibility to disruptions in capital flow.

By shedding light on these complexities, the book not only examines the intricacies of this transmission mechanism but also offers recommendations on how to enhance its effectiveness. It provides a comprehensive analysis that enables readers to grasp the challenges and nuances involved in managing exchange rates and their impact on the broader economic landscape in Pakistan.

In **Part 3**, titled "**Inflation**," the continual increase in prices has profound and widespread implications for Pakistan's economy. Within this section, we delve into crucial

aspects surrounding inflation, offering valuable insights into its drivers, the expenses associated with reducing inflation, and the significance of adopting inflation-targeting strategies. Understanding these fundamental concepts is vital for anyone concerned about Pakistan's economic health. This section particularly emphasizes the impact of both internal and external factors on inflation, including supply shocks and government-set prices, along with the implications of government borrowing. It highlights how comprehending the inflation landscape is pivotal in shaping policies concerning economic growth, employment, and even adjustment programs.

One significant aspect explored within this section is the concept of the "Sacrifice Ratio." It delves into the costs linked with reducing inflation and emphasizes the necessity for structural reforms to alleviate the adverse effects on economic growth and employment. Moreover, the book addresses skepticism surrounding the effectiveness of inflation targeting as a policy framework and delves into an assessment of whether Pakistan is adequately prepared to successfully implement it. It identifies promising advantages linked to improved macroeconomic performance through inflation targeting and suggests enhancements in the prioritization within statutes, maintaining consistency in inflation targeting, and implementing robust accountability mechanisms to ensure the successful execution of inflation targeting strategies. Through an in-depth analysis of these critical elements, this section provides readers with a comprehensive understanding of the complexities surrounding inflation, its management, and the potential adoption of inflation targeting in Pakistan's economic framework.

This book represents a culmination of scholarly endeavours, extensive research findings, and astute critical analyses. It stands as a compendium of knowledge, offering an invaluable resource for policymakers, economists, and individuals seeking to unravel the intricate dynamics governing monetary policy and its profound implications for Pakistan's economic trajectory.

By emphasizing the necessity of maintaining a balance between money and interest rates, the book underscores the importance of a nuanced and multifaceted approach in steering monetary policy decisions. This nuanced perspective aims to navigate the complexities of the economic landscape, ensuring a more robust framework that can better address the challenges and fluctuations inherent in the financial realm.

Beyond being a repository of information, this book aspires to catalyze vibrant discussions and debates. By igniting intellectual discourse, it aims to serve as a catalyst for innovative ideas that contribute substantially to the economic advancement and overall prosperity of Pakistan. The intention is to spark dialogues that transcend the confines of these pages, fostering an environment conducive to progressive economic policies and strategies that uplift the nation. Ultimately, the collective insights and engagements spurred by this work aim to chart a course toward a more prosperous future for Pakistan, grounded in informed decision-making and collaborative discourse.

Abdul Jalil & Hafsa Hina

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Part 1:
Monetary Policy and Interest Rate

Pakistan's Monetary Policy: Some Fundamental Issues

ZAFAR HAYAT*

INTRODUCTION

The role of transparency in terms of a monetary policy decision-making process and communication has been increasingly recognised, as an important component of the best central banking practices [Blinder, *et al.* (2008); Winkler (2002) and Fry, *et al.* (2000)]. The leading central banks such as the Federal Reserve (Fed), European Central Bank (ECB), and largely the inflation targeters including the developing countries have transformed into more open and informative central banks, since the 1990s instead of being secretive until the 1980s.[1]

The motivation for this transformation from a secretive to a more communicative approach hinges on the non-trivial benefits—the transparency and effective communication confer. For instance, it allows the central banks to anchor inflation expectations more effectively [Geraats (2005)] and reduces uncertainty both from the perspective of financial and public markets. [Geraat (2007)]. It enhances predictability [see Swanson (2004) and Gerlach-Kristen (2004)] and enables economic agents to plan and make rational decisions. It also facilitates the central bank's accountability, thereby paving the way for increased central bank independence. This in turn helps to improve the quality of a central bank's own functioning through credibility build-up [Winkler (2002)]. Thus by and large, the increased emphasis on transparency and communication has led the central banks to open up and communicate with clarity and precision, particularly in terms of their objectives, mandate, disclosures, and appropriate dissemination of public economic information. To what extent has the SBP progressed on these lines is an open question.

It is however pertinent to mention that although, some of the studies have evaluated the transparency and performance of Pakistan's monetary policy, none of them attempted to critically highlight the fundamental issues-related to the SBP's monetary policy statutory framework, decision-making, the conflicts of interest, disclosures, and dissemination of public economic information with possible implications for the SBP's credibility and

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[1] For instance, the Fed in the 1970s was sued to give the first written defense for its secretive behaviour. The seminal paper of Goodfriend (1985) provides a detailed exposition of the case, the defense of the Fed for the secrecy and the weaknesses therein.

effective communication. For instance, Malik and Din (2008) attempted to assess the SBP's monetary policy, while evaluating its transparency against the scores given in Eijffinger and Geraats (2006). Ahmed and Malik (2011) have also attempted to assess the SBP's monetary policy performance by using counterfactual simulations. They employed a simple Taylor rule and concluded: had the SBP followed a rule, its performance would have been better. Hayat (2014a) empirically assessed the SBP's monetary policy performance for a period of 50-years from 1961–2010, with a focus on the evaluation of the discretion granted to the SBP for the achievement of its dual objectives, inflation, and growth. He found robust evidence that by exercising their discretion, the monetary policy makers at the SBP created excessive inflationary pressures in the economy that harmed the real growth for 62 percent of the time—hence, counter-defeated both of its key objectives of inflation, and real growth.

Given this backdrop, the current paper intends to critically assess the SBP's monetary policy, while draws on some fundamental issues largely from a statutory perspective with implications for the SBP's credibility and effective conduct of monetary policy. Since there is no standard pattern of central banking practices that can be used as benchmark for the underlying assessment, this paper mainly relies on the prevailing practices of leading central banks, as well as inflation targeters as a reference point. To fill the gap, the remainder of this paper is structured into the following sections. Section 2 critically discusses the statutory objectives in the SBP Act, 1956 which is set out for the SBP and elicit the problems therein that hinders its effective performance of monetary policy. Section 3 highlights the SBP's issues pertaining to the statutory monetary policy mandate, its potential both as a monetary policy guiding framework, as well as a design for its performance evaluation and accountability. Section 4 delves into the potential conflicts of interest originating from the dual supervisory and monetary policy role of the SBP, fiscal dominance, and the Board's market affiliations that might hinder the effective conduct of monetary policy. Section 5 focuses on the disclosures of the profiles, minutes and voting records of the Board and assesses the efficacy of the SBP's performance in terms of dissemination of public economic information—especially forecasts, Monetary Policy Statement (MPS) and major publications. At the end, the last section concludes the paper.

STATUTORY OBJECTIVES

In case of Pakistan, Section 9A of the SBP Act (1956) vests the responsibility of the conduct of monetary policy with the SBP's apex body in the words:

The Central Board, in order to secure monetary stability and soundness of the financial system—(a) formulate and monitor monetary and credit policy and, in determining the expansion of liquidity, take into account the Federal Government's targets for growth and inflation, and ensure that the Bank conducts monetary and credit policy in a manner consistent with these targets….. p.10[2]

[2] It is imperative to mention that the SBP is expected to take care of other objectives such as exchange rate and financial stability; however, these are neither clearly defined as to exactly what they constitute nor there exist quantitative targets for such objectives. Therefore, the main focus in this section is on the SBP's dual objectives of inflation and growth, and the issues emerging from their numerical targets.

The wording of the Act implies that essentially the SBP has dual objectives, i.e. inflation and growth. The government sets annual inflation and growth targets each year, and as per the statute the SBP is supposed to actively pursue it. Majority of the countries abandoned, this kind of a framework back in the 1990s. The central banks no longer actively pursue ambitious growth targets such as the ones set by the Government of Pakistan (to be discussed in the next subsection). This transformation occurred largely on the back of the seminal research of Kydland and Prescott (1977). Hundreds of studies also [see Gartner (2000)] reveals that a central banker, who actively pursues the real growth in the long-term, ends up creating excessive inflation in the economy without any significant output gains. Another strand of literature shows that money is neutral in the long-run [see Weber (1994); Lucas (1995); Apostolos and Koustas (1998) and Bullard (1999)], which implies, creation of high average inflation without any corresponding long-term growth gain. To this effect, Hayat (2014d), while using the data from Pakistan for the period i.e. 1961–2010 found empirical evidence that monetary neutrality holds.

The maintenance of the status quo of the SBP Act regarding the duality of inflation, and growth targets even in the wake of the second decade of the twenty-first century is naïve. Active pursuit of dual mandate was not surprising until the 1960s, because prior to that the central banks were believed to be able to fetch higher growth rates by accepting relatively higher inflation—a phenomenon commonly referred to as the Phillips Curve. However, lately the world has learnt that the Phillips Curve became less steep in the 1970s and flat in the 1980s. Later in the 1990s, overwhelming evidence has been found that higher average inflation, instead affects the real growth adversely [Barro (1995); Ireland (1999)]. Thus, in light of the new knowledge, the focus of many central banks —irrespective of the underlying form of monetary policy strategy, whether inflation targeting or otherwise— shifted towards price stability. It helps in attaining a sustainable possible level of real growth without affecting the society adversely. Part of the change is also an acknowledgement of the knowledge that real growth is a function of a range of other factors beyond the control of the central banks, such as initial endowments, human capital, research and development, law and order, and so forth [see Levine and Renelt (1992); Barro (1995-96)].

Amidst these developments, the Government of Pakistan continues to stick to the outdated tenets of the SBP Act and sets the inflation, and growth targets in a way, where it is hard to find any fundamental economic theory or a standard central banking practice that may lend support to the naivety in these targets. Based on the government's assigned inflation and growth targets, the chances of formulation of an effective monetary policy are remote. Instead of providing any guiding framework, these targets essentially misguide the SBP and its monetary policy. The issues associated with individual inflation and growth targets as well as with their combination are discussed subsequently.

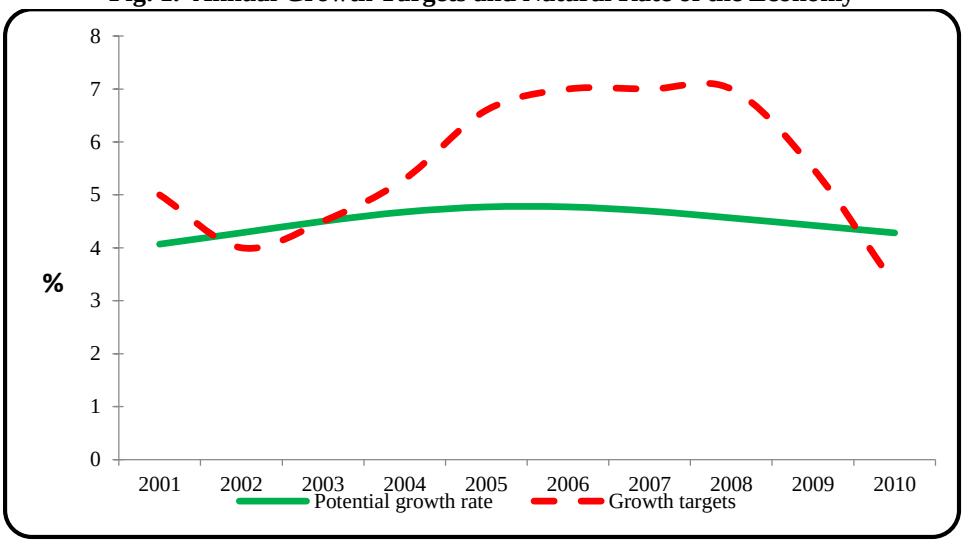
The Government's Assigned Growth Targets

The government's assignment of growth targets to the SBP and the latter's subsequent pursuit for its achievement potentially induces inflation bias. As was argued by Kydland and Prescott (1977) and Barro and Gordon (1983a, b) that inflation bias

results from the monetary policy makers temptation to spur the real growth beyond its potential without any output gains. Since, the Government of Pakistan generally sets the real growth targets, beyond the potential rate of the economy (Figure 1), attempts on part of the SBP for its achievement that leads to the creation of undesirable excess inflation in the economy.[1]

For example, Hayat (2014a) found empirical evidence that the SBP induced excess inflationary pressures in the economy, which hindered real growth for around 62 percent of the 50 years time from 1961–2010. This inflation bias over the period has resulted in undermining the SBP's credibility and effective conduct of monetary policy. Surico (2008) noted that in the case of the U.S., the Fed did tolerate even 1 percent inflation bias in the pre 1979 era, which they simultaneously eliminated by bringing inflation close to the 2 percent level. Whereas in case of Pakistan, Hayat (2014b) asserted that eight times higher average inflation bias than that of the U.S. has not been able to prompt either the government or the SBP to take long-lasting serious remedial measures for its elimination.

Fig. 1. Annual Growth Targets and Natural Rate of the Economy



Source: Author's estimation and SBP Annual Reports.

Given the limitations of monetary policy in terms of its ineffectiveness in stimulating the real growth, even the countries with dual mandate do not set any numerical growth or employment targets for the central banks. For example, in the case of the U.S. the statute requires the Fed to attain maximum possible employment, but unlike Pakistan, the government has no specific unemployment or growth targets, which the Fed is required by statutes to take into account, while formulating a monetary policy. Instead, the Fed maintains inflation at or close to 2 percent level, as in its view this rate allows the Fed to firmly anchor inflation expectations, which helps foster price stability and moderate long-term interest rates.

[1]The natural rate of the economy is extracted from real growth using HP filter by employing the penalty parameter $\lambda = 100$, which is the recommended level for annual data.

In turn, it enhances the Fed's ability to promote maximum employment. Unlike the SBP, the Fed clearly acknowledges that the maximum level of employment is largely determined by non-monetary factors. Since, these factors may change over time and may not be directly measurable; therefore neither the U.S. Government nor the Fed specifies any numerical targets for maximum employment or growth.

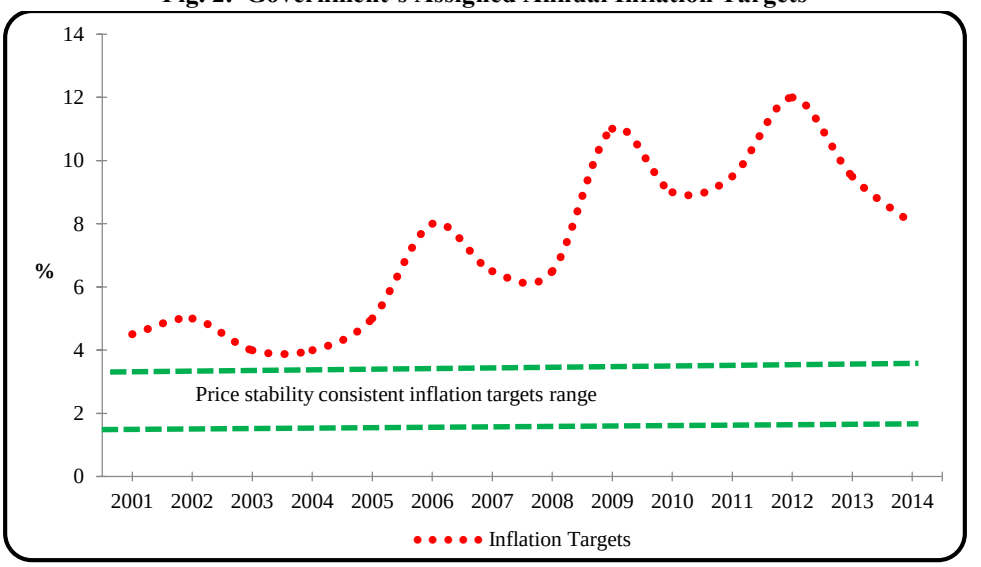
Likewise, it may not be a beneficial practice in case of Pakistan to set binding numerical growth targets for the SBP, especially higher than the natural rate of the economy as shown in Figure 1, because it induces inflation bias without any growth-gain [Kydland and Prescott (1977)]. This is more likely due to the fact that non-monetary factors largely determine the growth beyond the direct control of a central bank. The SBP instead can pave the way for the achievement of a sustainable growth by ensuring 'price stability'.

The Government's Assigned Inflation Targets

Quantitative inflation targets are set by the federal government each year. When observed over a horizon, these targets exhibit too high and erratic inflation rates to help achieve short, medium or long-term price stability (Figure 2).The government inflation target-setting strategy is problematic from three perspectives.

First, as a starting point, a default inflation bias element is induced on the part of the SBP by creating an implicit floor inflation rate. For instance, as is shown in Figure 2, in the last one and a half decade, by and large, the government has set the inflation targets far above than the 4 percent level. This implicit floor automatically biases the SBP towards the inflation, as it does not have to be wary to bring it down below this level to stabilise it in a narrow price stability, consistent range from 1 percent–3 percent in the medium to long-term. The price stability consistent inflation targets range in the Figure 2 is depicted by the dashed lines, where the government did not happen to set inflation target(s) even a single time, which implies allowing more room for undesirably high and volatile inflation.

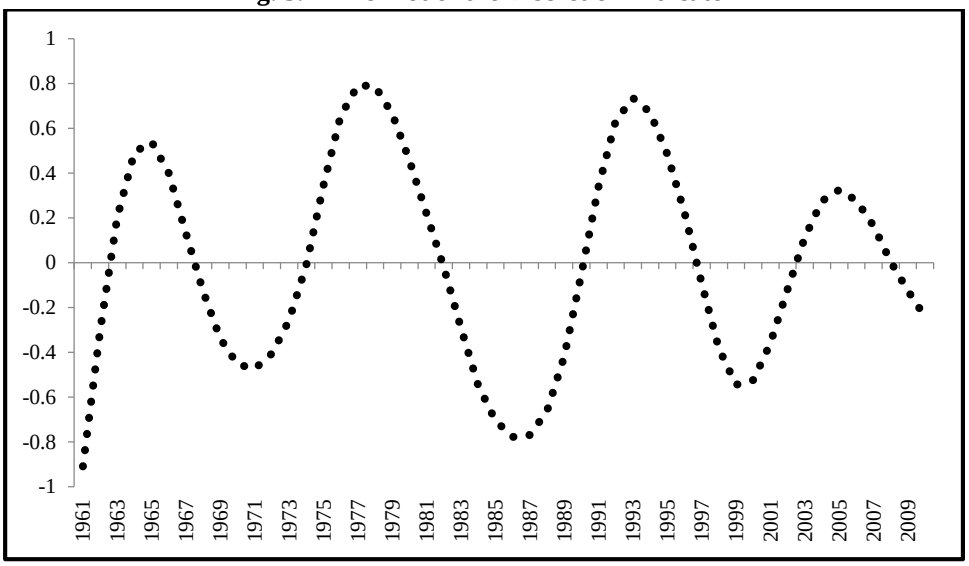
Fig. 2. Government's Assigned Annual Inflation Targets



Source: SBP Annual Reports.

These inflation targets seem to drive the behaviour of the SBP's monetary policy authorities. Hayat (2014d) observes the discretionary behaviour of Pakistan's monetary policy maker over a 50 year timeframe with the help of discretion indicator depicted in Figure 3. He notes that the turning points at the trough of the discretion indicator corresponds to a 4.4 percent observed inflation on average. He argues that this behaviour of the SBP for not allowing inflation roughly below 4 percent level is highly consistent with Cukierman's (2000) new inflation bias proposition—that such a central banker is wary that economy may sink into recession.

Fig. 3. Time Plot of the Discretion Indicator



Source: Hayat (2014d).

Therefore, the government's high average numerical inflation targets coupled with the SBP's active pursuit of higher than natural rate of the economy undermines its ability to successfully anchor inflation to the extent to maintain price stability. Since at times the inflation targets are set as high as 12 percent, the inflation expectations are naturally anchored accordingly at higher levels. In other words, for example when it is announced that inflation is expected to be 12 percent, how can public would expect that inflation would be lower, say at 6 percent? The inflation targets setting strategy of the government, thus potentially leads to a higher than equilibrium rate of inflation that is technically known as inflation bias.

Second, a nontrivial complication arises due to the government's naïve inflation targets as shown in Figure 2, in the sense that it is not possible to adjust monetary policy in response to such erratic inflation targets each year, and expect them being achieved; especially owing to the established fact that monetary policy actions takes effect with a lag [Friedman (1968); Havranek and Rusnak (2013)]. For argument sake, assuming even if no lags were involved in monetary policy, a perfect achievement of the government assigned inflation targets would instead have derailed the economy from the path of price stability. For example, average of the inflation targets for a 14 year period in Figure 2 is 7.32 percent

and its variance is 6.98 percent, which is highly inconsistent with the standard definition of 'price stability'.[2] Normally 2 percent inflation rate is considered consistent with the notion of price stability. For example, in the case of the U.S., the Federal Open Market Committee (FOMC)'s mandate-consistent inflation rate is generally judged to be about 2 percent or a bit below. Similarly, price stability is defined as a year-on-year increase in the Harmonised Index of Consumer Prices (HICP) for the Euro Area of below 2 percent by the ECB. Further, the inflation targeters (both develop and developing countries) largely targets inflation in a range of 1 percent–3 percent. Thus for the attainment of price stability, the dashed lines in Figure 2 indicate that the inflation rates in Pakistan will have to be contained in the 1 percent–3 percent range.

Third, given the government inflation targets-setting strategy, unlike other countries, the SBP may neither be made accountable for the maintenance of price stability, nor its inflation performance can be evaluated. As a result, it is not possible for the SBP to build its credibility to anchor inflation expectations at lower levels, because it cannot send non-noisy signals of commitment to a low and stable inflation rate over medium and long-term. Since the public, especially the private sector is rational; they do understand the inherent flaws in the overall monetary policy framework and therefore adjust their expectations accordingly.[3] Thus given the current monetary policy framework, the SBP may not successfully delink the inflation expectations of the public from high and erratic inflation rates. Therefore, like the central banks in other advanced and inflation targeting countries, if the SBP has to be made accountable, while putting in place a mechanism for its performance evaluation, the government will have to set appropriate inflation targets in a short to medium term.

Precisely, the government should set the inflation targets close to 2 percent with a plus/minus 1 percent band to allow for a cushion to deal with unforeseen supply side shocks to the economy.[4] Debelle (1999) notes that an inflation band allows a reasonable cushion with the central banker to deal with shocks to the economy. The better inflation and growth performance of the inflation targeting countries in the wake of recent financial crisis provides anecdotal evidence to this effect. Another possible cushion with the central bank to deal with the shocks could be the targeting of core inflation, which excludes the effects of food and supply side shocks, hence easing off to an extent the strict accountability.

Therefore, if the government sets inflation targets for the SBP in 1 percent–3 percent range, it will (i) significantly enhance the real growth [Hayat (2014a)], (ii) pave the way for the achievement of price stability, (iii) provide a framework for the SBP's accountability and its performance evaluation, (iv) help the SBP build inflation fighting credibility, and (v) would make the SBP's communication with the private and public sectors easier and effective to yield the maximum possible monetary policy benefits.

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[2]Price stability refers to a state of the economy characterised by low inflation and a stable value of money.

[3] There is a wide consensus on the point that the public is rational as has been modelled by majority of the theoretical models such as Kydland and Prescott (1977), and Barro and Gordon (1983). Moreover, Hayat (2014c) and Abbas, *et al.* (2015) found some empirical evidence about the rational expectations behaviour of the public in Pakistan.

[4] Almost all the advanced countries' central banks set their inflation targets around two percent [Romer and Romer (2002)], as this rate is consistent with 'price stability' and even allows a sufficient cushion to trivialise zero lower bound in a world of small shocks [Blanchard, *et al.* (2010)]. Surico (2008) estimated a bias of 1 percent in the case of the U.S. for pre-1979 policy regime, and noted that inflation bias disappears when the inflation target is close to 2 percent. Hayat (2014b) using data from Pakistan found that inflation exceeding 2 percent level significantly constitute inflation bias.

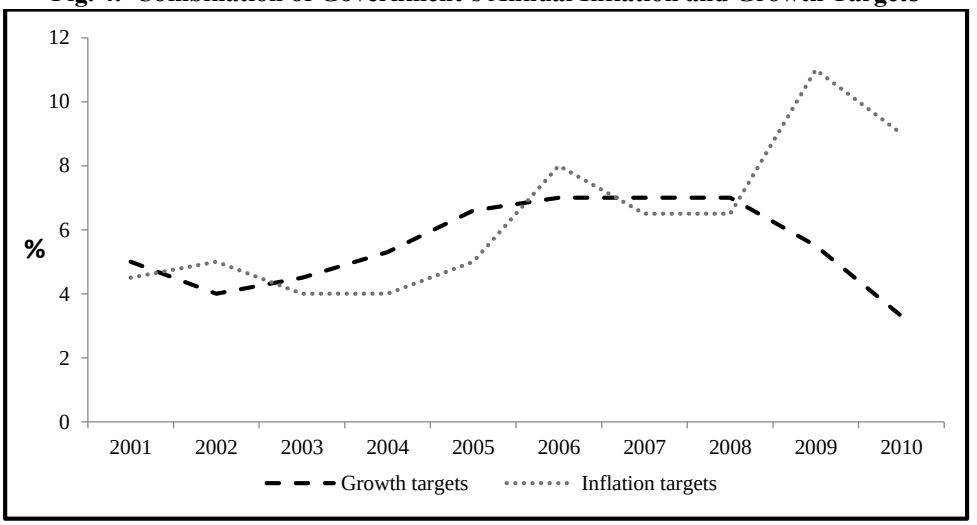
The Inflation-growth Targets Nexus

As indicated earlier, in case of Pakistan, the government sets numerical inflation and growth targets on annual basis and the statutes [SBP Act (1956)] makes it obligatory for the monetary authorities to duly consider these targets in formulation of monetary policy. This framework is also problematic not only owing to the issues emerging from the individual inflation and growth targets, but also from a combination thereof in a particular year, or over a period of time. To understand, how such combinations are senseless, it is imperative to briefly highlight the literature on the inflation-growth nexus to be able to relate it to the government's inflation and growth targets mix.

The relationship between inflation and growth is far from straightforward. For example, up till the mid 1970s, the Phillips Curve (positive relationship between inflation and growth) was popular, while the empirical evidence in the 1990s suggests a negative relationship [see for example, De Gregario (1992-93); Barro (1995) and Ireland (1999)]. One of the aspects of empirical evidence in the 1990s and 2000s, suggest a nonlinear relationship between inflation and growth [see for example, Fischer (1993); Sarel(1996) and Khan and Senhadji (2001)]. Divergence in the long and short-term effects of inflation on real growth is yet another dimension. For example, the long-term inflation is believed to be negatively affecting growth, however in the short-run, monetary policy can be used to stabilise shocks to the real economy, which suggests a short-term positive relationship between the two.

Nevertheless, as can be seen from Figure 4, the government's assigned inflation and growth targets neither follow a consistent pattern, nor can guide monetary policy in a particular direction. These targets do not depict any consistent relationship that can be related to or inferred from the literature on inflation growth nexus evolved over time—a positive relationship of the 1960s and a negative (or) a non-linear relationship on-ward. Naïve combinations of inflation and growth targets on annual basis in the existing fashion hamper the conduct of monetary policy in an appropriate manner. It does not allow an effective and beneficial conduct of monetary policy, because of the unavailability of any underlying fundamental economic theory or practice.

Fig. 4. Combination of Government's Annual Inflation and Growth Targets



As highlighted earlier that the government's individual inflation targets does not provide an appropriate benchmark for the SBP's performance evaluation, a mechanism for its accountability on its basis therefore may not be designed. Similar is the case when combination(s) of inflation and growth targets at different points is considered. For example, a combination of divergent inflation and growth targets like that of Pakistan may not be achieved simultaneously on a period by period basis, especially, when there is a conflict between the achievements of the two.

Therefore, as a starting point, the fundamental flaws in government's inflation and growth targets-setting strategy need to be addressed. Indeed, the best way to do it is to set inflation targets in price stability consistent range of 1 percent–3 percent, while making the SBP strictly accountable for its achievement. As far as the growth side is concerned, the government may set growth targets for its own guidance. However, the SBP may not be required to take these into account due to monetary policy in effectiveness in terms of real growth [see Hayat (2014d) for empirical evidence on long-term monetary neutrality].[5] Nonetheless, like other central banks, the SBP may play its part to stabilise short-term shocks to the real economy, as long as the inflation stays within the price stability range and only that monetary policy intervention is deemed effective.

This will help build the SBP's credibility and in turn it may communicate with the public and private sectors more effectively for the achievement of price stability. However, all this would require amending the SBP Act to make price stability as the prime objective of the SBP, while holding it accountable for its achievement. Setting numerical inflation targets around price stability consistent rate of 2 percent from medium to long-term, could be an optimal strategy to help achieve both inflation and growth stability.

MONETARY POLICY DECISION MAKING

Section 9.1 of the SBP Act (1956, p.9) constitute that:

The general superintendence and direction of the affairs and business of the Bank shall be entrusted to the Central Board of Directors, which may exercise all the powers and do all the acts and things that may be exercised or done by the Bank, and are not by this Act expressly directed or required to be done by the Bank in general meeting or annual general meeting.

One may clearly infer from the aforementioned statutes that the Central Board has been empowered hugely concerning the SBP's affairs. In light of the powers conferred via the Act, the Board is mandated to conduct the monetary policy, which is critically discussed in the proceeding sub-sections.

Mandate for Monetary Policy and SBP's Performance Evaluation

In case of Pakistan, Section 9A of the SBP Act (1956) vests the responsibility of the conduct of monetary policy with the Central Board to secure 'monetary stability and soundness of the financial system'.[6] The Board is undertaking multiple tasks, for example

[5] It is important to note that in practice central banks maintain clarity about inflation targets, whereas remain opaque about growth targets [Geraats (2006)].

[6] The Central Board of Directors (also referred to as the 'Board') consist of the (i) the SBP Governor, (ii) Secretary, Finance Division, Government of Pakistan, and (iii) eight directors (at-least one from each province).

taking decisions related to the compensation packages of the staff, leave and promotion policies, budget approvals and so forth. Whether, it is the best practice for the SBP Board to spent time on such a huge portfolio, along with a highly specialised and demanding responsibility of conduct of monetary policy? In case of the Bank of England (BoE), such functions other than monetary policy are instead, performed by the Court of Directors (composed of nine non-executive directors) appointed directly by the Crown. The court delegates day to day management of the bank to the governor and through him to other members of the executive, but reserves itself the right to agree on: the bank's strategy and objectives, expenditure budget, major capital projects, financial framework, risk management policies, approval of the accounts and the appointment of auditors. Also, the remit for management of the BoE's balance sheet, senior appointments within the bank, changes in remuneration and pension arrangements, the bank's succession plan, the establishment of sub-committees of the court, their terms of reference, and membership. The court keeps its procedures under close review and each year an annual effectiveness review is conducted on which a report is made to the court.

Further, in the case of the BoE, the Oversight Committee (a sub-committee of the Court) regularly reviews the performance of the BoE in relation to its objectives and strategy such as monetary policy objective, the financial stability objective, and any other objectives set by the court. Should there be such a practice of independent evaluation of the SBP's performance in terms of its objectives by a specialist body other than the Board is an open question. This needs a thorough intellectual debate on the appropriateness of the scope of the SBP Board given their capacity (see Sub-Section 3.3), formulation of any other independent specialist bodies and sub-committees, thereof in light of the best practices to ensure efficient and effective performance of the SBP's portfolio.

Issues with Monetary Stability as a Guiding Framework for Monetary Policy

Generally the central banks are given a certain mandate, predominantly price stability. Nevertheless, in some cases the mandate may be dual. For instance, in the case of the U.S., the Fed is mandated for price stability and maximum employment by statute. It is reiterated that the government do not quantify such a mandate, instead the FOMC considers 2 percent inflation as price stability consistent inflation rate, which in their view provides an enabling environment for the achievement of maximum employment in addition to other factors beyond its control. Therefore, the Fed despite being discretionary, in terms of duality of objectives has a clear inflation path to follow, the path of price stability.

Unlike the U.S., in case of Pakistan, the wording of the SBP Act when examined carefully, does not allow an appropriate path for the conduct of monetary policy. For example, the SBP Act (1956, p.10) says that:

The Central Board, in order to secure monetary stability and soundness of the financial system—(a) formulate and monitor monetary and credit policy and, in determining the expansion of liquidity, take into account the Federal Government's targets

for growth and inflation and ensure that the Bank conducts monetary and credit policy in a manner consistent with these targets…...

Thus, the statutes guides that primarily the SBP should aim at 'monetary stability' and 'soundness of financial system'.[7] In order to assess if the Act provides a basic guiding framework for the monetary policy, a logical question arises that should 'monetary stability' be the prime objectives of the SBP's monetary policy instead of 'price stability'? If the ultimate goal of the monetary policy is to improve the living standards of people, is monetary stability or price stability is the best way to raise their standards in an equitable fashion? To understand which framework between the two can best guide the monetary policy, they are assessed one by one as follows.

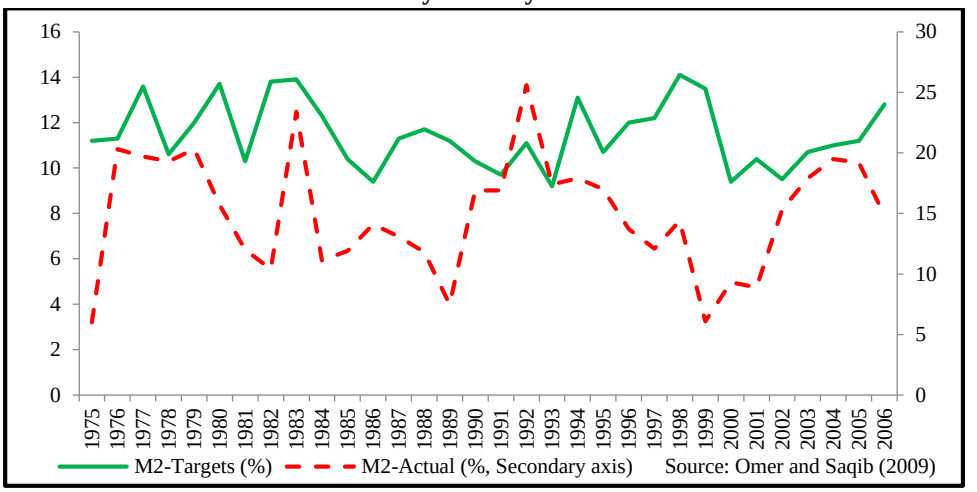
To start with, there is no tangible way to exactly define monetary stability for the purposes of monetary policy evaluation. Monetary stability is commonly referred to as the stability in prices, interest rate and exchange rate. Working with this definition, the main problem the existing framework poses is that it is hard to quantify monetary stability to provide an objective basis for conduct, evaluation and communication of monetary policy. Even if monetary stability is to be represented by stability in some measure of money, say growth in M2, then what is that particular growth rate or range of growth rates in M2 that would stabilise prices, interest rate and exchange rate at desirable levels? The flip side of the argument is that what are those unique rates in prices, interest rates and exchange rates that would help achieve monetary stability?

Another way to observe, if the notion of monetary stability can guide monetary policy is to analyse the issue in the context of the SBP's historical approach, which nevertheless—from an operational perspective—has been discontinued since August, 2009 after adopting the interest corridor system. The SBP used to set M2 targets consistent with the government's inflation and growth targets. Qayyum (2008) noted that if for example the government's targets for inflation and growth in a particular year are say 8 percent and 5 percent, respectively, the M2 targets would work out to be the sum of both the targets, which in this case would be 13 percent. Let's see if such a framework may help achieve monetary stability.

Figure 5 depicts the SBP's targets for growth in M2 along with the actual. Two observations are important. First, these targets per se; even if achieved 100 percent, may not represent monetary stability in anyway—as the spread of these targets is quite large ranging from 9 percent to 14 percent. Second, the volatility of the actual growth in M2 is very high—23 percent in terms of variance—to be deemed consistent with the notion of monetary stability. It therefore may not (1) induce any stability in the variables such as inflation, interest rates and exchange rates, (2) it is hard to be communicated to the public as it would not make any sense to them, and (3) it cannot be used as a benchmark for the purposes of monetary policy evaluation and accountability.

[7] See Sub-section 4.1 for a discussion on potential conflict of interest that may arise due to the supervisory role of a central bank.

Fig. 5. Historical Performance of the SBP in Terms of the Statutory Monetary Stability Mandate



On the contrary to the SBP statute regarding monetary stability and soundness of financial system, a widely acknowledged and popularly practiced notion is that of 'price stability', as it helps raise the standards of living of the people. Price stability allows an economic system to operate more efficiently, while producing higher levels of output and rapid economic growth, [Mishkin (1997)] hence raising the standards of living of the society. Conversely, the absence of price stability generates high costs to society. These costs may be diverse, ranging from the 'shoe leather' costs [Bailey (1956)] to the loss of output [Groshen and Schweitzer (1996)].[8] Considerable work of both theoretical and an empirical nature has been done, either to justify the importance of price stability, or to highlight the costs associated with price instability [see Fischer and Modigliani (1975); Fischer (1981); Briault (1995); Hatch, *et al.* (1998) and Mishkin (2006)]. Indeed this is why the Reserve Bank of New Zealand (RBNZ) Act (1989, p. 27), unambiguously put it in the words that "the primary function of the Bank is to formulate and implement monetary policy directed to the economic objective of achieving and maintaining stability in the general level of prices".

On the back of the aforecited literature and practice, let's consider if the price stability in contrast to the existing monetary stability framework allows an objective basis for conduct, evaluation and communication of monetary policy. As discussed earlier in Sub-section 2.2 that price stability is generally quantified in terms of inflation rate at or close to 2 percent. Hence, this is easily communicated to the public and at the same time, it allows a benchmark for monetary policy evaluation and accountability.[9] Since price stability implies low variability in inflation, it in turn stabilises variations in the interest

[8] Also see English (1996) for the shift of resources from productive use to non-productive use due to inflation.

[9] It may be noted that there may be a slight difference in the practice, for example some countries may consider a range of inflation say from 1 percent to 3 percent as appropriate for achieving price stability. The issues related to the choice of a particular indicator of inflation, i.e. headline or core inflation is beyond the scope of the current paper.

rate, exchange rate and money growth. The flip side is that the central banker should aim to stabilise interest rate, exchange rate and money growth at levels that ensure price stability. Therefore, the statutory primary goal of the SBP should be the achievement of price stability and the rest would automatically fell in place.

The Board and the Governor

Section 9.2.C of the SBP Act (1956, p.9) confers the responsibility of running the affairs of the SBP business with the Board (including the governor), "who shall be eminent professionals from the fields of economics, finance, banking and accountancy, to be appointed by the Federal Government". This covenant of the SBP Act to some extent appears consistent with theory, nevertheless, a brief discussion on the profiles of monetary authorities from other central banks as well as theory may help in inferring as to who such 'professionals' should be?

In order to draw some lessons from, a review of the profiles of some of the central bank's decision making bodies, explicitly indicate that their board members and the governors are eminent economists with impressive profiles, with the highest terminal degrees (PhDs) largely with relevant specialisation, and a wide range of research publications in high ranked international journals. For instance, in case of the U.S., out of the 12 FOMC members, ten have completed their doctorates in Economics and also carry impressive research profiles in the field of monetary policy. Most of them are working as editors of esteemed economic journals and honoured for their publications in the world's highest ranked journals. Moreover, two members of the FOMC are eminent professionals from the law field, who have been serving as editors of esteemed law journals.

Similarly, taking an example of the developing economy like Turkey, all the members on their central bank board including governors have done doctorates in Economics and have demonstrated research publications in high ranked journals. Even in the Reserve Bank of India (RBI) four out of the 10 Board members are PhDs with profound profiles in terms of their publications and relevant research. Again, the governor (chairman) of a central bank is normally an economist of a high repute. For instance, in case of the U.S., historically there have been big names like Alan Greenspan, Ben Bernanke and so forth. On a similar note, even the current governor of the RBI has a renowned profile with impressive publications and is an internationally recognised figure in the relevant field.

The theoretical literature on who should be granted the authority for the conduct of monetary policy can broadly take two forms that can practically be implemented. The first form is that of the incentive contract which is considered as an arrangement between the government and the central banker.[10] Under such arrangements, the policy maker is given a target rate of inflation and is rewarded or punished on the basis of its achievement/non-achievement.

[10] Incentive contracts are covered in Canzoneri (1985), Garfinkle and Oh (1993), Persson and Tabellini (1993) and Walsh (1993 b, 1995b).

Second is the delegation of the conduct of monetary policy authority to a weight-conservative central banker.[11] For instance, Rogoff (1985) proposed the delegation of monetary policy authority to an independent central banker who is inflation-averse. Such a central banker puts more weight on inflation and less on the output resulting in lower inflation bias, but the output variability may increase, especially when the supply shocks are large. Several studies extended the idea of delegation including Flood and Isard (1989); Person and Tabellini (1990, 1993); Alesina and Grilli (1991); Lohman (1992); Cukierman (1992) and Svensson (1997a). Romer and Romer (1997) added that the conduct of monetary policy should be delegated to knowledgeable persons who are adept in the evaluation and maximisation of social welfare. Such experts can better and faster incorporate the advances of knowledge in the monetary policy decision making process. Therefore, in most of the countries, the authority of the conduct of monetary policy has been delegated to high profile economists normally to inflation fighters, who in turn demonstrated greater performance in terms of ensuring price stability. For example, after the great inflation of the 1970s, almost all the advanced countries, inflation targeters and most of the emerging and developing economies have managed to bring down inflation rates to 'price stability' consistent levels, and have successfully sustained them.

Thus, the world has learnt that vesting the responsibility of the conduct of monetary policy with eminent professionals, especially the 'hawks' instead of 'doves' have led to yield beneficial results. Such results can be witnessed in terms of a reduction in inflation persistence [see Siklos (1999); Kuttner and Posen (1999-2001); King (2002) and Petursson (2005)], a reduction in inflation variability [Levin, *et al.* (2004); Lin and Ye (2009)], a reduction in inflation expectations [Johnson (2002)]. Similarly see Corbo, *et al.* (2001); Neuman and Von Hagen (2002); Levin, *et al.* (2004) and Peturson (2005) for a reduction in growth variability.

In view of the above, it is imperative for Pakistan's Government to implement the relevant clause (in the SBP Act) in letter and spirit, regarding the delegation of the conduct of monetary policy authority. It should be delegated to 'hawks' rather than 'doves' with terminal qualifications in Economics, preferably with specialisation in monetary policy along with a demonstrated research excellence and international exposure. This will greatly help improve the monetary policy practices at the SBP and hence its performance, and credibility to yield desirable results.

THE CONFLICT OF INTEREST

There are three major areas of Pakistan's monetary policy design, where potentially the conflict of interest issue may arise at different levels from different perspectives. Its' identification and discussion is nontrivial in the sense that it does affect the performance and the credibility of the SBP in conduct of monetary policy. First, the conflict of interest that originates due to the supervisory role of the SBP. Second, the conflict of interest that arises due to the explicit role of the government representatives in the affairs of monetary policy. Third, the conflict of interest that emanates from the market affiliation of the monetary policy decision makers. In any form, the conflict of interest is not deemed desirable, as it potentially risks the appropriate conduct of monetary policy.

[11] A weight-conservative central banker is the one who gives more weight to inflation as compared to output in the conduct of monetary policy.

The Conflict of Interest Due to the Supervisory Role of the SBP

Since 1990s, there has been a debate on the conflict of interest arising from the duality of the monetary policy and supervisory objectives of a central bank [Whelan (2012)]. The main theme emerges from the argument that the conflict of interest between the monetary policy, and the regulation of the banking sector may lead to inflation bias [see Noia and Giorgio (1999); Lim, *et al.* (2012)]. The idea is that a central bank will remain flexible on the inflation objective if it fears that tight monetary policy may affect the profitability and soundness of the banking sector [Goodhart and Schoenmaker (1993-95)]. Although, the debate is yet to reach to a conclusion, it is important to take into account, the potential inflation bias implications for higher average inflation in Pakistan as the SBP is also responsible for financial stability i.e., "The Central Board shall, in order to secure monetary stability and soundness of the financial system…" [SBP Act (1956)]. In case of a conflict between the inflation objective and financial stability, if the SBP chose to be flexible on the former, it may render its inflation fighting credibility tenuous, and in turn any communication to contain inflation would potentially be ineffective. As a solution to this problem, Blinder (2010) suggests that a central bank should rationally balance these competing objectives and who else other than the central bank can best do the job.

Since, there are divergent views as to whether the central bank should have both the monetary policy and supervisory objectives, the practice also varies. For example, in the case of the BoE, the Prudential Regulation Authority (PRA) is a separate body with distinct objectives from the Monetary Policy Committee (MPC).[12] Consistent with public law, its regulatory decision-making is rigorous and well documented, and its Board take the decisions while comprising the governor of the BoE, the deputy governors for financial stability and markets and banking, the chief executive officer of the PRA, and the independent non-executive members of the Board. The PRA Board is involved in the most important decisions on general policy and individual cases. Like the MPC, it is also accountable to the parliament. It is important to mention that the MPC in contrast to the PRA Board constitutes nine members including the governor, the three deputy governors, the bank's chief economist, and four external members appointed directly by the Chancellor. The appointment of independent members is designed to ensure that the MPC benefits from thinking and expertise in addition to what has gained in the BoE. Therefore, by construct, the room for the conflict of interest between monetary policy and banking supervision is minimised, because in the case of the MPC all the members have the right to vote.

On the contrary, in the case of the U.S., the supervisory role of the Fed is vested with the seven members Board of Governors, whereas the Fed's monetary policy decision making authority is the FOMC, which adds five non-voting Reserve Bank presidents to the Board of Governors. Although, these presidents attend the meetings, participate in the discussions, and contribute to the Committee's assessment of the economy, and policy options but they do not have the right to vote. Therefore, effectively the BoE is more insulated from the conflict of interest issue as compared to the U.S., as in the latter case, essentially the Board of Governors take the decisions both for monetary policy as well as for regulation.

[12] It may be noted that PRA, although part of the BoE is the prudential regulator for deposit-takers, insurance companies and designated investment firms.

The Conflict of Interest Due to the Government Officials' Presence on the Board

Since long it is recognised that a central banker should be independent of the fiscal dominance, especially in an operational sense, but at the same time it should be strictly accountable in terms of its objectives. Most of the countries have therefore streamlined their legislative frameworks in a way that the role of the government in monetary policy making is eliminated. It is quite possible that the directions from government may undermine the monetary policy for the achievement of its short-term designs, which may be in conflict with monetary policy objectives. In order to close the doors for such potential exercises, most of the governments through explicit legislation have discouraged the presence of government representatives in the monetary policy decision making process. In case of any such presence, the voting rights are not granted to the government official, but his (her) presence is meant for the provision of information on the fiscal side. For example, in the case of the BoE, a treasury representative is allowed to sit in the meetings to discuss policy issues, but is not allowed to vote. The purpose is for the MPC to be fully briefed about the fiscal developments.

As can be seen from Table 1, column (a), in majority of the standard monetary policy cases there are no government officials on the central banks excluding Pakistan, which does not seem to be in conformity with the relevant statutes in Pakistan. For instance, Section 9.2.C of the SBP Act (1956, p.9) clearly states that "those appointed to the Board shall have no conflict of interest with the business of the Bank". The presence of government officials on the board undermines the credibility of the central bank, and hence, the effectiveness can be achieved in monetary policy communications. The central banks in turn are not able to effectively anchor inflation expectations to maintain price stability.

In order to minimise the direct involvement of the government in central bank affairs, many countries have also designed the term structure of their boards and governors in a way that it is longer than the term of the governments per se. As can be observed from Table 1, columns (c) and (d), with a few exceptions including Pakistan, the term of the central bank's board members and governors is higher than the terms of the elected political parties in their respective countries.

Such legislative arrangement potentially frees the board members and the governor of the worries of reappointment. They are then in a better position to formulate monetary policy more independently to achieve medium to long-term price stability, instead of pursuing government's short-term objectives that may not necessarily be beneficial for the society. It is also pertinent to mention that for better results, these countries have explicitly provisioned in their respective statutes for the accountability of their central banks (see Table 1, column (f)). If such provisions are not in place, there would be no pressure on the board and the governor to conduct monetary policy in the best possible manner to yield better results. Holding the central bank accountable for price stability is indispensable for better functioning of the SBP. It will lead to improve the inflation performance of the SBP, and will help in credibility build-up to enhance the effectiveness of monetary policy and its communication.

Table 1

Central Bank Laws and Practices: Policy Types

Country	Government Officials on Board	Final Authority	Term of Members	Term of Governor/ Chairman	Proportion of Policy Board Appointed by Govern ment	Statutory Accountability of the Board/ Committee for Inflation Targets/ Price Stability	Governor/ Chairman/and Deputy Governors (PhDs or not)
(See note below)	(a)	(b)	(c)	(d)	(e)	(f)	(g)
Australia	1	g	5	7	1	Yes	Yes
Belgium	0	g	6	5	1	Yes	Yes
Canada	0	b(1967-) g(1967+)	3	7	12/14	Yes	Yes
France	0	g	6	U	12/13	Yes	Yes
Italy	0	g	3	3	1	Yes	Yes
Netherlands	0	g	7	7	1	Yes	Yes
Sweden	0	g	3	3	1	Yes	Yes
United Kingdom	0	g	4	5	1	Yes	Yes
Japan	0	b	4	4	1	Yes	Yes
United States	0	b	14 (N)	4	10/21	Yes	Yes
Germany	0	b	8	8	1/5	Yes	Yes
Switzerland	0	b	4	8	1	Yes	Yes
New Zealand	0	g	5	5	1	Yes	Yes
India	1	g	4	4	1	Yes	Yes
Pakistan	1	g	3	3	1	No	No

Source: Bade and Parkin (1988) and author's search from central bank's websites.

Notes: (a) number of (or their representatives) who sit on bank board.

(b) b = bank; g = government.

(c) years (N = not eligible for re-election).

(d) u = unlimited term.

(e) number represents proportion of members appointed directly or indirectly by the government.

The Conflict of Interest Due to Board Member's Market Affiliation

Given the sensitivity and demanding nature of the job, almost all the governments make sure that extremely competent and capable people are appointed on the boards of central banks. Normally, the board members including the governor are high profile specialists from academia or research organisations with demonstrated research excellence. Such appointments on one hand, allow mitigation of the conflict of interest, and on the other, ensure rational and long-lasting beneficial monetary policy decisions. The appropriate conduct of monetary policy requires an in-depth research base to be able to comprehend, understand and apply advancements in the knowledge, while taking policy decisions. Moreover, the board has to be technically sound as in some cases it has to review the performance of the bank as well as the governor. For instance in case of New Zealand, the RBNZ Act, 1989 on its page 50 Section 53 (1) binds the Board to (a) keep under constant review the performance of the bank in carrying out:

(i) Its primary function; and (ii) its functions relating to promoting the maintenance of a sound and efficient financial system; and (iii) its other functions under this Act or any other enactment: (b) keep under constant review the performance of the Governor in discharging the responsibilities of that office: (c) keep under constant review the performance of the Governor in ensuring that the Bank achieves the policy targets agreed to with the Minister under Section 9 or Section 12(7)(b).

In case of Pakistan, however, contrary to the prevailing best practices across the globe, positions of the Board members including the Governor do not seem to be filled with eminent professionals in the field of Economics with terminal qualifications and high research profiles. Such appointments on one hand, allow a leeway for inefficient conduct of monetary policy and on the other hand, for the potential conflict of interest. For example, one of the current Board members has an explicit affiliation with a corporate financial and advisory house in the country. He has worked with various commercial banks being regulated by the SBP, hence pointing towards a potential conflict of interest issue. Similarly, another Board member has affiliation with a firm providing consultations in the realm of banking, mergers and acquisitions, corporate and financial restructuring, and Islamic modes of financing. The conduct of such activities, although in private capacity is somehow indicative of the conflict of interest, when viewed in light of the business of the SBP. Notwithstanding, the governor is a non economist, non specialist and is affiliated with the banking sector, which again is in clear conflict with the statutes. Such appointments on the Board, where potential conflict of interests are involved should be avoided, because it may adversely affect the credibility and the effective functioning of the SBP.

DISCLOSURES AND PUBLIC ECONOMIC INFORMATION

Given the fact that public demands transparency from public institutions and that information increase the expected utility of decision makers [Blackwell (1953); Issing (2005, p. 67)] asserts:

A central bank should be well advised and even be legally obliged to publish all internal documents and data, in particular those that are instrumental in its monetary policy decisions and relate to its status of independence. Such obligations of accountability would then also encompass information regarding the decision making process itself, any differences of opinion, consensus agreements, a majority voting behaviour, etc.

The subsequent sub-sections assess the existing level of transparency and efficacy of public disclosures and economic information of the SBP.

Disclosure of Profiles, Minutes and Voting Records of the Board

With increasing transparency, proper disclosure is one of the increasing central banking practices. The disclosure of the profiles of board members, minutes of the meetings of the board, voting records, and in some cases even the transcripts are released for public consumption. The FeD, the BoE, RBNZ, Central Bank of the Republic of Turkey are a few glaring examples amongst others. Although, no consensus has been reached yet as to what constitute the optimal way of disclosure. Central banks today are more open and transparent, and are continuously in the quest to achieve the best possible standards.

Modern central banks share detailed profiles of monetary policy authorities as well as minute details of how they reached on certain policy decision(s) with the public. Nevertheless, exceptions such as SBP do exist where detailed profiles of the SBP's Board may not be tracked to determine, if the government has chosen eminent professionals capable of discharging the important responsibility of the conduct of monetary policy to foster public's confidence. The SBP only display their names, photos and dates of their

respective terms on the official website. Since, this opaqueness is in sharp contrast to the spirit of transparency which potentially undermines the SBP's credibility.

Like the disclosure of the detailed profiles of the board members, publication of detailed minutes of their meetings is equally important. In many countries the monetary policy decisions are taken by a committee/board. The minutes of such meetings give valuable insights into the arguments raised and the underlying considerations that drove the policy decisions [Geraats (2005)]. Advanced countries central banks such as the FeD, the BoE, Bank of Japan and ECB publish minutes to help the public develop a better understanding of the monetary policy implementation strategy, and predictability of monetary policy actions.

The SBP initiated publication of the minutes of the then MPC in November, 2009, however discontinued the practice in January 2011. The publication of the minutes has been resumed since January 2014 which might be due to the encouragement by the IMF, while being in programme in this period. The minutes of the Advisory Committee on Monetary Policy (ACMP) and the Board have been made available on the SBP's official website; however, these are as short as one and a half pager. It does not provide sufficient information to understand the underlying motivation (justification) in favour of or against a particular monetary policy decision, hence compromises the very spirit of the publication of minutes.

As is practiced in the advanced countries, the monetary authorities go at great lengths to elaborate its thinking and decisions, which is reflected in the minutes. It gives a full account of the policy discussions along with the differences in view points. Such minutes are normally made available within a week or two after the meeting. Greater publicity of information reduces the costs of the market of being informed and helps intensify the debate about the way the policy decisions are made. It also makes it easier for the public to check the outcomes against intentions [Goodfriend (1986)].

Since there is no consensus as to what should ideally be the length of such minutes, streamlining this exercise in line with the international standard practices and acknowledging communication of minutes, and voting records as part of the SBP's monetary policy communication strategy may be helpful. Of course that would first require a clear and well drafted communication, and disclosure policy in light of the recent research on transparency and practices of other central banks. Besides, publication of voting records could also add to the effectiveness of monetary policy communication. Further, the availability of transcripts of the important monetary policy related meetings could strengthen the credibility of the SBP.

Forecasts

Publication of the central bank forecasts gives the public and private sectors an understanding of the central bank's perception of the macroeconomic outlook, stochastic shocks, preferences, [Chortareas, *et al.* (2002)] as well as the future state of the economy. High levels of transparency in terms of information disclosure reduces information asymmetries that leads to effective conduct of monetary policy and enhances market efficiency—because the market can better evaluate the risks and therefore may take informed (optimal) decisions. Cornand and Heinemann (2008) noted that not only the market responds to central banks' signals but assigns it more weight than justified by its

informational content. This might be due to the superiority of the central bank information over the private sector [see Romer and Romer (2000) for empirical evidence].

Given that the public information is welfare enhancing both for public and private sectors [Morris and Shin (2002)], utmost effort should be made to attain the highest possible levels of precision as well as publicity. This is important not only for welfare enhancing reasons, but also for the reason that at the same time such disclosures may harm instead, if the expectations are coordinated away from the fundamentals [Amato, *et al.* (2002)]. As argued by Hayat (2014d) and can be inferred from the discussion in the current paper that Pakistan's overall monetary policy framework does not support a forward looking approach, but the SBP does publish projections of macroeconomic indicators such as GDP, CPI inflation, money supply (M2), workers' remittances, exports, imports, current account deficit, and fiscal deficit in its quarterly reports mainly covering a one year period. Some of these projections are model based forecasts such as CPI inflation, exports and imports. However, for the rest of the projections mechanism is not clear.[13]

Other than the appearance of the projections of key variables in the quarterly reports, normally a one year projection for inflation appears in MPS. Since, a forward looking monetary policy mainly focuses on medium to long-term path of inflation, development of sophisticated DSGE models, GTAP, structural and nonlinear VAR models as well as ARDL models may be a useful exercise to start with and publish medium to long-term forecasts accordingly.

It is however important to note that due to the scarcity of quality human resources, highly equipped with sophisticated skills that can solely be dedicated to do the job (see next section for a brief discussion on this point). The SBP may not start publication of reliable medium to long-term forecasts unless serious measures are taken to retain, encourage and acquire quality human resources, such as PhDs to enhance the SBP's performance. This nevertheless is a structural issue, which requires a change in the mindset of the SBP's top, upper and lower tier management. The SBP's job is mainly operational and its conduct does not necessarily require a full-fledged scientific research. This static approach has recently led the SBP to lose an incredible number of foreign qualified PhDs, having specialised in relevant areas to the SBP's functions, as they find the incentive structure and work environment outside the SBP, both in government and private sectors way lucrative.

MPS and SBP's Major Publications

MPS is the major policy document issued by the SBP every six months. The first MPS appeared on the SBP website covered the period from July-December, 2005. This document gives a brief outlook of the global as well as domestic economy, and announces a monetary expansion of 13 percent to achieve the inflation and growth targets of 8 percent and 7 percent, respectively. Backward in nature, this MPS mainly discussed trends in sectors and indicators such as monetary and credit sector, external sector, and inflation and interest rate indicators. Nevertheless, a review of the most recent MPS for the January 2015, a 25 pages document,

[13] It is also pertinent to mention that the practice of publication of these annual projections seems to have been discontinued after the second quarterly report for the FY14.

reveals a considerable improvement in terms of coverage and extensiveness of information. It discusses, relatively at a greater length, both the global and domestic developments and their outlook. It also covers a detailed trend analysis of all the key sectors of the economy such as, monetary, fiscal, external and real sectors and informs that the board has decided to reduce the SBP policy rate by 100 basis points.

It is however surprising to note that after the lapse of almost ten years that the SBP has started publication of the MPS, its quality needs significant improvement, especially in terms of the forward looking element, substantive coherent arguments and linkages. Khizar (2015) recently criticised the MPS issued in November, 2015 stating that:

The narrative which accompanied the decision is poor as the policy note falls short of explaining its rationale. Instead, it reads as a sycophantic review of the glorious past. Year-to-date inflation numbers and other macroeconomic statistics are quoted but with little attempt to delve into any deeper analysis of their causes and impact….The policy note was silent on the global outlook implying that the country's economy is insulated from global factors…What is the MPS take on the pressures on the currency and its linkage to interest rates? How has the decision of the US Federal Reserve to raise rates in December impacted the economy? Will this hike impact global currencies and commodity prices and what will be its consequences on Pakistan's trade balance and currency? What is the future outlook and how will the policy decision in Pakistan manage these changes? Is the stance dovish or hawkish? What is the rationale behind maintaining status quo in the policy rate? The policy note is not depicting any leaning and there is nothing to read between the lines. This may imply that the central bank is either, short of good staff to set the policy or the lack of interest of the institution in spelling out, a meaningful policy note….

Improvement might not be possible unless a reasonable resource base is attained both in terms of human resources as well as technology.[14] For example, there are only a few PhDs in the monetary policy department as well as the entire SBP, which does not allow a thorough and robust research on bits and pieces to help provide meat for the MPS. On a head count, there are only five PhDs in the monetary policy department including director, which is less than the Economics Department of the Institute of Business Administration (IBA).[15] The total number of the PhDs in the entire SBP is not even half the number of PhDs with specialisation in Economics and Finance in the Pakistan Institute of Development Economics (PIDE). The acute scarcity of quality human resource in the SBP is also evident from both the quality and quantity of the research outputs available on its website.[16] Further, one may hardly find references of the published research, either from the SBP staff or from academia in the SBP's major publications; such as Quarterly and Annual Reports to support the arguments made therein, which is a reflection of the poor quality of these publications. There is only one PhD in the staff at the SBP's relevant

[14] In terms of technology, for example, in addition to the EViews, the provision of commonly used fundamental econometric research tools such as MICROFIT, SAS and GTAP, as well as referencing software like End Note may be helpful. Acquisition of the LATEX as well the training of the staff on such tools is crucial for policy research

[15] The total number of PhDs in the Research Department of the SBP including Director is six.

[16] An independent evaluation of the quality and quantity of its policy notes, research outputs and regular publications by international specialists in the field may help the SBP to assess its level and efficacy. A similar evaluation is conducted by the Bank of Canada [see Meyer, *et al.* (2008)].

department—Economic Policy and Review Department (EPRD)—responsible for publication of Quarterly and Annual Reports on the state of the economy.[17] In contrast to this acute dearth of PhDs in the SBP, in the U.S., for example, there is a huge resource base even at the staff level with almost 350 PhDs—each one having a quality research capability as is reflected by their research profiles and research outputs.

Since, the monetary policy communications such as the MPS are crucial and at the same time meant to inform the public to build their confidence—that the monetary policy decisions were taken after having developed a thorough understanding of the underlying dynamics of the global and domestic economy and the linkages therein. A mere mention of the developments in the global economy, say for example in the case of Euro Area, Japan and the U.S., may not be sufficient, unless these developments and their potential impact could be very well connected to the domestic economy, and then to the goal variables. Similarly, a mere mention of the developments and outlook of the important sectors of the domestic economy may not constitute a useful central bank communication (MPS), unless properly linked together to indicate a support for the particular increase/decrease in the policy rate.

It is also important to connect more objectively (on the back of extensive impact analysis) that whether the decisions taken previously were translated into the key macroeconomic indicators as well as to the goal variables such as, inflation and growth. Further, what would be the possible courses taken by the monetary authorities in case of any variations in the contemplated global and domestic circumstances as well as deviations from the targeted goal variables. Since, the MPS is essentially meant for the forthcoming six months period, the document should be able to provide some insights in a forward looking manner, while highlighting both the short and medium term projections, and the possible impact of the underlying monetary policy decision(s) over a horizon(s). It should also review if the past decisions have been able to yield the desired results in terms of the goal variables, if not, why not and what steps have been taken to make the policy more effective?

CONCLUSION

There is a wide agreement that increased transparency in monetary policy decision making processes and communication has considerably enhanced central banks' performances across the globe. Today's central banks are in a much better position to anchor inflation expectations. This paper critically assesses the state of Pakistan's monetary policy transformation, in terms of transparency and openness, especially in terms of statutory objectives, monetary policy mandate, conflicts of interest, disclosures, and dissemination of effective public economic information.

The assessment indicates that the SBP Act, 1956 does not provide any effective guiding framework in terms of monetary policy objectives and mandate. The inflation and growth targets setting strategy of the government is intrinsically flawed, leading the economy away from the path of price stability, which is considered crucial for a sustainable

[17] It is important to highlight that EPRD hardly does any research-based analysis or review of existing economic policies as is envisaged by its name. Instead an ex-post backward-looking trend-based analysis of various sectors of the economy is provided in its Quarterly and Annual reports.

economic growth. It does not allow appropriate benchmarks for monetary policy evaluation and accountability. Further, the Act does not put an explicit mechanism to insulate against the conflict of interest issues, originating from the dual supervisory and monetary policy role of the SBP, market affiliations of the Board and the Governor as well as fiscal dominance.

If the SBP has to adapt to the needs of the modern central banking practices, serious and constant institutional capacity and credibility building measures will have to be taken, which however, in the first place requires a change in the static culture of the SBP. Implanting qualified human resources at the top, middle and lower tier managerial levels could play an instrumental role towards the organisational change.

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Assessing the Role of Money versus Interest Rate in Pakistan

ZAFAR HAYAT and MUHAMMAD NADIM HANIF*

INTRODUCTION

Although the debate about the choice of an appropriate monetary policy instrument is well known, it is far from being settled. The main instruments over which disagreements have persisted are the price, interest rateand quantity of money.[1] While there is a consensus that both cannot be used simultaneously at the same time to influence the target variables (Turnosky, 1975), studies concluded differently on their relative effectiveness as monetary policy instruments. For example, Sargeant and Wallace (1975) argued that reserve money is a better instrument as compared to the interest rates because the latter suffers from the problem of equilibrium indeterminacy. Similarly, Bhattacharya and Singh (2007) found that money maximises welfare in the presence of real shocks.[2] Gordon (1979) on the other hand concluded in favour of the superiority of the interest rate over monetary instruments for Canada. Similarly, Atkeson et al. (2007) found that the interest rates have a natural advantage over money instruments.

Research has also indicated that a combination policy (a certain mix between interest rates and money), as given in Poole (1970) instead may be a better option. He created a theoretical framework for a combination policy. However, his static unified framework only allows answering the underlying question of the relative effectiveness of monetary policy instruments in terms of output rather than the inflation, taming which is the prime objective of most of the central banks today.[3]

Monetary policy practices at the State Bank of Pakistan (SBP), the country's central bank have varied over time (see Hanif, 2014 for details). Historically, money played an important role as a monetary policy instrument. The focus nevertheless has now shifted to the interest rate and currently, an interest rate corridor system is in place effective from August 2009 (Hussain, 2009; Khan, 2010 and Hanif, 2014). Whether this transition of the SBP from an increased focus on money to the use of interest rate as an instrument of

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[1] Atkeson et al. (2007) accounts for exchange rate as one of the instruments in addition to interest rates and money.

[2] It may be noted that they also found that in the presence of nominal and relatively small shocks instead of money, interest rate instruments are better.

[3] Woglom (1979) and Benaive and Richard (1983) are among others who have worked along similar lines.

monetary policy has been effective; and should the former be completely deemphasised *vis-à-vis* the latter are crucial questions yet to find research-based answers. It is also important to ascertain if the transformation of Pakistan's monetary policy's focus from targeting monetary aggregates to the active use of short-term interest rates has any bearing on their relative effectiveness in terms of inflation over time in the country.

To the best of our knowledge, this is an unexplored research area. In a related attempt, Ali and Ahmad (2014) explored the relative performance of inflation, and price level targeting regimes under alternative monetary policy instruments, and found money as a better performer relative to the interest rate for Pakistan. Their analysis, however, is based on calibrating their model while using parameters from Din and Khan (2011), which used the annual data from 1972–2009. Neither their focus was nor could their study, by construct, observe the evolution of the relative role of money and interest rate—especially in the context of SBP's transition from the former to the latter—which was completed by 2009. It, therefore, did not take into account the full-fledged interest rate regime. Most recently Ahmad et al. (2016) theoretically evaluated the role of money in propagating business cycle fluctuations in Pakistan and found that cash base economy models under money growth rule perform well as compared to the cashless economy models with the Taylor type rule.

In contrast to the aforecited literature, we use; (i) the framework used by Hayat et al. (2016) to extract indicators of persistent changes in the variables of interest to be able to closely observe the most relevant underlying relationships and, (ii) apply the ARDL approach to estimate such relationships.

The results indicate that money remains a consistent performer *vis-à-vis* interest rate but its role has been receding with an increased focus of the SBP on the interest rate as a monetary policy instrument. Nevertheless, there is evidence of a positive relationship between the interest rate and inflation, which is indicative of the possibility of a price puzzle. Therefore, it may be advisable for the SBP not to completely de-emphasise the use of money as an instrument of monetary policy (*vis-à-vis* interest rate) as it has been significantly effective in taming inflation in the country.

METHODOLOGICAL FRAMEWORK

In order to examine the relative importance of money versus interest rate as monetary policy tools as well as their evolution over time, following Hayat et al (2016), we first generate indicators representing persistent variations in variables of interest and then use them to estimate their long-term relationships through the ARDL approach (see next section). This is important because only a small fraction of variations in monetary policy instruments may tend to relate to a small fraction of variations in target variables (such as inflation and/or real economic growth) given that the central bank may not necessarily exercise full control over the variations in monetary policy variables especially broad money. This postulation, as a starting point, is consistent with Bullard, 1999; Uhlig, 2005 & Hayat et al. 2016. We derive indicators of persistent variations from (a) growth in broad money, (b) market interest rate, (c) inflation, and (d) the real GDP growth rate in two steps as follows.

In the first step the Hodrick and Prescott (1997) filter—henceforth HP filter—is applied to decompose the observed series (X_t) into its permanent long term path (Xl_t) and

the transitory fluctuations (Xf_t). The Xf_t are obtained by subtracting the long-term path from the observed time series X_t such that $Xf_t = X_t - Xl_t$. In the second step, we apply the HP filter to Xf_t to extract its permanent part (Xfl_t), which is the indicator of persistent variations in X_t. One may ask about the justification of the use of the HP filter. First, our choice of this filter is driven by the fact that the filter allows the trend to vary over time and hence the magnitudes of deviations, which may better represent policy responses (variations) in the underlying policy as well as goal variables (Hayat et al. 2016). Second, double HP filter outperforms other detrending and smoothing methods in turning point signal stability, i.e. identifying turning points quickly (Nilsson & Gyomai, 2011), which reflect structural changes and hence regimes. This feature is important because our purpose is to observe the evolution of money and interest rate instruments across different regimes: (i) monetary (ii) transitory and (iii) interest rate regimes.

For all the four variables—broad money growth, interest rate, inflation and real GDP growth rate—we, therefore, apply the two-step procedure to obtain our desired indicators of persistent variations as follows.

Indicator of Persistent Variations in Broad Money Growth

In the first step, the HP filter is applied to decompose the observed series of growth in $M2$ (denoted by $\dot{m2}_t$) over time into its long-term growth path $\dot{m2}l_t$ and the fluctuations around it $\dot{m2}f_t$, such that:

$$\dot{m2}_t = \dot{m2}l_t + \dot{m2}f_t \qquad \text{for } t = 1, \dots\dots, T.$$

In the second step, the HP filter is applied to $\dot{m2}f_t$ to obtain its long-term trend path, which corresponds to persistent variations, denoted by $\dot{m2}fl_t$ such that:

$$\dot{m2}f_t = \dot{m2}fl_t + \dot{m2}ff_t \qquad \text{for } t = 1, \dots\dots T,$$

$$\Rightarrow \dot{m2}fl_t = \dot{m2}f_t - \dot{m2}ff_t \qquad \text{for } t = 1, \dots\dots T.$$

Where $\dot{m2}fl_t$ is the desired series representing persistent variations in broad money growth.

Indicator of Persistent Variations in Interest Rate

Similarly, the HP filter is applied to decompose the interest rate (i_t) over time into its long-term path and the fluctuations around it. In the first step:

$$i_t = il_t + if_t \quad \text{for } t = 1, \dots\dots T.$$

In the second the HP filter is applied again to if_t to obtain its long-term path of our interest ifl_t as follows:

$$if_t = ifl_t + iff_t \quad \text{for } t = 1, \dots\dots T.$$
$$\Rightarrow ifl_t = if_t - iff_t \quad \text{for } t = 1, \dots\dots T.$$

Indicator of Persistent Variations in Inflation

The two-step strategy of application of HP filter is also employed to generate indicators of inflation and real GDP growth as follows:

$$\pi_t = \pi l_t + \pi f_t \quad \text{for } t = 1, \ldots \ldots T,$$

where π_t is the inflation rate in time t. The πl_t is its long-term path in time t and πf_t represents the fluctuations around πl_t over time. In the first step, the HP filter is applied to π_t to obtain πl_t and πf_t. In the second step, the HP filter is applied to πf_t to obtain its long-term path such that:

$$\pi f_t = \pi f l_t + \pi f f_t \quad \text{for } t = 1, \ldots \ldots T.$$

$$\Longrightarrow \pi f l_t = \pi f_t - \pi f f_t \quad \text{for } t = 1, \ldots \ldots T.$$

Where, $\pi f l_t$ is the desired inflation indicator.

Indicator of Persistent Variations in the Real GDP Growth Rate

Likewise, the strategy of the application of the two-step HP filter is used to obtain the real GDP growth indicator. Firstly, the time series of the growth in real GDP ($\dot{y}_t$) is decomposed into its long-term growth path $\dot{y}l_t$ and the fluctuations around it, i.e. $\dot{y}f_t$ such that:

$$\dot{y}_t = \dot{y}l_t + \dot{y}f_t \quad \text{for } t = 1, \ldots \ldots T.$$

Secondly, the HP filter is applied to $\dot{y}f_t$ to obtain its long-term path as:

$$\dot{y}f_t = \dot{y}fl_t + \dot{y}ff_t \quad \text{for } t = 1, \ldots \ldots T.$$

$$\Longrightarrow \dot{y}fl_t = \dot{y}f_t - \dot{y}ff_t \quad \text{for } t = 1, \ldots \ldots T.$$

Where, $\dot{y}fl_t$ is the desired real growth indicator.

ESTIMATION APPROACH, MODEL SPECIFICATION AND DATA

We use the autoregressive distributed lag (ARDL) bounds testing and estimation approach to cointegration proposed by Pesaran and Shin (1999) and Pesaran et al. (2001) to obtain long-run parameter estimates. The estimators of the ARDL are super-consistent for long-run coefficients and it performs particularly well in small samples without losing long-run information. The ARDL approach allows the selection of optimal dynamic models. Since Pesaran and Pesaran 1997; Pesaran & Shin 1999 reported that the SBC is a consistent model selection criterion in small samples and that it selects a relatively more parsimonious model (Enders, 1995), we use the SBC. The ARDL works even in the presence of endogenous regressors irrespective of the order of integration (1 or 0) of explanatory variables (Pesaran & Pesaran, 1997; Pesaran & Shin, 1999).

Operationally, the ARDL is a two-stage procedure. The first stage is to test for the existence of cointegration by computing the *F*-statistic. Since the asymptotic distribution of this *F*-statistic is non-standard, Pesaran et al. (2001) tabulated two sets of appropriate critical values for I(0) or I(1), for different numbers of regressors (k) with and without intercept and trend. If the computed *F*-statistic falls outside the band for respective critical values of I(0) or I(1), cointegration exists. If it falls within that band then the result of the inference is inconclusive. In the second stage, long-run coefficients are obtained, provided

the cointegration is established in the first stage. In general form, the error correction version of our ARDL model may be given as:

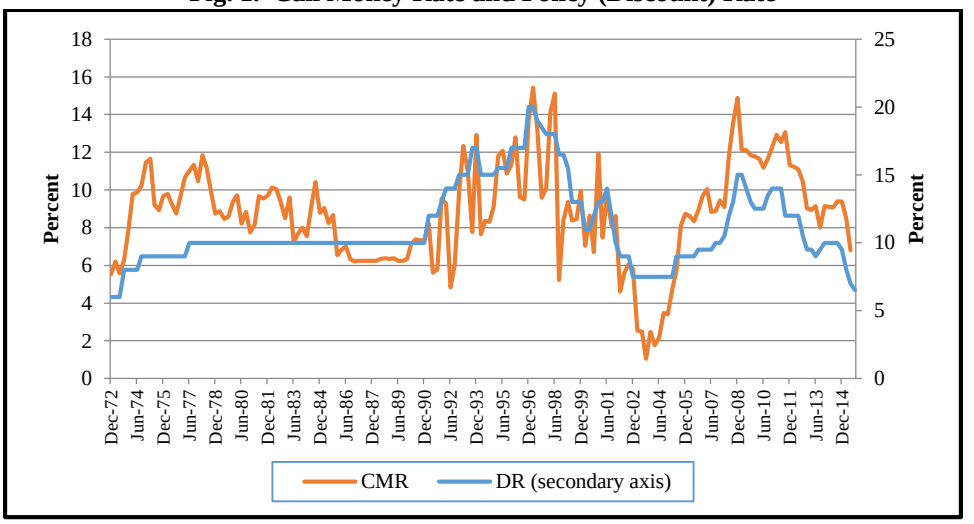
$$\Delta\pi fl_t = \emptyset_0 + \sum_{i=1}^{p} \emptyset_i \Delta\pi fl_{t-i} + \sum_{j=0}^{q1} \emptyset_j \Delta \dot{m2fl}_{t-j} + \sum_{k=0}^{q2} \emptyset_k \Delta ifl_{t-k} + \sum_{m=0}^{q3} \emptyset_m \Delta \dot{yfl}_{t-m} + \gamma_0 \pi fl_{t-1} + \gamma_1 \dot{m2fl}_{t-1} + \gamma_2 ifl_{t-1} + \gamma_3 \dot{yfl}_{t-1} + \epsilon_t \quad \ldots \quad (1)$$

Where πfl, $\dot{m2fl}$, ifl, and $\dot{yfl}$ are inflation, broad money growth, interest rate and real GDP growth indicators, respectively. The Δ denotes the first difference operator and ϵ is the error term.

We use the quarterly data series from Q1-1974 to Q2-2015. The main variables are expressed in terms of a year on year (YoY) change in CPI inflation, real GDP and broad money—which allows us to control possible seasonality—while the call money rate (as a proxy of policy rate) is in levels. The data for broad money growth and call money rate is taken from SBP. Since the policy rate remained constant from 1977 to 1990 (Figure 1), as an alternative, we, therefore, used the call money rate. The call money rate closely mimics the behaviour of the policy rate.[4] The correlation coefficient between the policy rate and call money rate is 0.95.

The inflation data has been obtained from the national statistical agency, the Pakistan Bureau of Statistics (PBS). National income accounts are complied by the PBS only on an annual basis; we, therefore, use the quarterly GDP data for Pakistan for the fiscal years 1973–2012 estimated by Hanif et al. (2013). Since they quarterised the data only until 2012, we extended their data set up to 2015 while using the proportions therein, based on the latest available annual data from the PBS for the period 2013–2015. It may be noted that for the entire series to be consistent, we transformed their series from 1974 to 2012 on the new base year, i.e. 2005–2006.

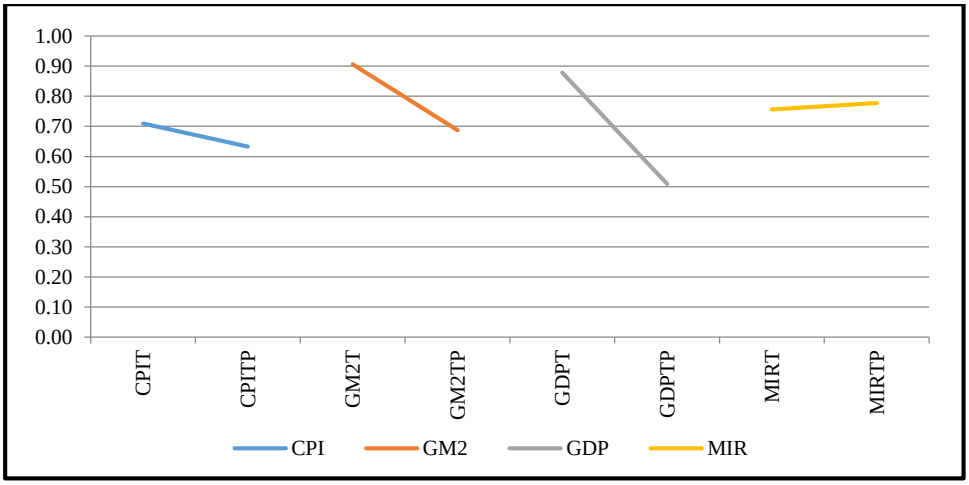
Fig. 1. Call Money Rate and Policy (Discount) Rate



[4] We use the nominal interest rate as the SBP uses nominal rather than real interest rate in its policy messages, and it is the nominal rate that is used/quoted by the banking system in its transactions.

In order to be confident whether our generated 'indicators' represent the behaviours in the respective base variables, and to make sure that it might not have led to a considerable loss of information, we checked their correlations with their respective base variables and cycle series. Figure 2 shows that by and large, double filtering has not led us to lose significant information as exhibited by correlation coefficients with respective base and cycle variables, especially in case of inflation and interest rate indicators. Instead, it seems that rather the noise part has been purged, which may not necessarily be representing policy-induced actions and responses in goal variables as all the shocks may not be treated to be representing informed policy actions or responses (see Hayat et al. 2016).[5] For example, the correlation between the base variable CPI inflation and its cycle series (CPIT) is 0.71 and that of CPI inflation and our generated indicator is 0.63 (see Figure 2).

Fig. 2. Correlation of the Base Variable with Respective Cycle Series and Generated Indicators



RESULTS

Model Selection, Diagnostic and Cointegration Tests

Given the lack of theoretical guidance as to what should be the appropriate maximum lag length in a particular situation, we relied on a general-to-specific approach for the imposition of optimal lag lengths. We started with 10 quarters as the maximum lag length in case of the full sample and kept reducing unless we could pick a cointegrating model with no issues of serial correlation, heteroscedasticity, and estimated coefficients' stability. This allowed for up to two and half years, reasonable transmission time for the effects of monetary policy instruments at least in the case of Pakistan (considering past research in this area like Khan, 2008). In the case of sub-samples, any maximum allowable lag length (lower than 10) was tried during the selection process. We used the SBC model selection criterion as it selects the most parsimonious model.

[5] A true test to this effect nevertheless would be for the indicators to yield intuitive results as against the base and cycle series (see Section 4 and 5).

For the model in equation (1), the null hypotheses of the non-existence of a long-run relationship is given by $H_0: \gamma_1 = \gamma_2 = \gamma_3 = 0$ against the alternative $H_1: \gamma_1 \neq 0$, $\gamma_2 \neq 0$, $\gamma_3 \neq 0$. The *F*–statistics computed for the joint significance of γ_1, γ_2 and γ_3 for the full (1974–2015) and subsamples (1974–1995, 1995–2009 and 2009–2015) are 10.99, 17.51, 9.35 and 162.67 respectively. All these computed statistics exceed the corresponding critical value bands of Pesaran et al. (2001) for unrestricted intercept and no trend at a 1 percent level, leading us to reject the null of the non-existence of a long-run relationship. This implies that the decision to proceed with computing long-run coefficients is conclusive and there is no need to know the cointegration rank (Pesaran & Pesaran, 1997). The long-run parameter estimates are obtained subsequently.

Although we are mindful of the possibility of endogeneity, we have confidence in our estimates as the ARDL methodology we used works well even in the presence of endogenous regressors irrespective of the order of integration [I(1) or I(0)] of explanatory variables (Pesaran & Pesaran, 1997; Pesaran & Shin, 1999). Alternative methodologies to minimise the extent of possible endogeneity are 2SLS and GMM, which, however, require identification of 'instrumental variables'. Generally, it is hard to find 'instrumental variables' for the variables in the equation to be estimated. In those cases, suggestion in the empirical literature is the use of lagged variables. In this study, the way we have developed each indicator, it in itself is like an instrument for the underlying variable. And that the use of the lagged values of these indicators in the ARDL modeling reduces the chances of endogeneity in our estimation.

Money Versus Interest Rate—Regime-wise Results

Since our objective is to assess if the SBP should place an increased emphasis on interest rate compared to the broad money and whether the transformation in the focus of Pakistan's monetary policy from the latter to the former has had any bearing on their relative effectiveness in terms of inflation, we analyse sub-periods that correspond to i) monetary targeting regime (1974–1995), ii) transition period from monetary targeting to interest rates as monetary policy instruments (1995–2009) and iii) an interest rate regime (2009–2015).[6] Furthermore, as a cross-check, we used the Bai Perron test (1998) for the identification of multiple breakpoints and found supporting evidence that breaks occurred in 1995 and 2009 (Appendix 1). Further supporting evidence of these breaks can also be had from the cointegration graph for our full sample model (see the first panel of Appendix 2).

The results indicate that a clear picture cannot be seen when the estimations are carried out for the full sample from 1974 to 2015 as neither money nor interest rate has a significant role in explaining inflation in Pakistan (Table 1, column (a)). This may be because during the entire sample period, the SBP's monetary policy preferences in terms of use of instruments have varied, obscuring the results for the overall sample. This, however, is not the case when we subsequently observe the results for the specific regimes.

[6] See Hanif (2014) for a discussion on key developments in these phases.

Table 1

Long-run Estimates

Variables	Full Sample 1974-2015 (a)	Monetary Regime 1974-1995 (b)	Transition Period 1995-2009 (c)	Interest Rate Regime 2009-2015 (d)
ifl	0.39	0.16	1.06	0.61
	[0.12]	[0.67]	[0.00]***	[0.00]***
$m\dot{2}fl$	0.08	0.95	1.26	0.60
	[0.57]	[0.02]**	[0.00]***	[0.00]***
$y\dot{f}l$	–0.81	–5.93	–1.37	–1.70
	[0.09]*	[0.04]**	[0.00]***	[0.00]***
a	0.01	0.14	0.05	–0.07
	[0.38]	[0.01]	[0.05]	[0.00]
$ECT(-1)$	–0.003	–0.004	–0.02	–0.35
	[0.00]***	[0.00]***	[0.00]***	[0.00]***
ARDL	(8,3,6,4)	(8,1,5,8)	(5,2,5,0)	(2,0,2,2)
COIN	1%	1%	1%	1%
DW	1.86	2.10	2.03	2.18
R^2	0.99	0.99	0.99	0.99

This table reports the long-run coefficients and the P-values. The latter are reported in brackets. ARDL shows the order of the lags of the selected models whereas COIN stands for cointegration. ***, ** and * indicate significance at 1 percent, 5 percent and 10 percent level, respectively.

The supply-side effects of real growth seem rather visible, which tend to reduce inflation. This result is consistent with Hayat et al. (2016) which founded an inverse relationship between the real growth and inflation indicators using the annual data from 1961 to 2010. Although the question may remain that whether the real activity indicator used is proxying the supply or demand side of the economy. We advocate the former because the real growth in GDP is used rather than nominal. Furthermore as is visible from column (b) through (d) in Table 2, the magnitude of the effect of the real growth on inflation decreases, which make sense only when real growth represents an increased supply of goods and services—as the average real growth witnessed in the sample period used in columns (b) (c) and (d) are 5.60, 4.47 and 3.41 respectively.

During the monetary targeting regime, the role of money in explaining inflation is both significant and quantitatively large as against interest rate (Table 1, column (b)). This result is consistent with a range of studies that have found brad money an important determinant of inflation in Pakistan such as Chaudhary & Ahmad, 1996; Price & Nasim, 1999; Kemal, 2006; Khan & Schimmelpfennig, 2006; Serfraz & Anwar, 2009 & Hayat et al. 2016. A straightforward policy implication for the SBP from these results is that money plays a significant role in explaining inflation and, therefore, it may be used as an effective monetary policy instrument to tame it. It is, however, interesting to note that interest rate whilst being insignificant during the monetary targeting regime, grew in significance during the transition period to the interest rate regime (Table 1, column (c)).

Under the interest rate regime, both money and interest rate played a significant role in explaining inflation; however, the quantitative effect of the latter is more pronounced in this regime as compared to the transition regime. On the other hand, the quantitative effect of broad money receded *vis-à-vis* the interest rate instrument during the transition period. These results imply that the shift in focus from monetary aggregates towards interest rate as a monetary policy instrument has had implications both for the relative importance and significance of the two monetary policy instruments.

When taken in isolation, although the interest rate instrument grew in significance during transition and interest rate regimes, it may not effectively guide the monetary policy as it brings forth an important monetary policy issue for the SBP, commonly known in the literature as 'price puzzle', wherein interest rate and inflation are positively related.[7]

The price puzzle issue is non-trivial as it renders the interest rate instrument ineffective [vis-à-vis the broad money instrument in conducting monetary policy], which is the main policy tool currently used by the SBP. We, therefore, suggest that money should not be deemphasised.

SOUNDNESS OF INDICATORS AND ROBUSTNESS CHECK

To check whether our generated double-filtered indicators have allowed us to obtain intuitively consistent approximations of the underlying phenomena, we did the estimations both using the base data and cycle series. The results obtained using base data (Table 2)—although not as intuitive as the results obtained from our double-filtered indicators—by and large, provide support to our mainstream results as compared to the results obtained by using cycle series (Table 3).

Table 2

Long-run Estimates Using Base Data

Variables	Full Sample 1974-2015 (a)	Monetary Regime 1974-1995 (b)	Transition Period 1995-2009 (c)	Interest Rate Regime 2009-2015 (d)
i_t	0.62 [0.01]**	0.33 [0.34]	1.53 [0.00]***	1.41 [0.00]***
$\dot{m2}_t$	0.44 [0.01]**	0.26 [0.12]	0.20 [0.51]	0.24 [0.46]
$\dot{y}_t$	0.01 [0.98]	–1.07 [0.02]**	1.79 [0.15]	–0.39 [0.54]
a	–3.71 [0.25]	8.04 [0.08]	–16.49 [0.02]	–7.14 [0.23]
$ECT(-1)$	–0.22 [0.00]***	–0.29 [0.00]***	–0. 29 [0.11]	–0.67 [0.05]*
ARDL	(7,0,7,1)	(8,0,3,3)	(7,5,8,5)	(2,0,0,0)
COIN	1%	2.5%	Nil	Nil
DW	1.99	2.01	1.98	2.26
R^2	0.90	0.86	0.98	0.83

This table reports the long-run coefficients and the *P*-values. The latter are reported in brackets. Nil means no cointegration. ARDL shows the order of the lags of the selected models whereas COIN stands for cointegration. ***, ** and * indicate significance at 1 percent, 5 percent and 10 percent level, respectively.

[7] Javid and Munir (2010) also found similar results. Felipe (2009), Naqvi and Rizvi (2010) also pointed to this issue while examining the suitability of adoption of inflation targeting for Pakistan.

Table 3

Long-run Estimates Using Cycle Data

Variables	Full Sample 1974-2015 (a)	Monetary Regime 1974-1995 (b)	Transition Period 1995-2009 (c)	Interest Rate Regime 2009-2015 (d)
if_t	–0.31	0.09	0.33	–0.68
	[0.22]	[0.82]	[0.32]	[0.49]
$\dot{m2}f_t$	–0.15	–0.20	0.23	–0.29
	[0.18]	[0.18]	[0.35]	[0.46]
$\dot{y}f_t$	–0.01	–0.57	0.22	1.85
	[0.93]	[0.08]*	[0.64]	[0.18]
a	–0.05	–0.10	0.03	–0.34
	[0.81]	[0.83]	[0.95]	[0.52]
$ECT(-1)$	–0.46	–0.34	–0. 28	–0.55
	[0.00]***	[0.00]***	[0.04]**	[0.01]**
ARDL	(8,3,6,1)	(5,0,3,0)	(5,0,0,1)	(2,1,0,1)
COIN	1%	Nil	Nil	Nil
DW	1.98	1.95	1.70	2.30
R^2	0.84	0.80	0.88	0.67

This table reports the long-run coefficients and the *P*-values. The latter are reported in brackets. Nil means non-existence of a cointegrating relationship. ARDL shows the order of the lags of the selected models whereas COIN stands for cointegration. ***, ** and * indicate significance at 1 percent, 5 percent and 10 percent level, respectively.

All the mainstream models obtained using double-filtered indicators not only fits the data well but also approximate cointegrating relationships as compared to the models that instead uses the variables in base and cycle form. The results obtained by using cycle series are highly inconsistent. They largely depict incorrect signs and do not pick the breaks, thus failing to track the evolution in the relative role of money versus interest rates. On the contrary, the results obtained using the model with generated indicators better identify the breaks in a cointegrating relationship (see Appendix 2).

As far as the robustness is concerned, our results are largely robust to alternative specifications for almost all the sample sizes. First, we dropped the real growth indicator and estimated the model for all the regimes. Second, we ran the regressions for interest rate and broad money indicators both individually and in combination which led us to conclude in favour of our main findings.[8] Since we also found evidence of a structural break in 1982–83 (Appendix 1), we controlled for it through dummy variable and re-estimated our models (a) and (b) in Table 1 just in case the results turn out to be different than without controlling for the structural break. Our inference from the new results obtained, however, remained unaltered.[9]

[8] For brevity purposes, these results however are not reported and may be obtained from the corresponding author if needed.

[9] These results are not reported and may be obtained from corresponding author upon request.

CONCLUSION

Pakistan's monetary policy has evolved over time. The evolution of the relative role of money and interest rate is examined across three distinct phases of monetary policy experience in Pakistan, i.e. regime of targeting monetary aggregates, a period of transition towards interest rate and interest rate regime. A framework was created that allowed the generation of indicators to capture persistent variations in underlying variables. Broad money is found to consistently perform *vis-à-vis* interest rate throughout the entire spectrum in controlling inflation in the country. Its quantum effect, however, started receding during the transition period and almost equalised the interest rate instrument during the interest rate regime. The role of the interest rate is found to be puzzling as it is positively and significantly related to inflation. The use of the interest rate by the SBP, therefore, may not be effective unless this puzzle is explored and addressed. Since broad money is still effective, its role should not be completely deemphasised.

APPENDIX 1

Bai-Perron Multiple Break Points Test

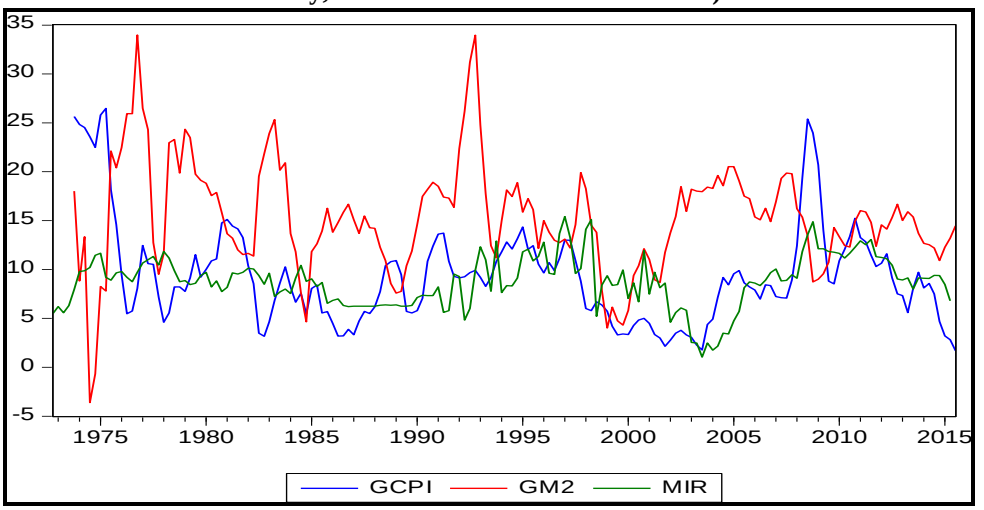
Breaks	F-Statistic	Critical Value	Break Year(s)
1*	41.8	18.26	1982
2*	55.89	14.45	1983, 1991
3*	56.67	12.16	1983, 1991, 2005
4*	61.99	10.56	1983, 1989, 1995, 2006
5*	56.68	8.71	1983,1989,1995,2002, 2008

*denotes significance level at 1 percent. A trimming level of 15 percent was used and the maximum breaks allowed were 5. The critical values are that of Bai and Perron (2003).

APPENDIX 2

Supplementary Material

Graph of Base Variables (GCPI is Inflation, GM2 is Growth in Broad Money, and MIR is Market Interest Rate)



Descriptive Statistics of the Base Variables

	GCPI	GM2	MIR
Mean	9.361266	15.30568	8.844052
Median	8.606444	15.00142	8.936667
Maximum	26.48080	33.99265	15.42333
Minimum	1.780676	–3.617128	1.050000
Std. Dev.	5.121828	5.568757	2.607813
Skewness	1.391459	0.245834	–0.292618
Kurtosis	5.340424	4.615676	3.544695
Jarque-Bera	92.00458	19.84619	4.447716
Probability	0.000000	0.000049	0.108191
Sum	1563.331	2556.049	1476.957
Sum Sq. Dev.	4354.698	5147.834	1128.914
Observations	167	167	167

Unit Root Tests of Base Variables

Table: Stationarity Properties of The Variables

	ADF		*PP*	
Variables	Level	First difference	Level	First difference
GCPI	[0.01]**		[0.01]**	
GM2	[0.00]***		[0.00]***	
MIR	[0.06]*	[0.00]***	[0.00]***	

This table reports the *P-v*alues of the Augmented Dicky–Fuller (*ADF*) and the Phillips–Perron (*PP*) tests in brackets. ***, ** and * indicate that the series are stationary at the 1 percent, 5 percent and 10 percent level of significance respectively.

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Part 2:

Exchange Rate

Don't Fall in Love with Parity: Understanding Exchange Rate Depreciation

ABDUL JALIL*

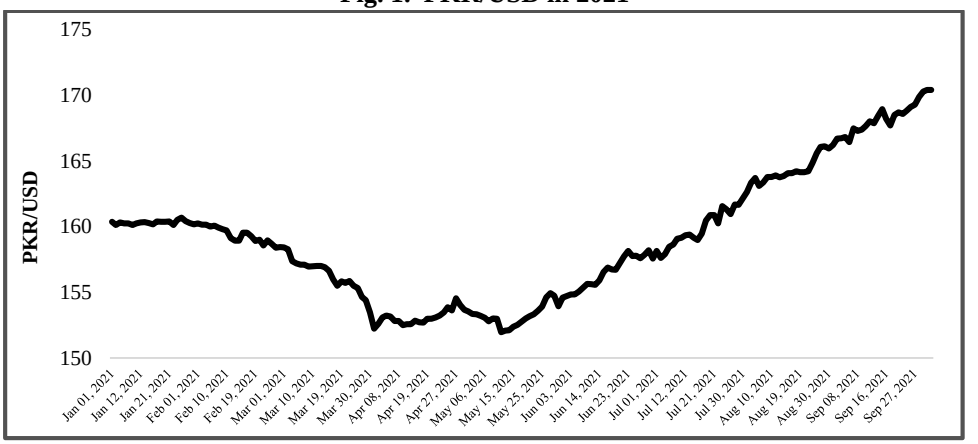
Key Takeaways from Global Research

- Exchange rate is like temperature in a human body: it merely reflects underlying weaknesses. Like the human body artificially holding the temperature down for long periods without addressing the causes is likely to lead to grievous consequences.
- There is no such thing as an active devaluation policy for boosting exports.
- Holding the exchange rate at an artificially appreciated rate is only possible through reserve loss. These losses cannot be incurred over the long run as reserves are finite and market participants know that reserves can be attacked to their advantage.
- Bolstering the exchange rate through exchange and import controls serves only to disrupt supply chains and eventually weaken the domestic economy. At best it is a short-run painful solution.

The Pakistani rupee has depreciated, against the US dollar, around 10 per cent, since May 2021 (see Figure 1). This is a natural response of the exchange rate parity to swelling trade deficit, mounting inflation, and negative real interest rates. Considering the macroeconomic fundamentals of the Pakistani economy, it is expected that the rupee will remain under pressure and will continue on the fall. This situation raises several questions. What should be the response of the State Bank of Pakistan (SBP)? Should SBP intervene in the forex market or not save the parity? If yes, then how much? If not, then why? What should be the course of action of the government and the SBP in the long run?

This policy viewpoint will answer these questions and provide straightforward guidelines for the SBP and the government.

Fig. 1. PKR/USD in 2021



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SHOULD SBP CONTINUOUSLY SAVE THE EXCHANGE RATE PARITY THROUGH FOREIGN EXCHANGE INTERVENTION?

The answer is NO.

It is being argued that the exchange rate is continuously depreciating despite having a handsome amount of foreign exchange reserves. So, this is 'against the fundamentals of economics that the foreign exchange reserves are increasing and, on the other hand, the rupee is depreciating. So, SBP should manage the pressure on the exchange rate through the intervention in the foreign exchange market (see Box 1).

Box: 1: Exchange Rate Pressure: Managed or not Managed

When there is a mismatch between the demand of the foreign currency (dollars in our case), and the supply of the foreign currency than the home currency (Pak rupee in our case) remain under pressure to depreciate or appreciate. In this case, the central bank, SBP in our case, may intervene in the foreign exchange market through the selling or buying of the foreign currency to manage the pressure. The difference between the actual nominal exchange rate and the equilibrium exchange rate is called the unmanaged portion of the pressure. If the actual exchange rate is equal to the equilibrium exchange rate, then SBP is not managing the exchange rate. If the actual exchange rate is overvalued when the demand of the dollar is higher than the supply of the dollar, then the pressure is fully managed by the SBP(see Jalil 2021 and Rao 2019 for the details and calculations of exchange market pressures and management).

We argue that the SBP should not intervene in the forex market. It is very clear that the amount of foreign exchange reserve is not in the safe zone. As per the SBP data, Pakistan's liquid foreign exchange reserves are around 26.1 billion USD (19.2 billion USD SBP reserve and 6.8 billion USD commercial bank reserve). It is also important to mention that we availed several debt reliefs and additional finances during COVID. If we net off all these finances, roughly, the foreign exchange reserves level will be around 20 billion USD.

On the other hand, the import bill is around 6 billion USD per month and growing in the backdrop of post-COVID recovery and increasing international commodity prices. According to these numbers, the foreign exchange reserves provide only the coverage of 3.0 to 3.5 months imports coverage. So, the reserves are not in the safe zone. If SBP intervenes in the foreign exchange market by selling the dollars, then foreign exchange reserves' loss is very obvious. That's why, keeping in view the pressure on the external sector in the future and the level of foreign exchange reserve, it is not advisable, in any case, that SBP should intervene continuously.

If SBP intervenes continuously, the loss of foreign exchange reserves will lead to balance of payment (BOP) crises. The obvious outcome is to approach to International Monetary Fund (IMF) to manage the BOP crises. The heart of the IMF loan-led policy is 'stabilisation' and 'the market-based exchange rate.' Consequently, the SBP intervention in the forex market will lead to loss of reserve, BOP crises, depreciation of the currency, and compromise on the GDP growth.

THEN WHAT ARE THE OTHER OPTIONS?

The SBP has other options in this challenging situation that are not being utilised. We think that SBP should seriously think on these lines.

Publicly Announced Interventions in the Foreign Exchange Market

The important thing is that the SBP should intervene in the foreign exchange market to curb the extra volatility and the artificial demand in the foreign exchange market. The extra volatility and the artificial demand are creating uncertainty in the foreign exchange market. Indeed, this situation is prone to speculative attacks and untargeted bidding (see Box 2). First and foremost, the task of the SBP should tackle this situation to save the market from speculative attacks.

Box 2: Untargeted Bidding in the Foreign Exchange Market

The untargeted bidding phenomenon often happens in the forex market when the traders feel uncertainty about the speed of the movement of exchange rate parity. It means that when a foreign exchange dealer just takes the ask/bid rate from the other dealer without committing the deal. This, just asking the rate, generates expectations about excess demand and excess supply in the market. Ultimately this creates the artificial demand and supply of the foreign currency in the forex market. It is also important to mention that the untargeted bidding can generate a very irrational number of order flow, based on the number of buyers and sellers, while the amount of buying and selling do not indicate the same trend.

One of the most important tools is the publicly ***announced intervention***. The SBP should adequately communicate about the size and the sign of the foreign exchange intervention. When an artificial buyer will have information that the SBP will intervene to save the parity, this will discourage his/her intention of buying or dollarisation. So, the publicly announced intervention may curb the unnecessary artificial demand of the dollars and the speculative attacks.

Recently, Patel and Cavllino (2019) surveyed several central banks and concluded that the publicly announced intervention significantly strengthens the signalling effect of the market. This is not new evidence or advice. Sarno and Taylor (2001) is a valuable read in this regard.

Importantly, this is growing practice among the central banks that they intervene publicly and remain transparent in the forex market. However, this phenomenon is more common in Latin American economies than in Asian economies (see Patel and Cavllino, 2019). Patel and Cavllino (2019) also argue that transparency and publicly announced intervention have advantages. It sets a signal from the central bank that what is going to happen in the future. Similarly, it enhances the credibility of the central bank. A credible commitment regarding the intervention or no intervention reinforces the signalling effect.

Should Focus on the Market Intelligence

However, there is no question that market intelligence is key to success. The knowledge about the intensity and the persistence of the exchange rate pressure may help determine the level of the foreign exchange intervention for anchoring the

volatility of the exchange rate. If the pressure is persistent and due to structural issues, then it is better not to intervene. Otherwise, the forex traders will trade in the opposite direction of the central bank, and the central bank may deplete reserves without much impact on the volatility and the parity. Both announced interventions and secret interventions don't work in this case.

Proper Communication to Curb any Conspiracy Theory

The SBP should get accurate information about the inflows and outflows of the foreign exchange and then correctly communicate to the stakeholders to curb any conspiracy theory. For example, recently, there has been a rumour that the dollar is being transacted on Afghanistan's borders. The volume of these transactions is not precisely known. It may be possible that the actual volume is very low. But the rumours of 'huge transactions' are creating uncertainty and artificial demand. Unfortunately, the government is also hiding herself and the structural issues behind these rumours. This is more dangerous than the actual situation. Therefore, SBP and the government should adequately investigate the number and volume of the transactions. Then it should be properly communicated to the relevant stakeholders. This is also true in all other cases where the artificial demand and supply of dollars may create uncertainties. This act of SBP and the government will reinforce the credibility of the central bank. Indeed, the action of any credible central bank matter a lot to reduce speculative attacks.

Communication about the Equilibrium Exchange Rate

Jalil (2021) clearly shows that the undervalued/undervalued exchange rate has a positive/negative impact on economic activities. Therefore, SBP should continuously monitor the equilibrium value of the exchange rate and then properly communicate to the stakeholder. This will further signal to the stakeholder about the direction and the extent of the movement of the exchange rate and the intervention of the SBP into the foreign exchange market. This may also enhance the credibility of the SBP and may curb the extra artificial pressure on the home currency.

Very Calculated Tightening of Monetary Policy

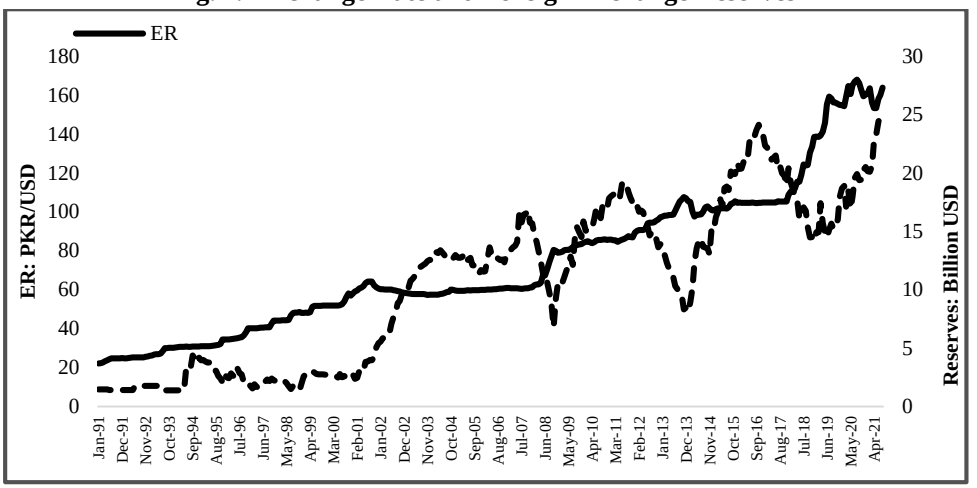
The current monetary policy statement (MPS) of the SBP increases the policy rate to indicate that the SBP has changed its stance in the backdrop of rising inflation due to the increased demand. This is further linked with the revival of economic growth and the recovery from COVID-related recession. Partially, it is true that the prices have been increased due to the rise in demand. But there is another version that the supply chain is disrupted due to the Covid. If this is the case, then the monetary policy's tightening will not help curb the cost-push inflation pressure. The rising interest rate will hit both sides, that is, slow down the revival of the growth and increase the cost-push inflation. Surely, the rising inflation will hit the poor of the society and competitiveness as well. So, the SBP should track the actual reasons and size of the demand and supply-side pressures on inflation and act accordingly in the context of tightening the monetary policy.

LONG RUN STRATEGY

Don't Fall in Love with Parity

It is highly recommended that the exchange rate parity should move with the market forces. Historically, whenever the SBP intervened in the forex market to stabilise the exchange rate against the market forces then after some period the loss of foreign exchange reserves was the obvious outcome (see Figure 2) and the BOP crises.[3] This led to the IMF program. Consequently, we had to over-adjust the rupee to follow the IMF program. This led to both depreciation and the loss of foreign exchange reserves. Therefore, the SBP should not repeat the old mistake. If SBP and government claim that this is a new regime and the 'parity can move in both ways', then the SBP and government should not panic. They should be bold enough to wait for the natural movement of the exchange rate. They should let the rupee on the market forces with anchoring the artificial pressure and artificial uncertainties.

Fig. 2. Exchange Rate and Foreign Exchange Reserves



Clear-cut Structural Reforms to Ease the Pressure on the External Sector

If a country has chronic issues in the BOP, then the home currency cannot be stabilised for a more extended period. Therefore, Pakistan should concentrate on the long-term strategy to recover the BOP issues. Merely, depreciation will not correct the current account deficit (CAD) or trade deficit issues. It may partially, keeping rigidities given imports, reduce the imports. But the exports cannot be flourished with the depreciation only. Because we have several limitations with the exports on the front of narrow base, regulations, governance and international diplomacy. It is very obvious that the regulations have to be improved, simplified and streamlined. Without improving the external sector, the issue in the currency would not be resolved.

[3] We may get some benefits on the fiscal side by artificially stabilised exchange rates. However, we may not continue this policy for a longer period given the level of foreign exchange reserve. Once we let the parity on the market forces and allow rupee depreciation then we shall have, as usual, problems on all sides, that is, exchange rate, foreign exchange reserves, inflation and fiscal side.

Accumulate Foreign Exchange Reserves

As mentioned earlier, the foreign exchange reserves of Pakistan are not in a safe zone according to reserves adequacy ratios. Therefore, the SBP should accumulate foreign exchange reserves. On the one hand, aforesaid should intervene in the foreign exchange market by selling the dollars to save or reverse the parity. On the other hand, the SBP should purchase the dollars from the forex market whenever possible. Last year, there was an excellent chance to buy the dollars from the market. However, the SBP let the PKR appreciate from 168 per USD to 151 per USD by announcing that the *parity will move both sides*. The SBP could purchase a heavy amount of dollars through purchasing and could maintain the rupee undervalue.[4] This would not be a unique case. The SBP purchased a heavy amount of dollars from the market in the early 2000s (see Hussain and Jalil, 2006).

Don't Put Exchange Controls

The SBP should not strengthen the local currency through foreign exchange control and import controls. Indeed, this act will serve only to disrupt supply chains and eventually weaken the domestic economy. At best, it is a painful short-run solution. It is well documented in the literature that foreign exchange restrictions spawn the parallel currency markets and the parallel exchange rate.[5] The premium between the official rate and the kerb rate reflects the sign of devaluation/depreciation. Therefore, ultimately, the currency has to be depreciated along with a high cost. We have witnessed the kerb exchange market and the dual exchange rate in Pakistan during the 1980s and 1990s.

CONCLUDING AND WAY FORWARD

This note discussed several options for the SBP and the government in the backdrop of currency depreciation and uncertainty in the forex market. We suggest that SBP should:

- Public information about the size and direction of the foreign exchange interventions in the foreign exchange market.
- Properly communicate with the stakeholders about the transactions of the dollars.
- Educate the stakeholders about the market value of the exchange rate.
- Move towards the tightening of monetary policy in a very calculated way.

We believe that these steps will curb artificial volatility and artificial demand in the short run. Secondly, the intervention in the forex market on a long-term basis is not advisable in any case. The cost is huge as we have experienced in the past. Third, the structural reforms are indispensable for the correction of the chronic issue in the BOP. We want to clear that we are not against the intervention in the forex market to curb the extra uncertainty in the forex market, but there must be a tolerance level. More clearly, this note is to inform the fear of nominal exchange rate fluctuations and especially of future depreciation. We believe that the debate on this issue will lead to a better monetary and exchange rate policy.

[4] See Jalil (2021) on the policy of undervaluation.

[5] It is known as Kerb rate in the history of Pakistan international finance.

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Exchange Rate Policy Must Seek Undervaluation!

ABDUL JALIL*

In Pakistan, the exchange rate policy has always tended towards overvaluation (see Box 1). This policy has led to five major currency crises, an attack on foreign exchange reserves, and an eventual IMF programme, over the last 30 years (Haque and Hina, 2020).

Box 1: Currency Misalignment

Misaligned currency means exchange rate that is inconsistent with satisfactory macroeconomic fundamentals of a country. If the currency is misaligned, then it may be overvalued or undervalued.

Overvaluation: If the currency of a country is overvalued, then it makes the imports attractive and exports hard to sell. Currency overvaluation leads to an unsustainable current account deficit.

Undervaluation: On the other hand, if the currency of a country is undervalued, it results in current account surplus. Undervaluation of currency can stimulate the economy to a higher economic growth level.

The present knowledge brief reviews literature on the relationship between exchange rate policy stance and economic growth. Besides, an attempt is also made to estimate the misalignment of the exchange rate for Pakistan using an econometric model. The evidence provides overwhelming support for an exchange rate policy that seeks undervaluation to stimulate growth. In Pakistan, however, the State Bank of Pakistan (SBP) continues to adopt the policy of exchange rate overvaluation.

The Impact of Misalignment on Economic Growth around the World

As mentioned earlier, there is an extensive literature that tests the impact of exchange rate misalignment on economic growth. Three essential points can be inferred from the literature.

- There are different concepts of real exchange rate misalignment (see Box 2).

Box 2: Methodologies for Measuring the Misalignment of Exchange Rate

The difference between the prevailing exchange rate and the 'equilibrium' exchange rate is called the misalignment of the exchange rate. The measurement of the equilibrium exchange rate is not a straightforward task. The researchers provide various measures depending on the objective, focus, the conceptual framework, empirical methodology, and assumptions (Isard, 2007). Therefore, the literature suggests several empirical methodologies to measure the equilibrium exchange rate. These may be model-independent or model-dependent. In a nutshell, there is not an 'equilibrium' exchange rate. All measures provide different numbers for the equilibrium exchange rate depending on the period, methodology, and underlying assumptions about the macroeconomic variables.

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- Researchers use different sets of explanatory variables to calculate the equilibrium exchange rate.
- The calculation of the equilibrium exchange rate is sensitive to econometric models and econometric techniques.

Despite all the technical issues, there is almost a consensus that the real exchange rate undervaluation positively impacts economic growth. More specifically, Bhalla (2008) notes that each 1 percent sustained undervaluation may lead to 0.3 percent to 0.4 percent increase in economic growth. On the other hand, the overvaluation of the real exchange rate negatively impacts economic activities (see Table 1).

Table 1

The Impact of Undervaluation and Overvaluation on the Economic Growth

Study	Sample Country	Sample Period	Impact of Misalignment
Impact of Undervaluation on Economic Growth			
Gala and Lucinda (2006)	58 countries	1960-1999	Positive
Bhalla (2008)	56 countries	1997-2007	Positive
Cheung et al. (2007)	111 countries	1975-2004	Positive
Dubas (2009)	102 countries	1973-2002	Positive
Coudert and Couharde (2009)	128 countries	1974-2004	Positive
Zakaria (2010)	Pakistan	1983-2005	Positive
Mejía-Reyes et al. (2010)	06 countries	1951-2000	Positive
Mbaye (2012)	72 countries	1970-2008	Positive
Bereau et al. (2012)	33 countries	1980-2007	Positive
Elbadawi et al. (2012)	83 countries	1980-2004	Positive
Ozyurt (2013)	66 countries	1983-2007	Positive
Naseem and Hamizah (2013)	Malaysia	1991-2009	Positive
Schroder (2013)	63 countries	1970-2007	Positive
Holtemoller and Mallick (2013)	69 countries	1970-2006	Positive
Couharde and Sallenave (2013)	26 countries	1980-2009	Positive
Oreiro and Araujo (2013)	Brazil	1994-2008	Positive
Grekou (2015)	CFA Zone*	1985-2011	Positive
Hajek (2016)	12 countries	1980-2014	Positive
Zou and Wang (2017)	cross-economy	1980–2011	Positive
Razzaque et al. (2017)	Bangladesh	1980-2012	Positive
Goncalves and Rodrigues (2017)	Emerging countries	1950-2014	Positive
Bhattia et al. (2018)	Pakistan	1980-2013	Positive
Iyke (2018)	100 countries	1994-2010	Positive
Chavez (2020)	11 Countries	1980-2018	Positive
An et al. (2020)	ASEAN countries	1989-2018	Positive
Baxa and Paulus (2020)	Developing countries	1996-2014	Positive
Ribeiro et al. (2020)	54 countries	1990-2010	Negative
Impact of Overvaluation on Economic Growth			
Razin and Collins (1997)	86 countries	1975-1992	Negative
Kemme and Roy (2006)	Russia and Poland	1995-2001	Negative
Abida (2011)	Tunisia, Algeria, and Morocco	1980-2008	Negative
Nouira and Sekkat (2012)	52 countries	1980-2005	Negative
Hall et al. (2013)	China, Japan, UK	2001-2009	Negative
Wong (2013)	Malaysia	1971-2008	Negative
Debowicz and Saeed (2014)	Pakistan	1982-2010	Negative
Rafindadi (2015)	Nigeria	1980-2011	Negative
Akram and Rath (2017)	India	1980-2014	Negative
Chen (2017)	49 countries	1996-2011	Negative
Morvillier (2020)	62 countries	1985-2015	Negative
Karahan (2020)	Turkey	2002-2019	Negative
Jehan and Irshad (2020)	Pakistan	1980-2016	Negative

Note: CFA-Franc: The CFA Franc is the common currency for the Franc Zone of 15 Central and West African countries, plus Comoros.

The Channels through which (Mis)Alignment Effect Economic Growth

- The literature cites the example of East Asian countries' outward-oriented policies when discussing the positive impact of the undervaluation of currency on economic growth. On the other hand, the overvalued currency hurt the Latin American and African countries' economic growth following inward-oriented policies.
- Rodrik (2008) notes that market failures and bad institutions affect the tradable sector in developing countries. Therefore, currency undervaluation might work to correct market distortions and positively impact economic growth.
- The currency undervaluation may boost the industrial sector through incentives for capital accumulation, technological capabilities, and information spillover. The improved industrial sector will add to the economic growth of the country.
- Theoretically, Gala (2007) suggests that the real exchange rate's undervaluation may increase profit margins. These profit margins will induce higher savings, investments, and ultimately increase economic growth.
- A stable and competitive (undervalued) real exchange rate may boost economic diversification in developing countries.

The Case of Pakistan

As mentioned earlier, the SBP continuously pursuing the policy of keeping the exchange rate parity overvalued by supporting the foreign exchange market through central bank interventions (see Box 3). Therefore, the prevailing nominal exchange rate in Pakistan does not reflect the equilibrium exchange rate. The difference between the prevailing and the equilibrium exchange rate is called the exchange rate misalignment. As mentioned earlier, there are several methods to calculate the misalignment of the exchange rate (see Box 2). However, we follow the IMF's suggestions[6] and use an econometric model by taking several variables into account, keeping the dynamics of Pakistan's economy in view. In this regard, we take Rao's (2019) guidelines to construct a macro model for Pakistan's case (Box 4). Since the SBP manages the exchange rate parity through interventions, we simulate the nominal exchange rate with and without foreign exchange interventions (see Figure 1).

Box 3. Central Bank Interventions

The central banks intervene in the foreign exchange market through buying and selling of the foreign/local currency to support the nominal exchange rate parity. The support could be to reach a specific desired level of exchange rate parity or to reduce the exchange rate volatility in the currency exchange market.

Selling of Foreign Currency: When the local currency is under pressure in the foreign exchange market due to weak macroeconomic fundamentals, the market signals to depreciate the exchange rate. In this scenario, the central bank sells foreign currency and buys local currency to manage the pressure. The exchange rate will be overvalued. Resultantly, the central banks lose foreign exchange reserves. The reserve deficient countries, such as Pakistan, cannot afford this policy for a long time. Whenever the central bank stops the support due to the lack of foreign exchange reserves, the local currency depreciates rapidly to adjusts to its market value. Sometimes, rapid depreciation may lead to currency crises.

Buying of Foreign Currency: On the other hand, the central bank buys the foreign currency when the market forces signal the appreciation of the local currency. The central bank builds the international reserves in this process.

[6] Almost all the IMF methodologies are based on econometric estimations.

Box 4. Currency Misalignment in the Case of Pakistan

Rao (2019) postulates that the State Bank of Pakistan (SBP) kept Pak Rupee overvalued, over several years, through central bank interventions in the foreign exchange market. Keeping the argument of Rao (2019) in view, we simulate a counterfactual exchange rate in the absence of the central bank intervention.

For this purpose, we propose a six variable structural vector autoregressive (SVAR) macroeconomic model keeping the dynamics of Pakistan's economy in view (see Rao, 2019 for details). These variables are output (denoted by *y*), interest rate (denoted by *i*), exchange rate (denoted by *e*), inflation (denoted by π), private sector credit (denoted by *psc*), and central bank interventions (denoted by *int*). The resultant SVAR model, after applying the theoretical restrictions, is as follows:

$$y_t = \beta_{10} + \beta_{14} i_t + \beta_{16} e_t + \varepsilon_t^y \quad \text{Dynamic IS equation} \quad (1)$$

$$\pi_t = \beta_{20} + \beta_{21} y_t + \beta_{24} i_t + \beta_{26} e_t + \beta_{27} E_t[\pi_{t+1}] + \varepsilon_t^\pi \quad \text{Dynamic Philips Curve} \quad (2)$$

$$psc_t = \beta_{30} + \beta_{31} y_t + \beta_{34} i_t + \varepsilon_t^{psc} \quad \text{Credit Dynamics} \quad (3)$$

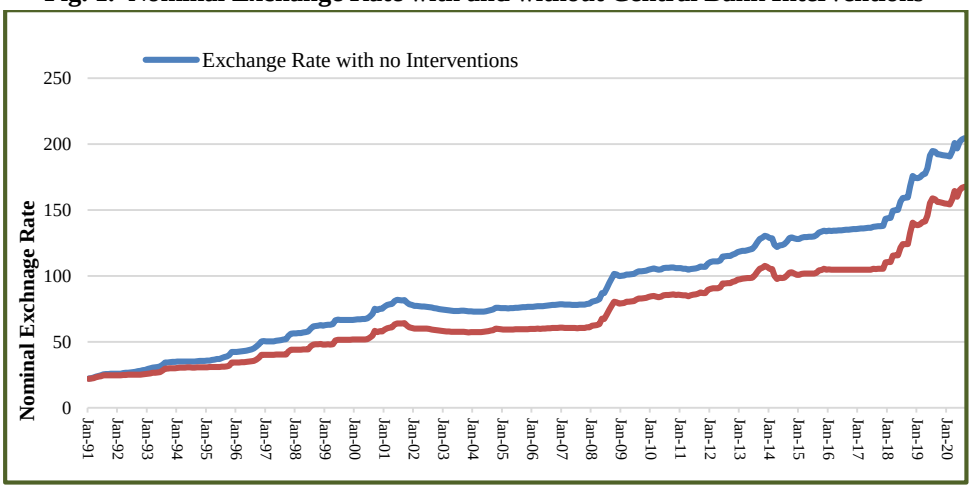
$$i_t = \beta_{40} + \beta_{41} y_t + \beta_{42} \pi_t + \beta_{46} e_t + \varepsilon_t^i \quad \text{Monetary Policy Function} \quad (4)$$

$$INT_t = \beta_{50} + \beta_{54} i_t + \beta_{56} e_t + \varepsilon_t^{INT} \quad \text{Intervention Equation} \quad (5)$$

$$e_t = \beta_{60} + \beta_{62} \pi_t + \beta_{64} i_t + \beta_{65} INT_t + \varepsilon_t^e \quad \text{Exchange Rate Equation} \quad (6)$$

Figure 1 provides a historical evaluation of SBP's intervention effectiveness in controlling the exchange rate parity.

Fig. 1. Nominal Exchange Rate with and without Central Bank Interventions



Our analysis comes up with three main messages, namely:

- First, if the SBP does not intervene to support the foreign exchange market, the exchange rate would have been around 205 per USD at the end of August of 2020. The support of SBP kept the exchange rate overvalued for a long time.

- Second, following Rao's (2019) methodology, our estimates show that the SBP has provided cumulative direct market support of USD 119 billion from January 1991 to August 2020. However, the support of USD 119 billion has yielded management of the exchange rate by only Rs. 36.
- Third, the overvalued exchange rate largely subsidised imported consumption and distorted the competitiveness of exportable items. This led to a higher trade deficit, balance of payment (BOP) crises, and ultimately the IMF bailout packages. This also suggests that if the SBP adopts a less protective exchange rate regime, we may avoid severe economic outcomes such as the depletion of foreign exchange reserves, BOP crises, and currency crises (Haque and Hina, 2020).

CONCLUSION

This note provides overwhelming evidence that currency undervaluation is beneficial for economic growth. A macro-econometric model shows that the SBP continually used our scarce foreign exchange reserves to keep the exchange rate arbitrarily overvalued throughout history. This is one important factor that has contributed to our repeated BOP crises and IMF programmes. We hope that this note will inform the exchange rate policy to keep an undervalued target exchange rate and not use reserves to fight overvaluation (see also Jalil, 2020).

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What Do We Know of Exchange Rate Pass Through?

ABDUL JALIL*

Domestic prices in an open economy are influenced by fluctuations of exchange rates. The effect of exchange rate changes on the domestic prices is termed exchange rate pass through (ERPT) (see Box1).

Box 1: Definition, Formula and Measurement of ERPT

ERPT is a measure of degree of response of inflation to a change in exchange rate. Formally, ERPT is an elasticity of domestic prices with respect to the exchange rate. More formally,

$$ERPT = \frac{percentage\ change\ in\ domestic\ prices}{percentage\ change\ in\ exchange\ rate}$$

Measurement

Measurement of ERPT is typically performed using the impact of nominal exchange rate on aggregate price indices like consumer price index, wholesale price index and import price index along with some *other* macroeconomic variables which can affect domestic prices.

The standard approach to measure ERPT is based on the following regression:

$$\Delta \ln p_t = \alpha_0 + \sum_{i=o}^{q} \beta_i \Delta lner_t + \delta \Delta lnX_t + \varepsilon_t$$

Here p is the price index, *er* is nominal exchange rate, X_t is the vector of other macroeconomic variables, A is notation for change, in is for log, ε is for error term and subscript t is a representation of time. The above regression can be estimated through different estimation techniques keeping the properties of data series in view. The sum β_i, that is $\sum_{i=o}^{q} \beta_i$, is ERPT after q periods.

When the variations in exchange rate are fully transmitted in the domestic prices, then it is known as complete ERPT and vice versa. Theoretically, the degree and speed of ERPT varies for the different types of price indices. It is the lowest in consumer price index and the highest in import prices. The literature also bifurcates the first stage and second stage pass through.[1]

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[1] The ERPT related to import price is known as first stage pass through and ERPT to consumer price is known as second stage pass through.

Estimated ERPTs in Selected Countries

ERPT is determined by several factors such as trade openness, globalisation, stance of monetary policy, transparency of monetary policy, direction of exchange rate. exchange rate volatility, inflationary environment of the country, size of current account balance, composition of import basket, central bank's independency and level of dollarisation of the country. ERPT is also asymmetric in that an appreciation or a depreciation may not have the same effects. In the Table I here, we present a broad summary of estimated ERPT as a percentage of the price level. Hence the estimate shows the expected rate of percentage point change in the price level for a percent change in the exchange rate.[2]

The Table 1 shows the large variation in the ERPTs calculated in various emerging economies. Average ERPT of 27 emerging market economies is about 22%. Furthermore, this range is much lower in the short run. It implies that the concerns of inflationary consequences of depreciation of exchange rate in emerging market economies are somewhat inappropriate. Therefore, we may argue that so-called stability (or overvaluation) of exchange rate is not important and desirable for reducing the inflationary cost on the economy.

Several points should be noted in interpreting these ERPT calculations especially for policy purposes.

(1) The Table 1 shows that there is a huge variation in the degree of ERPT among the emerging market economies. Different studies calculate/report the different degree of ERPT even in the case of same country. ERPT also varies by sample, methodology and country.

(2) The degree of ERPT is non-linear and asymmetric, that is, the variation in the exchange rate impact differently on the inflation rate in the case of appreciation or depreciation. Caselli and Roitman (2019) estimates posit that ERPT becomes nonlinear when the exchange rate depreciates by more than 24 percent in the case of emerging market economies.[3]

(3) The degree of ERPT is sensitive to level of inflation of the country. That is, it may be different in the high inflation episode than a low inflation episode of the country.[4] The empirical literature suggests that the degree of ERPT has declined in low inflationary environment.

(4) Research suggests that estimates vary by choice of data and other misspecification issues. Using the ERPT, therefore, requires care and context-specific interpretation. For policy, authorities should measure ERPT carefully through several methods contextualised to local considerations.

(5) The literature does not guide us regarding the impact of exchange regimes on the degree of ERPT on inflation. There is a huge variation in the degree of ERPT in our selected sample, even in a similar type of exchange rate regimes (see the last column of the table). Hence, we cannot claim that exchange rate regime may explain the degree of ERPT.

[2] Details of sample, measurement of variables, methodological issues and interpretations of size speed of ERPT are in the list of references.

[3] However, Caselli and Roitman (2019) also postulate that 24 percent is not unique threshold level but there may be a reasonable range of threshold exists. More clearly, it would appear that this threshold level may vary from country to country.

[4] The high and low episodes are in relative terms. The literature does post the size or range regarding low or high inflation in this regard.

Table 1

The Degree of Exchange Rate Pass Through in Emerging Markets Economies

Country	Study	ERPT	Study	ERPT	Study	ERPT	Study	ERPT	Exchange Rate Regime
Brazil	Correa and Minella (2010)	0.0% to 9%	Kolhscheen (2010)	32%	Nogueira and Leon-Ledesmab (2009)	11%	Ghosh (2013)	47%	Independently Floating
Bangladesh	Aziz et al (2013)	59%	Khondker et al (2012)	60% to 100% *	--	--	--	--	Fixed Pegged
Chile	Justel and Sansone (2015)	14%	--	--	--	--	--	--	Independently Floating
Columbia	Rine& and Rodriguez (2016)	11% to 29% *	Rowland (2003)	8%	--	--	--	--	Managed Floating
Czech Republic	Kolhscheen (2010)	52%	Kucharcukova et. al. (2013)	11%	Hajeka and Horvath (2016)	50%	Maria-Dolores (2010)	17%	Independently Floating
Ghana	Asafo (2019)	9% - 14%*	--	--	--	--	--	--	Managed Floating
Hungry	Hajnal et. al. (2015)	10% to 60%*	Maria-Dolores (2010)	49%	--	--	--	--	Independently Floating
Indonesia	Kolhscheen (2010)	60%	Edwards and Sahminan (2008)	16%	Ito and Sato (2008)	40%	Prasertnukul et.al (2010)	10%	Managed Floating
India	Khundrakpam (2007)	5% to 20%*	Kapur and Behera (2012)	10%	Bhattacharyara et al. (2008)	3% to 17%*	--	--	Managed Floating
Malaysia	Ahmad (2009)	18%	Ito and Sato (2008)	0.5 % to 3%*	Bank Negara (2012)	1.5%	--	--	Managed Floating
Maldives	Masha and Park (2012)	79%	--	--	--	--	--	--	Fixed Pegged Arrangement
Mexico	Kolhscheen (2010)	13%	Edwards (2006)	2%	Ghosh (2013)	1%	Peona and Brindisb (2014)	2%	Independently Floating
Nigeria	Adekunle and Tiamyu (2018)	61%	Musti and siddiki (2018)	84%	Zubair et al, (2013)	26%	--	--	Managed Floating
Pakistan	Ahmed at al. (2008)	7%	Hyder and Shah	0.27%	Minhaj. and Nisha (2018)	0.06% to 1.26%*	--	--	Managed Floating
Peru	Forero and Vega (2015)	10% to 20%*	Winkelried (2014)	10%	--	--	--	--	Managed Floating
Philippines	Kolhscheen (2010)	9%	Ito and Sato (2008)	6%	Prasertnukul et. al. (2010)	0.0%	Central Bank of Philippines	0%	Independently Floating
Poland	Przystupaa and Wrobel (2011)	7% to 27%*	Arratibel and Michaelis (2014)	10%	Maria-Dolores (2010)	24%	--	--	Independently Floating
Romania	Stoian and Murarasu (2015)	7% to 29%*	Gueorguiev (2003)	16% to 43%	--	--	--	--	Managed Floating
South Korea	Kolhscheen (2010)	20%	Ito and Sato (2008)	7%	Prasertnukul et. al. (2010)	6%	Edwards (2006)	3%	Independently Floating
South Africa	Aron et. al. (2014)	50%	Kolhscheen (2010)	25%	Aron et. al. (2014)	40%	Aron et. al. (2014)	30%	Independently Floating
Thailand	Wattanakoon (2013)	15%	Kolhscheen (2010)	16%	Ito and Sato (2008)	14%	Prasertnukul et al. (2010)	12%	Managed Floating
Turkey	Arslaner et al. (2015)	15%	Kara and Ogunc (2008)	30%	Kara and Ogunc (2012)	15%	Kilinc and Tunc (2017)	18%	Independently Floating
Egypt	Helmy et al. (2018)	72%	Awad (2019)	15% to 210% *	--	--	--	--	Managed Floating
Ukraine	Faryna (2016)	6.8%	--	--	--	--	--	--	Managed Floating
Vietnam	Van (2009)	8% to 16%*	--	--	--	--	--	--	Fixed Pegged Arrangement
27 emerging	Caselli et al (2019).	22%	--	--	--	--	--	--	

Note 1: * indicates that the *study* reports various ERPT depending on various samples and methods. The reported range depicts minimum and maximum magnitudes of EPRT in the particular study.

Note 2: Tunc (2017) recently estimate horizon of ERPT for the emerging market economies. It varies from 5 months (Russia) to 24 months (Chile).

ERPT FOR PAKISTAN

There are few studies on ERPT in the case of Pakistan (see Table 2).

Table 2

Estimates of ERPT in Pakistan

Study	Sample	Variable	Methodology	EPRT			
				Long Run	Short Run	Lags**	Speed of EPRT*
Hyder and Shah (2008)	1988-2003	CPI, OP, LSMI, WPI, M2, and ER	Recursive VAR	10.27%	3.44%	4	12 Months
Ahmed Et al (2018)	2005-2015	ER, IP, MS, IR, OP, and CPI	Recursive VAR	7.19%	0.31%	12	10 Months
Minhaj and Nihsat (2018)	1982-2016	CPI, ER, MS, IR, IP, GDP	Markov Switching Approach	--	1.26%	--	--
Chaudri and khan (2002)	1982-2001	CPI, ER, FCPI	Ordinary Least Square	--	2.00%	4	24 Months
Author's Calculation	1999-2019	CPI, ER, PSB, LSMI, MS, OP	ARDL	15.10%	2.59%	4	13 Months

Note 1: *= ERPT speed implies that ERPT will be completed in 12 months (see last column).
Note 2: **= Indicates the optimal lags in estimation procedure.

Box 2: ERPT Estimation Methodology of the Present Study

This study uses Auto regressive distributed lag (ARDL) model for estimating short run and long run ERPT. The ARDL model has various advantages over the other estimating methodologies (see Pesaran and Pesaran 1999 and Pesaran et al 2001). We specify an econometric regression as follows

$$CPI = \beta_0 + \beta_1 ER + \beta_2 PSB + \beta_1 OP + \beta_1 MS + \beta_1 LSM + U_t$$

Where CPI is consumer price index, ER is exchange rate, PSB is public sector borrowing, OP is oil price, MS is money supply (M2), LSMI is large scale manufacturing index and U is Guassian error. All data series are taken from State Bank of Pakistan. We use monthly data from January 1991 to November 2019.

The Table 2 shows that there is no evidence of a significant pass-through of rupee depreciations to consumer prices in the short run. It is around 3 percent in short run. However, the long run pass through of rupee depreciations ranges from 7. 19 % to 15.10 %. Furthermore, the duration of complete pass through may range from 10 months to 24 months (see last column of Table 2).

The estimates of the present study show that long run ERPT is around 15.10 percent and 2.59 percent in short run. The estimated duration of complete ERPT is 13 months.

CONCLUSION

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Pakistan's Five Currency Crises

NADEEM UL HAQUE and HAFSA HINA*

The foreign reserves comprise of bank notes, bank deposits, treasury bills and government securities of the reserve currency. According to IMF - Currency Composition of Official Foreign Exchange Reserve the popular reserve currencies are US dollar and euro (as shown by the blue and orange slice of pie chart).

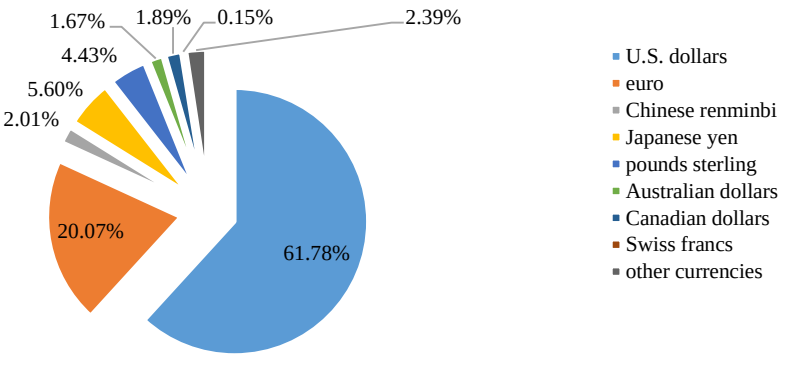
Exchange Rate Regimes and Financial Crisis

- Fixed exchange rate is failed to cope the adverse external shocks like worsening of terms of trade or decline in capital inflows. The authorities pays the cost in terms of depletion of foreign exchange reserves to fix the rate (Edwards, 2001).
- Intermediate regimes are more vulnerable to currency. The targeted exchange rate reliefs the economic agents not to worry about exchange risk. This complacency motivates them to invest into heavy, unhedged foreign currency borrowing. This damages the debt structure of the country and increases the potential risk of speculative attack (Esaka, 2010).

Flexible exchange rate avoids the possibility of currency crises by quickly response to negative external shocks and authorities do not need to defend the exchange rate (Joshi, 2003).

The main reason to hold foreign reserve is to

(i) Smooth unpredictable and temporary imbalances in international payments
(ii) Manage the exchange rate and backing of domestic currency
(iii) Servicing external debt and liabilities and
(iv) Maintain confidence in financial markets and creditworthiness of the country.



World- Allocated Reserves by Currency for 2019Q3
Source: IMF Data - Currency Composition of Official Foreign Exchange Reserve

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The rule of exchange rate management is that the value of domestic currency is determined by the market forces. Intervention is at best a temporary phenomenon to smooth out market conditions but without losing any significant amount of reserves. Modern Central Banks do not attempt to fix exchange rates at the expense of reserves. In fact, policy wisdom now is to maintain an undervalued real exchange rate to accumulate of foreign reserves while facilitating growth by promoting exports (Dooley *et al.*, 2003).

Adequacy of reserves are gauge by two indicators which are internationally acceptable;

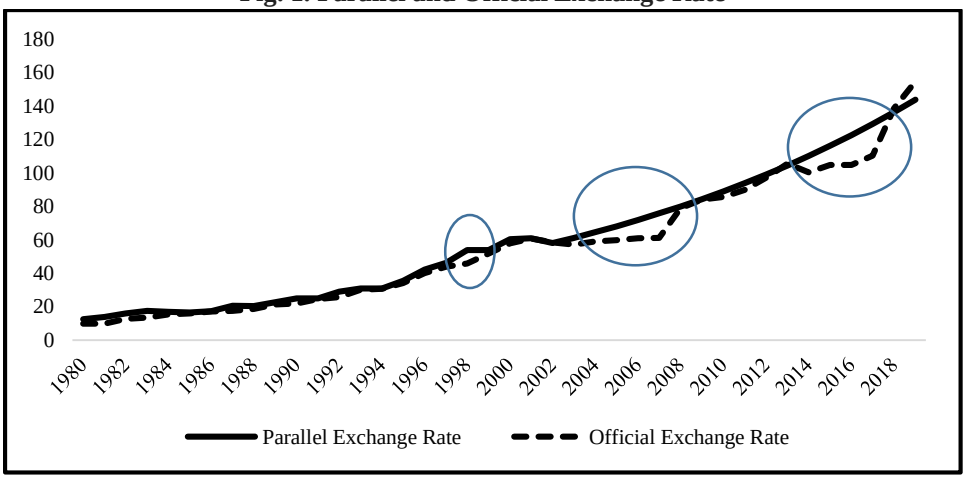
(i) Coverage of months of imports (3 months considered adequate)
(ii) Reserves to Short term debt (1 considered adequate)

Should the exchange rate have been fixed?

Since 1982, Pakistan has officially claimed to have adopted a flexible exchange rate policy or a "managed float". Is exchange rate of Pakistan at real equilibrium rate or does it depart from its equilibrium value?

The real equilibrium rate is the rate consistent with the internal and external balance. The misalignment in exchange rate is captured by the difference in parallel exchange rate and the official exchange rate. Parallel exchange rate is determine in a free market and not contaminated by the distortionary effects of government policy. Figure 1 shows that parallel exchange rate[1] is higher than the official exchange rate upon the adoption of two tier exchange rate in 1999, 2003-2008 and 2013 to 2017. What about reserve adequacy?

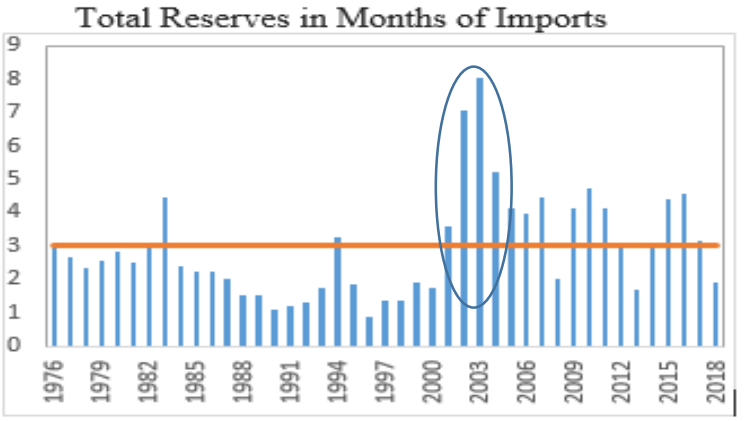
Fig. 1. Parallel and Official Exchange Rate



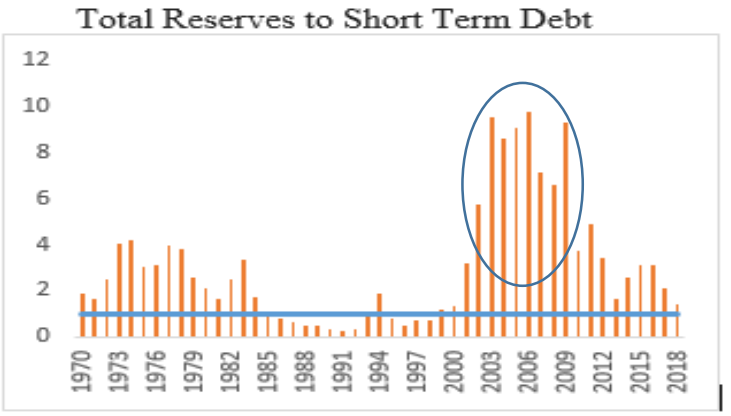
[1] The data on parallel exchange rate are collected from "http://www.carmenreinhart.com". The data is available only for the period 1948-2003. The remaining data from 2004 to 2015 is generated by forecasting univariate model of parallel exchange rate. According to Box and Jenkins (1970) methodology the suitable model for parallel exchange rate is ARMA (0,1,0). $\text{Dlnpex}_t = 0.053$, Where, $\text{Dlnpex}_t = \text{lnpex}_t - \text{lnpex}_{t-1}$ therefore, the equation can be written as $\text{lnpex}_t = 0.053 + \text{lnpex}_{t-1}$ where, lnpex_t is the log of parallel exchange rate.

From Figure 2, import coverage ratio and reserves to short term debt ratio show that only during 2001 to 2007 did the reserve level significantly above levels considered adequate (3 months of imports). The average reserves during this period were 5.20; and reserves were 7.55 times short term debt (ever highest as compared to other periods). This buildup in reserves was due in part to the rescheduling of debt in 2001 as well as the steady global growth in this period.'

Fig. 2. Total Reserves in Months of Imports and in Short Term Debt



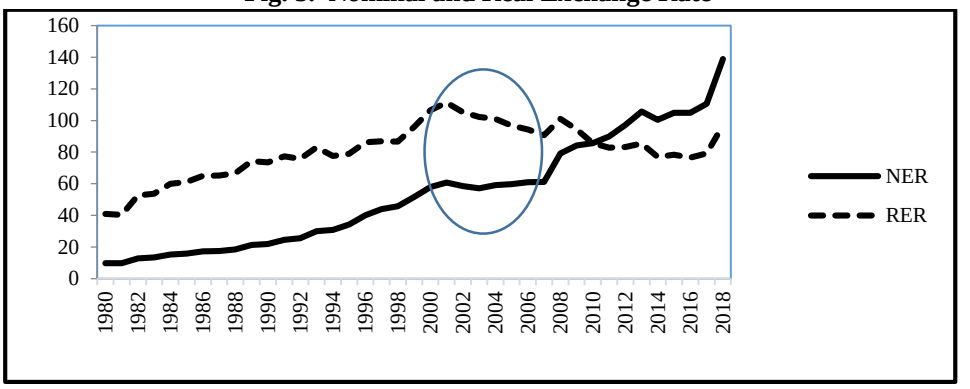
Source: The world Bank Data



Source: The World Bank Data

Looking at nominal and real exchange rate of Pak rupee per unit of US $, from 1980 to 2001both follow the same direction but after that NER and RER have been moving in opposite directions (rise in NER and RER shows the devaluation of nominal and real exchange rate respectively). It indicates that domestic prices are increasing relative to foreign prices and offsetting the impacts of NER devaluation. During the period 2001-2007 when reserves were adequate, the RER appreciated, clearly showing an official approach to stand against the market (see Figure 3). It seems that the window of opportunity offered by the rescheduling and the steady global growth of the early 2000s was used to check the necessary exchange rare movement.

Fig. 3. Nominal and Real Exchange Rate



Data Source: International Financial Statistics.

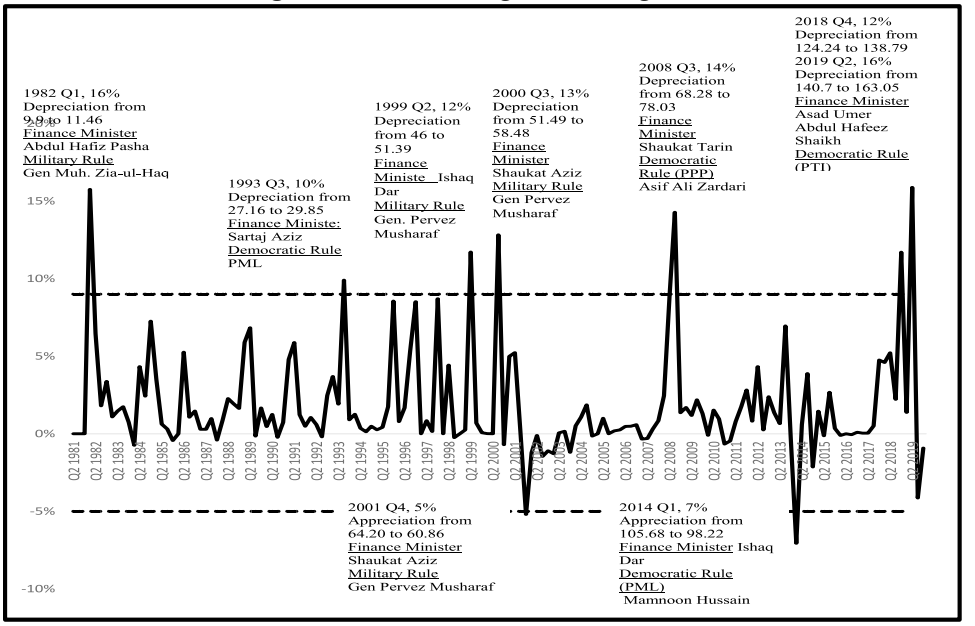
SBP: A history of Currency Crises

A currency crisis occurs when the State Bank of Pakistan (SBP) is forced to sharply devalue the currency in the face of declining reserves. We have seen several such cases in the last 30

years. Large depreciations happened in 1982, 1993, 1999, 2000, 2008, 2018 and 2019. Each of these was a currency crisis caused by earlier attempts to maintain an unrealistic exchange rate in the face of declining reserves (see Figure 4).

Currency crisis refers to a situation when country faces a significant and unwanted depreciation of the currency and forces the authorities to defend the currency by selling foreign exchange reserves (Krugman, 1995; Glick and Hutchison, 2011).

Figure 4: Rate of Change in Exchange Rate

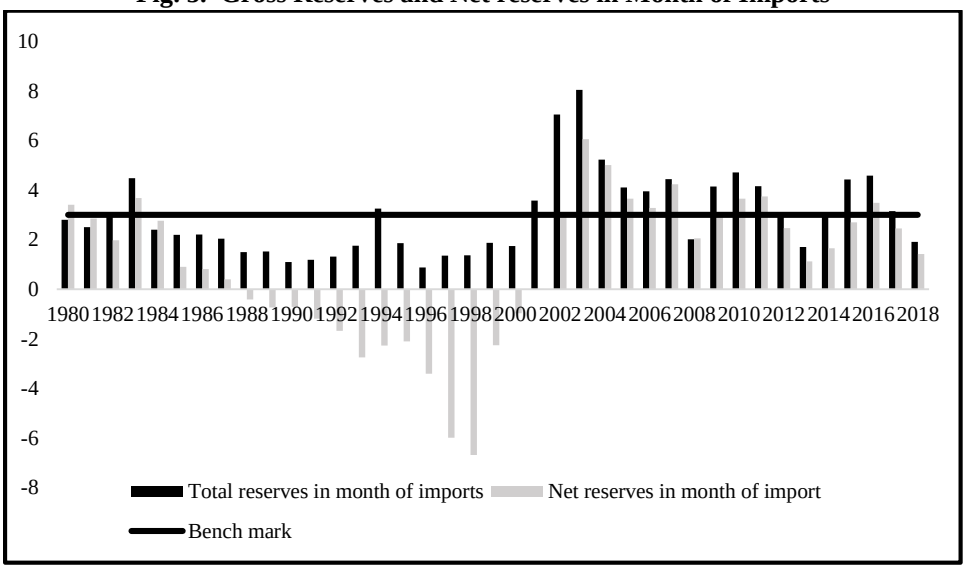


In 1982, the decision was made to delink PKR from US $ and allow it to float against a trade weighted currency basket. This was done with a 16% devaluation as in the previous fixed peg regime reserves were declining.

For most of this period SBP has struggled with clarity on exchange rates allowing reserves often to be depleted on account of trying to dictate a rate to the market. Here we define a crisis to be a depreciation of 2 standard deviations

Crisis 1. In 1993, PKR was devalued by 10% from Rs. 27.16 to Rs.29.85 per US dollar. The ostensible rationale behind the devaluation was the massive devaluation of Indian rupee, which increased Indian textile exports in Pakistan exporting area by 19.3 in dollar terms by May 1993. In reality, as Figure 2 Shows, reserves had declined both in terms of imports and short-term debt to very low levels. Besides as Figure 5 below shows the inflation differential between Pakistan and partner countries too had been growing substantially prior to this sharp depreciation. Put these 2 facts together, it becomes obvious SBP was trying to keep an artificial exchange rate level.

Fig. 5. Gross Reserves and Net reserves in Month of Imports



Crisis 2. The foreign currency deposit crisis: Through the 90s dollarisation increased as the SBP was allowing banks to take dollar deposits and on lend to the SBP with the SBP taking the exchange risk. By the end of the decade the SBP had liabilities stood at about 11 billion dollars some 30% of imports while reserves had fallen to 2-3 weeks of imports. Net reserves, in fact had started going into negative territory through this period (see Figure 5).

When an external shock (the Indian Nuclear test) hit the economy in June 1998, a run on the rupee had to be nipped in the bud by freezing the SBPs and imposing restrictions on capital outflows. There followed a period of unravelling the FCDs into bonds and dual exchange rate regime. The currency depreciated by about 13% on weighted average of the official rate (pegged to US dollar) and weighted Free Interbank Rate (FIBR) (determined in the interbank forex market).

(a) **In 1999**, State Bank of Pakistan replaced the two-tier exchange rate system with a market based unified exchange rate system and put the PKR on dirty a float. Under the dirty float exchange rate policy, PKR was pegged to the US dollar and allowed to float within the narrow band of 52.10 - 52.30 rupees per US dollar.
(b) Dirty float exchange rate band was abolished by the State Bank of Pakistan in **July 2000** and a flexible exchange rate system was finally achieved. With the implementation of flexible exchange rate policy, exchange rate volatility increased dramatically and depreciated PKR from Rs.57.5 to Rs. 60.9 per US dollar.
(c) The total depreciation in unraveling the FCD crisis stretched out over 2 years was 28%. And during this period SBP also maintained a dual exchange rate.

The boom in the country that had been created by the rescheduling and the global growth of the period was endangered by an unrealistic exchange rate policy. During this period not only was the exchange rate allowed to appreciate in real terms, the interest too was kept negative in real terms to facilitate a domestic consumption boom (see Figure 7). The currency crisis was inevitable.

Crisis 3. **Fixed rate of the 2000s** Through the Pervez Musharraf's government, the exchange rate was fixed at 60 to the USD. Economic performance, government finances and balance of payments improved in the early Musharraf years as worker remittances increased in the face of increasing migration and as the overall debt to GDP ratio declined with a generous debt rescheduling in 2001. As a result, SBP, was able purchase US $ 8.3 billion from foreign exchange market to control the excess liquidity. During 2001 to 2003, nominal exchange rate against dollar appreciated by 6 percent and foreign exchange reserves increased by 398 percent (from $ 2146 million to $ 10693 million) equivalent to 11 months' imports.

(a) However, the exchange rate was appreciating in real terms through this period as inflation in Pakistan remain higher than the rest of the world. As can be seen from Figure 6, the domestic inflation has always higher than foreign inflation (average of trading partner's is taken as proxy of foreign inflation). But the gap rises from 2004 to 2009 and after that it has been declining. Therefore, RER moves opposite to the NER (see Figure 3).
(b) Exchange rate pressures also started surfacing in 2006 onwards requiring sharp interest rate increases. Prior to 2006, SBP was by policy maintaining a negative real interest rate policy to drive growth. As inflationary pressures rose the, SBP had to raise the policy rate from 4 percent in Jan 2005 to 8 percent in May 2005 in a matter of months. But key interest rates remain negative in real terms (see Figure 7).
(c) Despite higher worker's remittances, the current account moved into deficit in 2004-05 due to high international oil prices. Despite a large increase in oil prices and budget deficit, SBP let rate be fixed till June 2008.

Global financial crisis 2007-2008 had slowed the global demand and fall in commodity prices hurt Pakistan's economy through trade imbalances, and significant reduction in remittances and capital inflows. The fixed peg of the 2000s then resulted in another currency crisis as reserves were quickly used up to defend the peg. Rupee lost its value by 21 percent during 2008 and this has caused the exchange rate to reach the level of 86 Rupees per US dollar.

Crisis 5. The Dar fixed rate: In 2014**,** domestic currency appreciated by 7%. The reason behind this appreciation is that PML-N had relied mostly on borrowing loans from international financial institutions and friendly countries to build up foreign exchange reserves. Foreign exchange reserves increased from $ 5.67 billion as on February 2014 to $ 8.70 billion on April 2014.

Finance Minister Dar willfully fixed the exchange rate despite much public opposition from various factions such as known economists. In defense of the rate substantial reserves were lost. By 2017, the folly of the fixed rate had become apparent and a series of depreciations were allowed as reserves continued to bleed. By the middle for 2019 the exchange rate had depreciated from 98 to the USD to 164, a depreciation of 67%. It finally settled at 155 to the USD after an IMF program had been signed.

Fig. 6. Pakistan—Trading Partners' Inflation

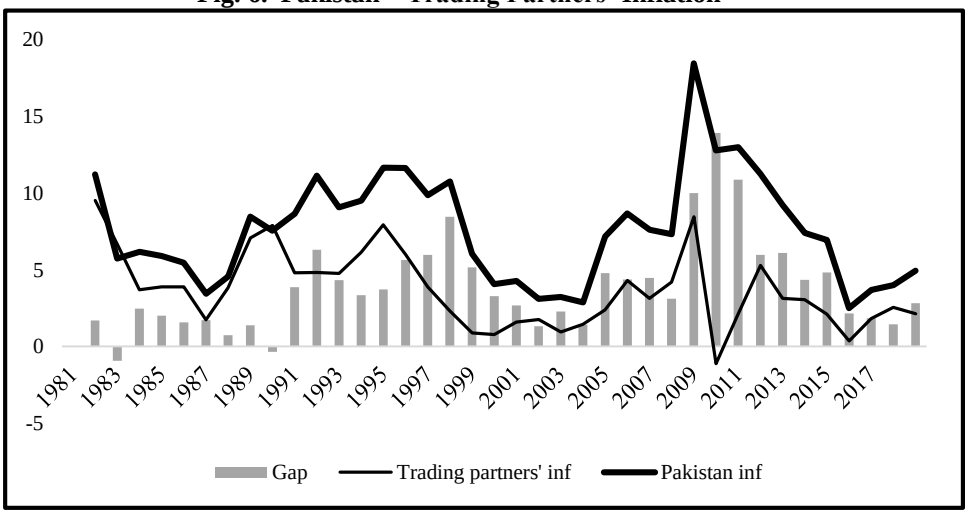
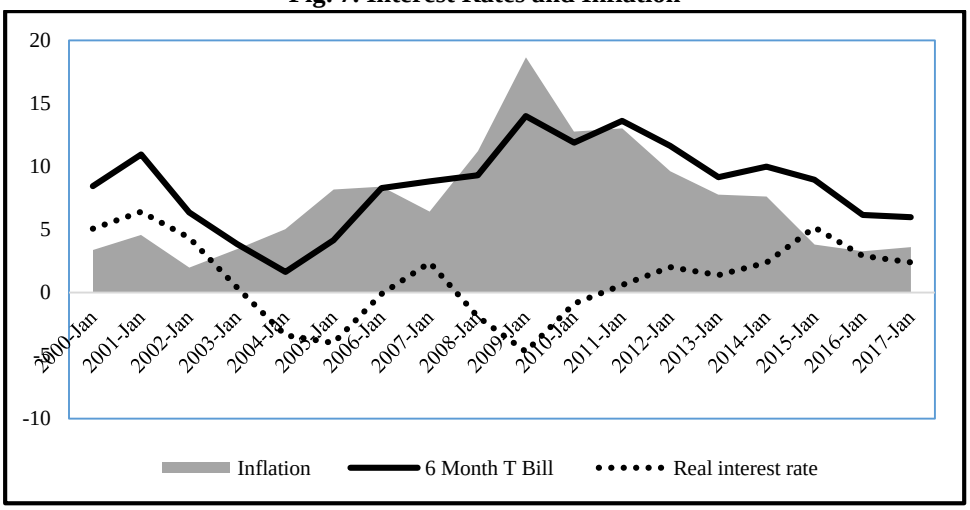


Fig. 7. Interest Rates and Inflation



Data Source: International Financial Statistics.

Exchange Market Pressure (EMP) Index

EMP index is developed to capture unsuccessful currency attacks. Kaminsky *et al*., (1999) calculated EMP index as a weighted average of exchange rate changes and reserve losses. $EMP_t = \frac{\Delta e_t}{e_t} - \frac{\sigma_e}{\sigma_r}\frac{\Delta r_t}{r_t}$

Where σ_e: standard deviation of exchange rate and

σ_r: standard deviation of reserves

When value of EMP index exceeds the mean plus two times SD is considered as currency crisis. The intuition is that if there is an attack on the currency, either the exchange rate would depreciate or the central bank would sell foreign currency to support the exchange rate.

Exchanged Market Pressure

As described earlier, a currency crisis occurs when an artificial rate is supported in the face of declining reserves. This can be formally addressed by developing an index of exchange market pressure (EMP) Kaminsky et al., (1999).

We used the EMP to estimate the periods of currency crisis and corroborated the above episodes. EMP identifies the following the periods of currency crisis: 1993, 1996, 2000, 2008 and 2019 (see Figure 8, where dotted line show the 95% confidence interval). There was a massive decrease in foreign reserves prior to these episodes: 31 % in 1993, 51% in 1996 31% in 2008 and 10% in 2019. Following a depreciation there was an increase in foreign reserves (see Table 1).

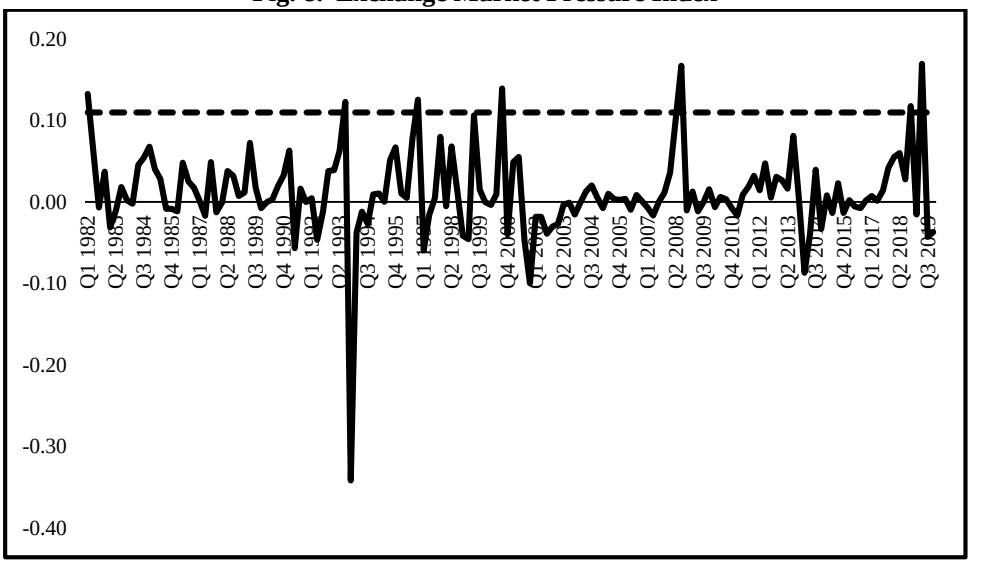
Table 1

Change in Reserves during the Period of Depreciation

Currency Crisis on the basis of EMP index	Change in Foreign Exchange Reserves	Depreciation of Nominal Exchange Rate
1981 Q4	7% ⇩	0%
1982 Q1	32 % ⇧	16%
1982 Q2	5% ⇧	6%
1993 Q2	55% ⇩	2%
1993 Q3	30% ⇩	10%
1993 Q4	445 % ⇧	1%
1996 Q3	32 % ⇩	5%
1996 Q4	51% ⇩	9%
1997 Q1	75 % ⇧	0%
1999 Q1	61 % ⇧	0%
1999 Q2	14 % ⇧	12%
1999 Q3	11 % ⇩	1 %
2000 Q2	12 % ⇩	0%
2000 Q3	14% ⇩	13%
2000 Q4	41 % ⇧	0 %
2008 Q2	14 % ⇩	9 %
2008 Q3	31 % ⇩	14%
2008 Q4	30 % ⇧	1 %
2019 Q1	37 % ⇧	1 %
2019 Q2	13% ⇩	16%
2019 Q3	2 % ⇧	-4 %

Green color are the periods of currency crisis.

Fig. 8. Exchange Market Pressure Index



CONCLUSION

The lesson we learnt from above discussion is

(1) Let the exchange rate be market determined and as suggested by research.
(2) Accumulate reserves and keep the exchange rate somewhat undervalued.
(3) SBP should not try to use reserves to fix the value of the exchange rate except to deal with very short-term disorderly conditions. The principle should be to never lose significant reserves to fix the exchange rate.
(4) Currency crises or attacks happen if the SBP attempts to use reserves to hold the exchange rate against the market. In the end the market wins and destabilises the rate.
(5) There is nothing wrong with some exchange rate variability and a depreciating trend in an orderly market. Depreciation with a low level of foreign reserve invite currency crises.

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Effectiveness of the Exchange Rate Channel in Monetary Policy Transmission in Pakistan

FAYYAZ HUSSAIN and MEHAK EJAZ*

INTRODUCTION

Monetary policy is one of the important aggregate demand management tools to smooth business cycle fluctuations in the economy. One of the essential channels of monetary policy transmission to the real economy is the exchange rate (Mishkin, 1995). Monetary policy shock affects exchange rate, which, in turn, impacts aggregate demand through different channels such as trade, financial, and fiscal channels.

Monetary policy transmission is relatively weak in developing countries relative to developed countries (Mishra and Montiel, 2013). One of the reasons for less effective monetary policy in these economies is the typical characteristics that make them suffer from fear of floating and, therefore, fixation or stabilisation of exchange rates. These characteristics include but are not limited to weak fiscal and monetary institutions, currency substitution, liability dollarisation, and vulnerability to sudden stops of capital flows (Calvo and Mishkin, 2003). The fixation/stabilisation of the exchange rate weakens the working of the exchange rate channel of monetary policy transmission (Kami, 1997).

Being a small open economy, Pakistan is also vulnerable to sudden stops of capital flows, foreign liabilities of the government far exceed her foreign assets, and monetary and fiscal institutions have yet to develop fully. In this backdrop, the exchange rate is allowed only limited flexibility that might have weakened the effectiveness of monetary policy transmission in Pakistan through a weak exchange rate channel.

In recent years, however, many emerging economies that moved to using interest rates as operational targets under inflation targeting regimes are allowing greater flexibility in the exchange rate (Brandao-Marques, et al. 2020). Allowing greater flexibility in exchange rate bodes well for gaining monetary autonomy and enhancing the effectiveness of monetary policy transmission (Li and Tsai, 2013). Since Pakistan also intends to switch to flexible inflation targeting regime, the State Bank of Pakistan has announced adopting a market-based flexible exchange rate regime from May 2019.[1]

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[1] Pakistan Request for an Extended Arrangement Under the Extended Fund Facility-Press Release; Staff Report; and Statement by the Executive Director for Pakistan: https://www.imf.org/en/Publications/CR/Issues/2019/07/08/Pakistan-Request-for-an-Extended-Arrangement-Under-the-Extended-Fund-Facility-Press-Release-47092

Moreover, SBP has further liberalised foreign exchange controls related to trade and investment policies from February 2021. SBP has revised its foreign exchange manual to facilitate start-ups, fintechs, and exports.[2] To facilitate business where foreign exchange approvals are required, SBP has launched an online portal to provide such approvals. In collaboration with commercial banks, SBP has also successfully launched Roshan Digital Account (RDA) for non-resident Pakistanis from 10th September 2020.[3] These accounts provide innovative banking solutions for non-resident Pakistanis to invest in real estate, stock exchange, Naya Pakistan certificate, and pay utility bills. These measures are likely to integrate Pakistan with the global financial system. Global financial integration strengthens the exchange rate channel of monetary policy transmission (Gudmundsson, 2008; Meier, 2013).

Against this backdrop, the objective of this study is twofold. First, to assess the effectiveness of the exchange rate channel in monetary policy transmission in Pakistan, and second how this effect changes with the episodes of greater flexibility in the exchange rate. This study is different from the previous studies in the following respects. First, this study considers exchange rate regimes while estimating the effectiveness of the exchange rate channel of monetary policy transmission. Second, international economic environment is taken into account by controlling for global economic growth, global interest rates, and world food prices. Third, we also controlled for public sector borrowings from the banking system to acknowledge the impact of fiscal dominance on monetary policy.

The results show weak transmission of monetary policy shock through the exchange rate channel. Working of the exchange rate channel is, however, better during the episodes of greater exchange rate flexibility. The study also finds that the exchange rate channel is more effective in impacting inflation than domestic economic activity. This reflects the impact of pass-through of exchange rate changes to domestic prices through imported items in the consumer basket and inflation expectations. In particular, one standard deviation appreciation in exchange rate reduces inflation by about 30 basis points.

The rest of the study is organised as follows. Section 2 discusses the theoretical background, section three reviews the literature followed by a section on exchange rate history in Pakistan. Section five elaborates methodology, and section six describes data. Section seven discusses the results, and the last section concludes the study.

THEORETICAL BACKGROUND

The exchange rate channel of monetary policy works through the interest rate parity condition. Specifically, when the central bank lowers policy rates, the return on domestic assets falls relative to foreign assets. This makes foreign assets more attractive, in turn, putting pressure on local currency (Kamin, 1997). This exchange rate depreciation makes domestic goods cheaper than foreign goods, thereby leading to expenditure switching and a rise in net exports and the overall level of aggregate demand (Mishkin, 1995).

However, a part of this trade channel of the exchange rate may be offset by adverse balance sheet effects in the presence of large debt in foreign currency. A depreciating exchange rate may weaken borrowers (whose foreign liabilities exceed foreign assets) net worth, limiting

[2] FE Circular No. 01 of 2021 at https://www.sbp.org.pk/epd/2021/FEC1.htm. Background note is placed at https://www.sbp.org.pk/press/2021/Pr1-10-Feb-21.pdf

[3] https://www.sbp.org.pk/press/2021/Pr-10-Feb-21.pdf

their ability to borrow and contracting economic activity (Krugmen, 1999, Céspedes, Chang & Velasco, 2004; Avdjiev, Bruno, Koch & Shin, 2019).

Two things are essential for the exchange rate channel of monetary policy transmission to work. First is the degree of reaction of the exchange rate to monetary innovations, and second is the extent of responsiveness of economic activity and prices to movements in the exchange rate. The response of the exchange rate to changes in interest rates would be higher provided there is greater substitutivity between domestic and foreign assets (Kamin, 1997). For instance, despite the policy rate in Pakistan remaining around 20 percent in FY-1997, far above the interest rate on the foreign bonds of the same tenor, Pak Rupee witnessed depreciation. This counter-intuitive response of the exchange rate to policy-induced increase in interest rate shows weak substitutivity between domestic and foreign bonds, probably on account of the low level of foreign exchange reserves and the consequently higher risk premium. Lastly, even if international capital flows are sensitive to shocks to policy rates, fixation or heavy management of exchange rate weakens the effectiveness of monetary policy transmission through this channel (Kamin, 1997).

The second important link for the exchange rate channel's effectiveness is the exchange rate's impact on economic activity and prices. The impact of the exchange rate on economic activity depends on the elasticities of exports and imports to exchange rate movement. If the absolute sum of price elasticity of exports and imports is higher than one (Marshall Lerner Condition), then exchange rate depreciation (appreciation) will increase (decrease) net exports and, thereby level of aggregate demand (Robinson, 1937). Along with the exchange rate sensitivity, the effect of the exchange rate on domestic economic activity also depends on the degree of openness of an economy. The exchange rate channel is expected to be more effective in the case of a more open economy (Brandao-Marques, 2020). The effectiveness of the exchange rate channel in the transmission of monetary policy depends on the nature of exchange rate regimes followed and the degree of openness of the economy. For instance, Bryant, Hooper, & Mann (2010), Taylor (1993), and Smets (1995) found that smaller and more open economies tend to see more significant effects through this channel.

Along with aggregate demand, the exchange rate also directly impacts domestic costs through increased prices of imported consumer goods. This is also called the exchange rate pass-through to domestic prices. Exchange rate pass-through is likely to be higher if the consumption basket contains a large number of imported goods. In case prices of imported items are administered by the government, the exchange rate pass-through on domestic prices will be weaker.

The exchange rate pass-through is typically higher in a high inflation environment (Taylor, 2000). In high inflation countries, exchange rate movement is considered an essential signal of future price movement, and wages & prices may change even before the movement in import costs through the cost structure (Kamin, 1997).

The strength of the exchange rate channel of monetary transmission is expected to be negatively impacted if foreign liabilities of government, financial and non-financial firms exceed their foreign assets (Krugman, 1999). For example, with a large share of external liability (external debt), exchange rate depreciation would increase the government's foreign liabilities, reducing the government's net worth. Exchange rate depreciation will also increase the external debt servicing costs of the government. As a

result, the sovereign risk premium will increase. These will constrain the government's ability to raise external funds by issuing bonds in the international market. As a result, aggregate demand and prices will be negatively affected. Same holds true for firms and the financial sector whose foreign liabilities are greater than their foreign assets.

To sum up, for the effectiveness of the exchange rate channel of monetary policy transmission, in the first step, interest rate changes must impact the exchange rate. If domestic assets are imperfect substitutes of foreign assets, the central bank intervenes in the foreign exchange market to manage the exchange rate, and capital are less mobile across the border, then the exchange rate will be less responsive to changes in interest rate. In the second step, changes in the exchange rate must affect aggregate demand through net exports. However, higher external debts of the business and the government will adversely impact the strength of the monetary policy exchange rate channel. Apart from the indirect impact on aggregate demand, prices are also affected directly by the increase in prices of imported goods in the CPI basket. This direct exchange rate pass-through is swifter in a high inflation environment (Taylor, 2000).

LITERATURE REVIEW

Mishra, et al. (2013) survey empirical literature on the effectiveness of monetary policy transmission in developing countries. They find that monetary policy transmission is relatively weak in developing countries relative to developed countries. One of the reasons for less effective monetary policy in these economies is the acute stabilisation of the exchange rate that weakens the working of the exchange rate channel of monetary policy transmission.

In the case of Pakistan, there are very few studies on the monetary policy transmission channels in general and the exchange rate channel in particular. These studies do not have a consensus on the effectiveness of the exchange rate channel of monetary policy in Pakistan. Most noticeable amongst those is Agha, et al. (2005). Using monthly data from July 1996 to March 2004, they find that Pakistan's exchange rate channel is not robust. Their findings suggest that the credit channel is the most dominant monetary transmission in Pakistan. However, using monthly data from January 1964 to December 2007, Hussain (2009) shows that the exchange rate channel also plays a vital role in monetary policy transmission in Pakistan. In a relatively more recent paper, Nizamani, et al. (2015) find the exchange rate channel as the least important for monetary policy transmission in Pakistan. They use quarterly data from Q1-1996 to Q4-2012.

Apart from the overall exchange rate channel, literature on its components is also rare. For instance, for the exchange rate channel to work, changes in the policy rate should impact the exchange rate. The relationship between exchange and interest rates is investigated by testing the interest rate parity condition. If interest rate parity holds, then changes in policy rate do affect the exchange rate. For Pakistan, we can find only two studies that tested the interest rate parity condition. First is by Singh and Banerjee (2006). Their results show that real interest rate parity does not hold for emerging economies, including Pakistan. The second study by Omar, et al. (2013) tests interest parity conditions for Pakistan only. Using monthly data from January 2001 to December 2008, they show that the interest parity condition holds for Pakistan.

The second important step in the exchange rate channel of monetary policy transmission is the responsiveness of net exports to changes in the exchange rate. The effectiveness of exchange rate depreciation in improving net exports depends on the Marshall Lerner condition. In Pakistan, there is no final agreement on whether the Marshall Lerner condition holds or not. Shazad, et al. (2017) test Marshal Lerner condition for seven south Asian countries. Their estimates indicate that the Marshall Lerner condition does not hold for these economies as the absolute sum of the price elasticity of imports and exports is less than one. Iqbal, et al. (2015) test Marshall Lerner condition in bilateral trade between Pakistan and its ten trading partners. Their results indicate that the Marshall Lerner condition holds with six of the trading partners, and there is no evidence of the condition for the remaining partner.

Apart from the indirect impact of aggregate demand, the exchange rate also directly impacts prices through an increase in prices of imported goods. Here are some studies that estimated the impact of exchange movements on inflation. McCarthy (2000) find that exchange rates have a modest effect on domestic price inflation, while import prices have a more substantial effect. Ehsan and Hakura (2006), using a panel of 71 countries from 1979–2000, show strong evidence of a positive and significant association between the pass-through and the average inflation rate across countries and periods. Michele, et al. (2007) examine the degree of Exchange Rate Pass-Through (ERPT) to prices in 12 emerging markets in Asia, Latin America, and Central and Eastern Europe. Their results show that exchange rate pass-through into both import and consumer prices is always higher in "emerging" than in "developed" countries.

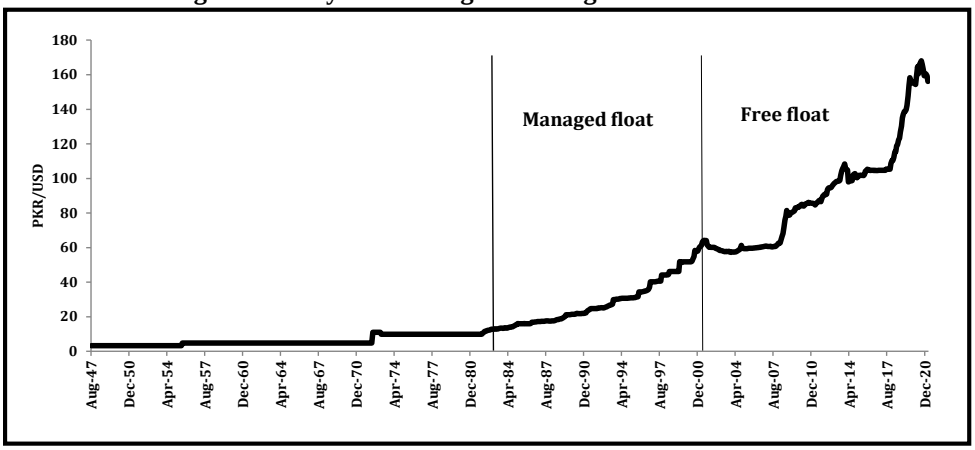
Regarding literature on Pakistan, Hyder and Shah (2005) main findings are: (1) the exchange rate movements have only a moderate effect on domestic prices, i.e., exchange rate pass-through is low, (2) the exchange rate pass-through is more substantial in wholesale price index (WPI) relative to consumers price index (CPI) and (3) the impact of pass-through on domestic prices spreads over 12 months. In another study on Pakistan, Ahmad and Ali (1999) emphasise that the empirical work in Pakistan provides unwavering proof that the domestic price level responds significantly but gradually to exchange rate devaluation. All these studies show low to moderate pass-through of exchange rate changes on domestic prices. This probably reflects a relatively lower share of imported items in the CPI basket. Further, the government determines the prices of a considerable number of imported CPI items. In short, existing literature shows that exchange rate channel of monetary policy transmission is weak.

HISTORY OF EXCHANGE RATE IN PAKISTAN

Pakistan came into existence on 14th August, 1947. At that time, the exchange rates of the International Monetary Fund (IMF) members were fixed under the Bretton Woods system. Under this system, every member country was required to fix its exchange rate to Gold, and IMF filled temporary imbalances in the balance of payments. As per the best global practices, Pakistan also followed fixed exchange rate regimes in the first decades. By March 1973 Bretton Woods system was broken, and member countries were free to float the exchange rate. After the breakdown of the Bretton Wood system, most of the economies moved from fixed exchange rates to floating exchange rate regimes. The regime shift resulted in significant fluctuation in the exchange rate in these countries. With much

volatility in the exchange rates of trading partners and global oil prices, Pakistan had to make a big adjustment in the exchange rate. However, Pakistan continued with the fixed exchange rate regime till 1982.

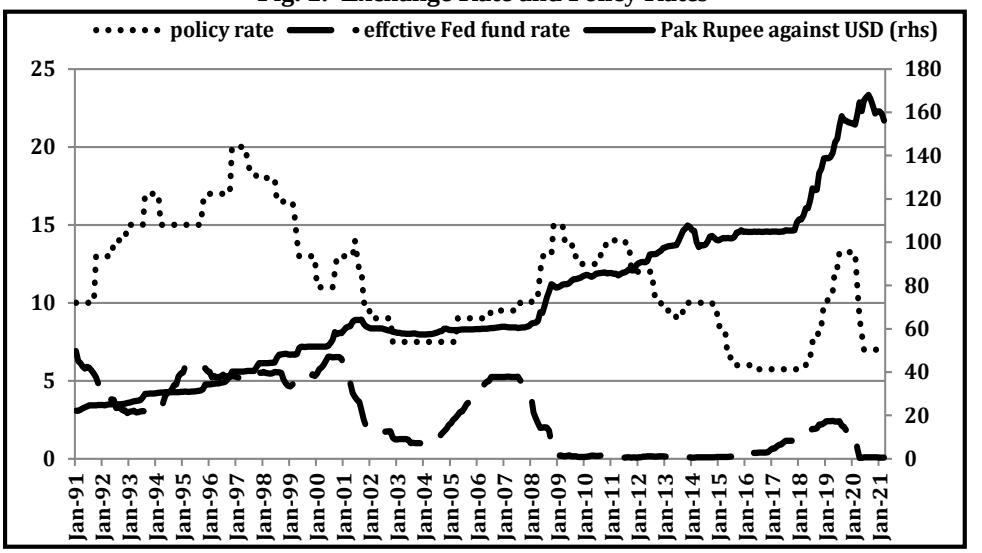
Fig. 1. History of Exchange Rate Regimes for Pakistan



With the difficulties in managing the balance of payments position, Pakistan approached the International Monetary Fund and signed the Extended Fund Facility (EFF) programme in 1981. As per IMF advice under Article IV consultation, Pakistan was asked to adjust its exchange rate significantly. Pakistan had two options, either to make a onetime adjustment or gradual adjustment on a daily basis. Pakistan opted for the second option and shifted to managed float in January 1982. Under this regime, the exchange rate was set on a day-to-day basis, keeping in view (i) exchange rate movements of Pakistan's fourteen major trading partners, (ii) exchange rate movement of 32 major export destinations of Pakistan, and (iii) exchange rate movement of export competing countries. Pakistan followed managed float till mid-2000. After the nuclear blasts in May 1998, Pakistan switched to a dual exchange rate regime for a short time. In July 2000, Pakistan switched to a free float exchange rate regime and is officially following this regime till now. In this regime, the State Bank of Pakistan intervenes in the foreign exchange market from time to time to smooth unnecessary volatility and quell speculative attacks on the exchange rate. For instance, with the substantial capital inflows after 9/11, the State Bank of Pakistan purchased foreign exchange from the interbank market to avoid abrupt appreciation in the exchange rate. Likewise, in case of a temporary shortage of foreign exchange in the interbank market, the State Bank of Pakistan sells foreign exchange in the market.

In this background, market forces had a relatively limited role in exchange rate determination till 2000. This implies monetary policy shocks or changes in policy rate might have had a limited influence on the exchange rate at least before 2000. A simple plot (Figure 2) of the policy rate in Pakistan and the United States shows that monetary policy did not explain much of the movement in the exchange rate before 2000. For instance, in the 1990s, the policy rate increased to around 20 percent. This should have appreciated the exchange rate. Conversely, the exchange rate depreciated from about 22 rupees per dollar to 40 rupees per dollar in the same period.

Fig. 2. Exchange Rate and Policy Rates



However, after the adoption of the free-floating of the exchange rate in 2000, market forces role has increased in the determination of the exchange rate. This becomes even clearer when we look at the rolling correlation between the interest rate differential between the policy rate of Pakistan and the world proxied by the federal fund rate of the United States. The correlation coefficient between the interest differential on the two currencies and the exchange rate was positive before 2000 (Figure 3). This was counter-intuitive. As per the prediction of interest rate parity condition, the interest rate differential between the local and foreign currencies should be negatively associated with the exchange rate movements. From 2000 onward, this prediction appears correct. However, this association weakened in the post-2008 period, which probably reflects an increased risk premium on the local currency due to the balance of payments crises. The correlation coefficient again turns negative after 2016.

Fig. 3. Rolling Correlation between Exchange Rate and Interest Rate Spread

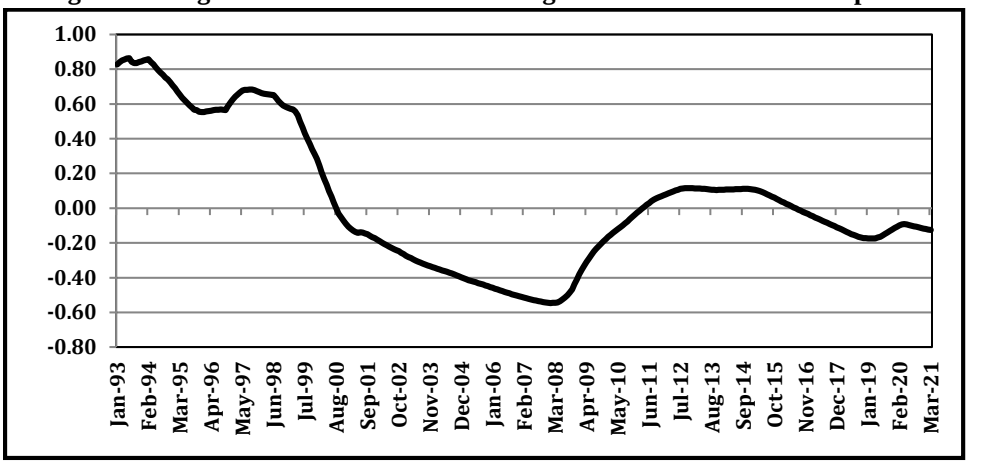
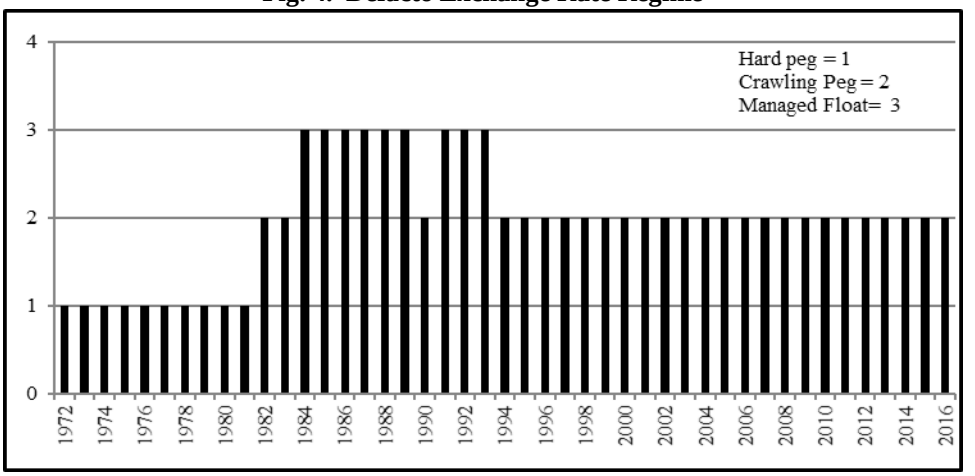


Fig. 4. Defacto Exchange Rate Regime



Apart from the flexible exchange rate, the introduction of FE-25 foreign currency deposits from 1999 onward might also have contributed to the increased sensitivity of exchange rate changes to interest rate differential. With the increase in the policy rate, the interest rate on local currency deposits increases relative to foreign currency deposits. This increases demand for local currency relative to foreign currency, which leads to an appreciation of the local currency. However, expectations of exchange rate depreciation may weaken this link. Specifically, the expected exchange rate depreciation makes foreign currency attractive, which may offset the impact of increased interest rate on local currency deposits. Another possibility for interest rate parity to work is lending against foreign currency deposits. An increase in policy rate increase borrowing costs in local currency; as a result, importers and exporters may increase demand for borrowing in foreign currency against FE-25 deposits. This borrowing against FE-25 deposits will increase the supply of foreign currency in the interbank market, leading to appreciation of the local currency. Other than interest rates, borrowing costs in foreign currency also include expected exchange rate movements. Expectations of exchange rate depreciation increase borrowing costs in foreign currency that may discourage borrowing in foreign currency and hence limited impact on exchange rate.

Though the State Bank of Pakistan officially follows a free float exchange rate and intervenes in the foreign exchange market only to curb disorderly market conditions, many independent analysts argue that it is not pure free float. For instance, EIlzetzki, et al. (2017) classification of the de facto exchange rate regime suggests that from 1993 onward, Pakistan is following a crawling peg. Despite the fact that Pakistan is officially following free float, it is still categorised in a crawling peg. This excessive stabilisation of the exchange rate may weaken the working of the exchange rate channel of monetary policy transmission in Pakistan.

To address these concerns, the State Bank of Pakistan has announced market-based flexible exchange rate regime from May 2019. Allowing exchange rate flexibility is not only important for keeping the external balances at a sustainable level but would also help SBP gain more independence under inflation targeting regime. Li and Tsai (2013) show that allowing flexibility in exchange rates increases the autonomy of monetary authority.

Other factors that are important for the effectiveness of the exchange rate channels are the openness of the economy. Trade openness, as measured by the ratio of exports plus imports to gross domestic products, fluctuated between 30 to 40 percent. This ratio peaked at 39.9 percent in 1991, and it had again come down to 27.6 percent in 2015. This gradual decline in the openness of the economy might have adversely affected the working of the exchange rate channel of monetary policy transmission in Pakistan.

METHODOLOGY

Mishra, et al. (2011), in their survey of literature on the transmission of monetary policy in developing countries, showed that Vector Autoregressive (VAR) has become customary to investigate the effect of monetary policy. Following standard practice in the literature, this study also uses VAR to estimate the impact of the exchange rate channel on monetary policy transmission. This approach has various advantages over other model-based approaches. First, residual in the VAR are pure unanticipated innovations, so they can potentially separate the impact of unanticipated monetary policy shock on the aggregate demand. Second, this takes into account the simultaneity bias between monetary policy variables and real variables like economic activity and inflation, and third, with no serial correlation among the residual of VARs, there is no need to include all the potential determinants of aggregate demand other than the indicators that influence monetary policy decision making of the central bank. This study will use four endogenous variables that include gross domestic product proxied by large-scale manufacturing, consumer price index, policy rate proxied by call rate, and exchange rate. The exogenous variables include global food prices, global gross domestic product proxied by the United States Industrial Production Index, international interest rates proxied by federal fund rate, and fiscal dominance captured by the government borrowing from the banking system. The study uses monthly data on these variables from 1995 to 2020.

The Benchmark *VAR(P)* representation looks as follows:

$$\sum_{i=0}^{p} \phi_i Y_{t-i} = \delta X_t + \epsilon_t \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (1)$$

Where Y_t is the vector of endogenous domestic variables, X_t is the vector of exogenous variables. ϕ and δ are the lag polynomial and $\in_t$ represents the vector of structural innovations.

To analyse the dynamic impact of monetary policy shocks on the channeling variable exchange rate and goal variables i.e., output and prices, we discuss the impulse responses. We estimate structural impulse responses by using the Cholesky decomposition of the variance-covariance matrix of the reduced form Vector Autoregressive models.

Following Bernanke and Blinder (1992) identification scheme, monetary policy variables appear last in the Cholesky ordering, assuming that the endogenous macro variables could be observed contemporaneously by the policy-makers. We have used the following specific restrictions. First, any shock to the exchange rate has no contemporaneous impact on all the other variables, but other variables do affect it in the same period. Second, with the transmission lag in monetary policy, nominal policy shocks have no contemporaneous impact on output and prices, but it instantly impacts the exchange rate. Third, consumer prices have zero contemporaneous impact on output, but

it immediately impacts policy and exchange rates. Fourth, real shock contemporaneously affects all the variables in the system, but other variables do not impact it. The restriction structure looks as follows.

$$\begin{bmatrix} U^Y t \\ U^P t \\ U^R t \\ U^{ER} t \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ a_{21} & 1 & 0 & 0 \\ a_{31} & a_{32} & 1 & 0 \\ a_{41} & a_{42} & a_{43} & 1 \end{bmatrix} \begin{bmatrix} \varepsilon_t^Y \\ \varepsilon_t^p \\ \varepsilon_t^R \\ \varepsilon_t^{er} \end{bmatrix}$$

To estimate the impulse responses, we have used monthly data for Pakistan from January 1991 to December 2020.

DATA

Data on consumer price index and large-scale manufacturing is collected from Pakistan Bureau of Statistics (PBS), exchange rate, interest rates and public sector borrowing from the banking system are collected from the State Bank of Pakistan and world food prices, the United States Industrial Production iIndex, United States interest rates are collected from International Financial Statistics of International Monetary Fund.

As we are using data on a monthly basis, essential variables such as large-scale manufacturing and prices depict much seasonality. For instance, large-scale manufacturing usually gains momentum when the sugar crushing season starts. Likewise, consumer prices show variation due to seasonal demand for goods and services in winter and summer. To study the underlying trend of the data, we have seasonally adjusted all the variables except interest rates (discount rate and federal fund rate). To further smooth the data, we have taken a log of all the series except the discount rate and federal fund rate.

Correlation Analysis

Table A1 in Annexure 1 shows the correlation coefficient of the variables used in the model. Looking at the correlations will give some sense of association between the monetary policy instrument and other variables relevant for exchange rate transmission. Correlation between some of the important variables is as follow: Policy rate and the federal fund rate are positively associated. This indicates that while policy rate setting, monetary authority in Pakistan also considers world interest rates. Second, the policy and nominal effective exchange rates are also positively associated. This also makes intuitive sense, an increase in policy rate is usually associated with exchange rate appreciation through interest rate parity conditions. The correlation coefficient between the policy rate and large-scale manufacturing is negative. This reflects the contractionary impact of monetary policy tightening on growth. Lastly, the correlation coefficient between the policy rate and inflation is also negative. This indicates that monetary policy tightening is associated decline in prices.

Likewise, consumer prices are positively associated with supply-side factors such as world food prices and global oil prices. On the demand side, prices are positively associated with public sector borrowing and negatively associated with exchange rate appreciation.

Augmented Dicky Fuller Test

We have applied the Augmented Dicky Fuller Test to test the stationarity of the data. First, we tested the stationarity of the data in levels. As in absolute terms, test statistics of the ADF test are low than its critical value at a five percent level of significance for all the series; we fail to reject the null hypothesis of a unit root. Thus, all the series have unit-roots. Then we applied the ADF test to the first difference of these variables. Now, in absolute terms, the test statistics of the ADF test of all the variables are greater than critical values that imply we reject unit root in these series. As all the series are first difference stationary, these series are integrated of order one. Thus, we have transformed the data accordingly.

Table 1
Summary Statistics

	Observations	Mean	Median	Maximum	Minimum	Std. Dev.	Order of Integration
World food price index	143	0.001	–0.002	0.123	–0.176	0.035	I(1)
US Industrial production index	143	0.000	0.001	0.014	–0.042	0.007	I(1)
Federal fund rate	143	–0.020	0.000	0.250	–1.250	0.184	I(1)
Global oil prices	143	–0.001	0.011	0.242	–0.333	0.091	I(1)
Consumer price index	143	0.002	0.003	0.125	–0.126	0.034	I(1)
Large scale manufacturing index	143	0.007	0.006	0.030	–0.009	0.007	I(1)
Policy rate (call rate)	143	0.023	0.000	3.950	–6.420	0.949	I(1)
Neer	143	–0.006	–0.004	0.039	–0.056	0.015	I(1)
Public sector borrowing from banking system	143	0.018	0.015	0.159	–0.051	0.025	I(1)

Note: All the variables are in log difference form except interest rates that are in simple difference form.

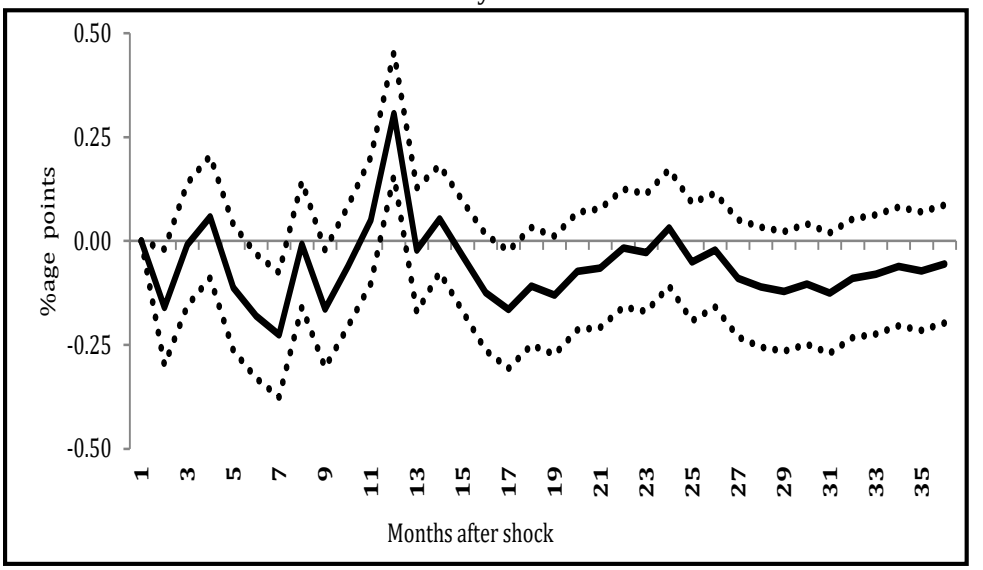
Different lag criteria were giving different optimal lag lengths. Schwarz information criterion chose an optimal lag length of one month, while Akaike information criterion criteria chose a lag length of 12 months. Since one month is too short, we opted for seven months lag.

EMPIRICAL RESULTS

The impulse response function shows that one standard deviation unanticipated positive shock to policy rate leads to an appreciation of nominal effective exchange rate. Transmission of this shock is almost complete within twenty months. However, the magnitude of the response of the exchange rate to monetary policy shock appears small and statistically insignificant (Figure 5 c).

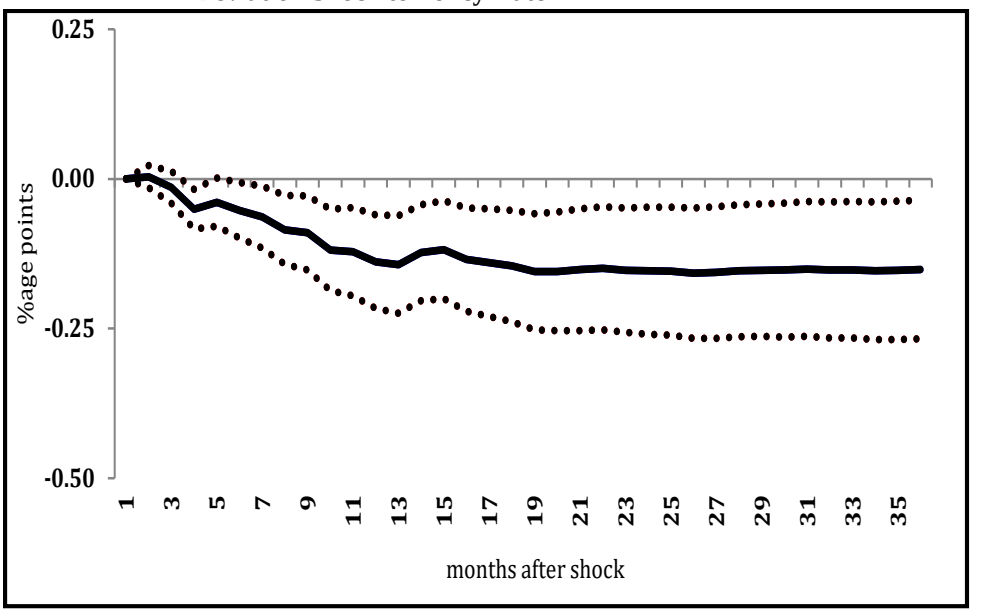
Contractionary monetary policy shock hurts growth. Transmission of monetary policy shock on LSM growth takes time to materialise. After showing some oscillations during the first twelve months, monetary policy shock has a permanent contractionary impact on growth from thirteen months onward. The impact becomes statistically significant in almost seventeen to eighteen months (Figure 5 a).

Fig. 5a. Cumulative Impulse Response of Growth to One Standard Deviation Shock to Policy Rate



The transmission lag of monetary policy is even more substantial in case of inflation. The impact becomes statistically significant from four months after the monetary policy shock. Monetary shock (normalised to 100 basis points increase in call rate) decreases inflation by around 15 basis points (Figure 5b). The transmission of monetary policy shock to consumer prices is also complete in 24 months.

Fig. 5b. Cumulative Impulse Response of Inflation to One Standard Deviation Shock to Policy Rate



Appreciation in a nominal effective exchange rate (increase in NEER means appreciation) leads to a price fall (Figure 5e). The impact of exchange rate appreciation takes some time to affect the prices. This reflects the downward rigidity in prices. Transmission of exchange rate changes on prices almost stabilised toward the end of the second year. Specifically, one standard deviation positive shock to the exchange rate, reduces inflation by around 30 basis points.

Fig. 5c. Cumulative Impulse Response of NEER to One Standard Deviation Shock to Policy Rate

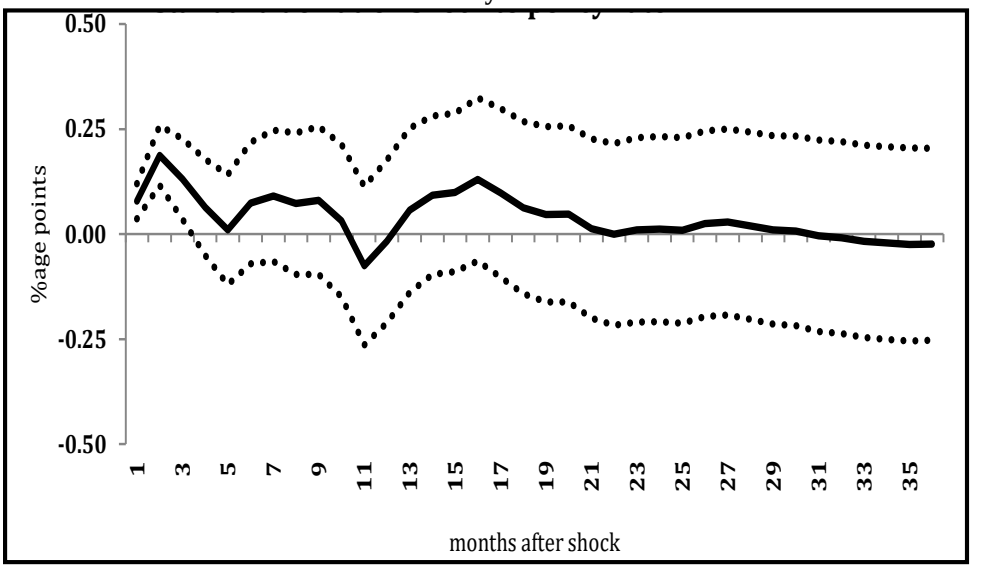


Fig. 5d. Cumulative Impulse Response of Growth to One Standard Deviation Shock to NEER

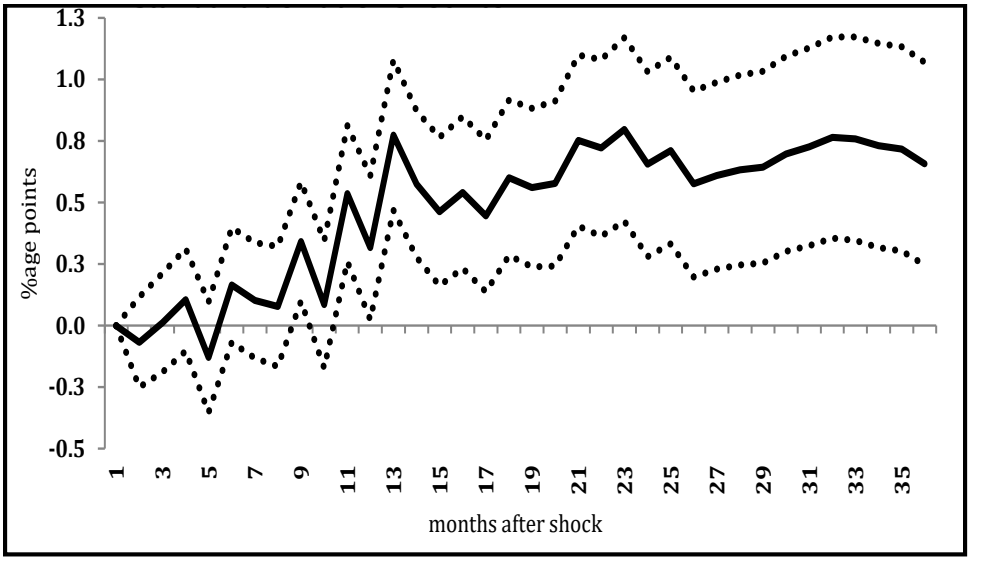


Fig. 5e. Cumulative Impulse Response of Inflation to One Standard Deviation Shock to NEER

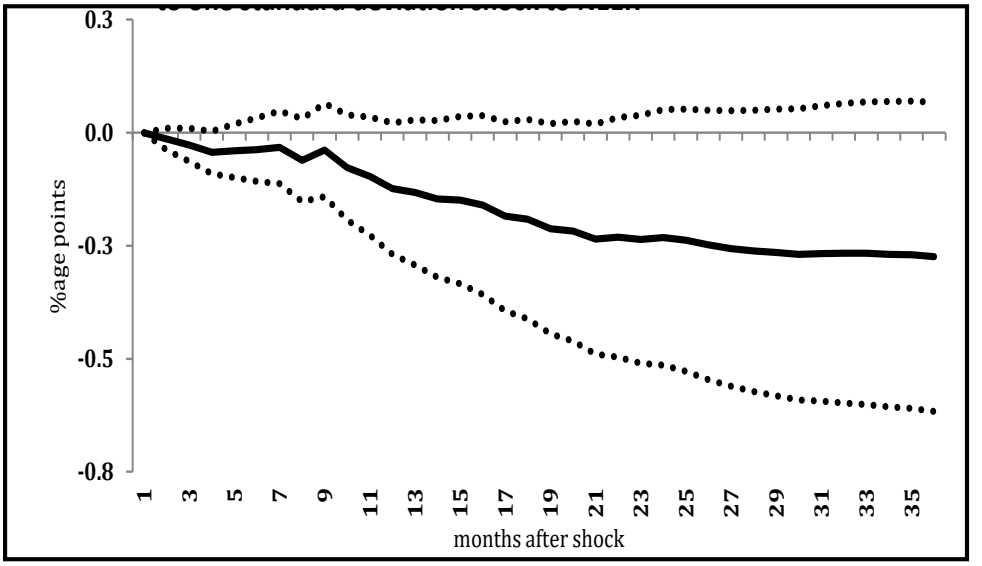
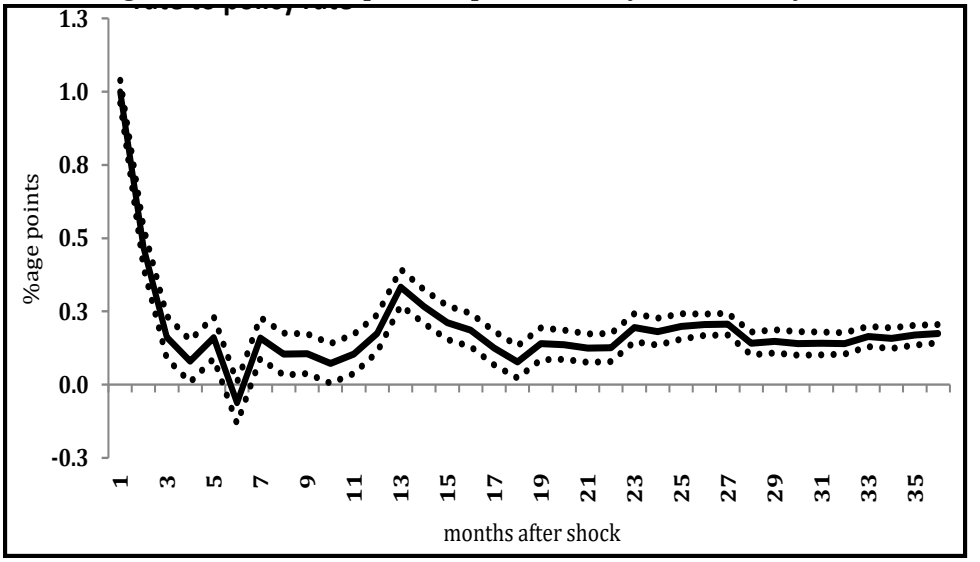


Fig. 5f. Cumulative Impulse Response of Policy Rate to Policy Rate



The impact of exchange rate appreciation on LSM growth appears counter-intuitive. Exchange rate appreciation has a positive impact on LSM growth (Figure 5d). The probable reason for this increase in LSM growth may be explained by the dependence of Pakistan's economy on imports. Specifically, the Pakistan industry is dependent on the import of raw material such as oil, gas, chemicals etc., and machinery to grow. With the appreciation in the exchange rate, these imports become cheaper. The consequent reduction in costs of production of the businesses may explain this increase in LSM production.

Strength of the Exchange Rate Channel

We have attempted to test the strength of the exchange rate channel in the following way. We ran two regressions, one with the exchange rate channel working and the other with the exchange rate channel shut down. Specifically, in the first case, we have allowed the exchange rate to respond to policy shock and other variables in the system. In the second case, we treated the exchange rate and its potential lags as exogenous variables, i.e., the exchange rate was not allowed to respond to changes in the policy rate and other variables in the system. Then we compared the impulse responses of the two cases.

Fig. 6a. Relative Strength of Exchange Rate Channel: Impulse Response of Growth to Policy Rate

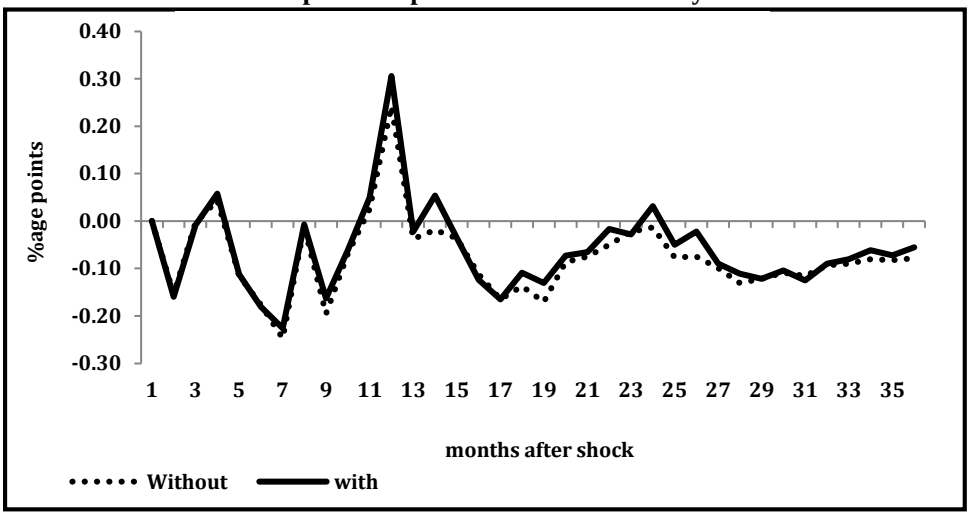
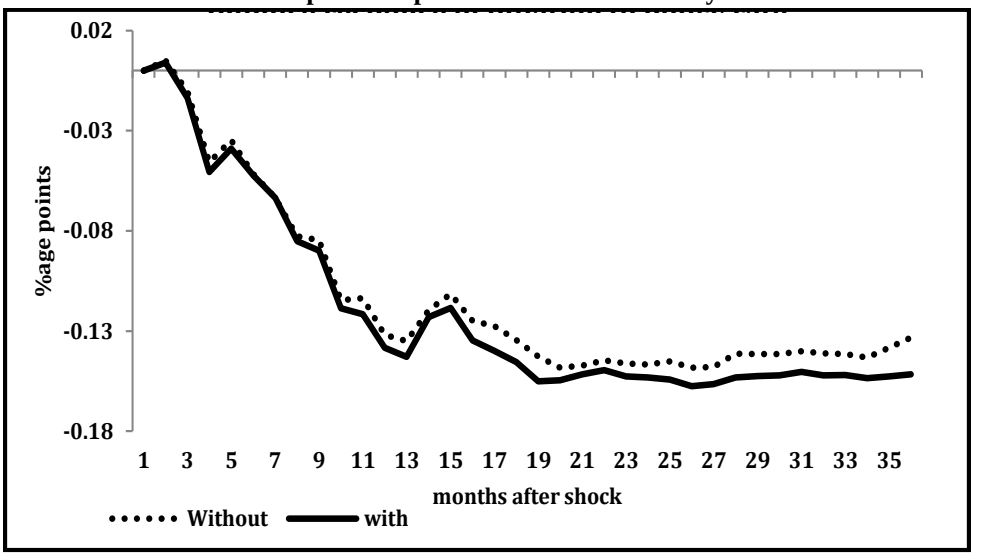


Fig. 6b. Relative Strength of Exchange Rate Channel: Impulse Response of Inflation to Policy Rate



The exchange rate channel does not appear effective for large-scale manufacturing growth. The transmission of monetary shocks on LSM growth is similar with and without the exchange rate channel. However, the exchange rate channel appears relatively effective when we analyse the impact of monetary policy shock on inflation. Though the exchange rate has little impact on aggregate demand, as is shown in LSM growth, a stronger impact on prices probably reflects the impact of exchange rate pass-through on import prices. As mentioned earlier, one standard deviation appreciation in exchange rate is estimated to decreases inflation by 30 basis points.

Strength of the Exchange Rate Channel under Different Exchange Rate Regimes

As discussed earlier, the exchange rate channel is more potent under a flexible exchange rate regime. To test this hypothesis for Pakistan, we have categorised the exchange regime for Pakistan into managed versus flexible. First, we followed the de-jure exchange rate classification, where Pakistan followed the managed exchange rate till 2000 and shifted to a flexible exchange rate after that. Second, we followed the de-facto exchange rate classification done by Ilzetzki, Reinhart, & Rogoff (2017).

We have used dummy variables to capture the exchange rate regime.

$$Dumerregime = 1, if\ exchange\ rate\ flexible$$
$$Dumerregime = 0, if\ exchange\ rate\ is\ fixed\ or\ managed$$

To investigate the impact of the exchange rate regime on the effectiveness of the exchange rate channel, we interacted the exchange rate regime dummy with the exchange rate. Structural VAR estimates the regression. Finally, impulse responses of growth and inflation to exchange rate are compared with the exchange rate interacted with the regime dummy.

Figure 7 shows the comparison of impulse responses for growth. The impulse response of growth to monetary policy shock under a flexible exchange rate regime (both de jure and de facto) is not much different from the original impulse response.

Fig. 7a. Impulse Response of Growth to Policy Rate under Flexible Exchange Rate Regime

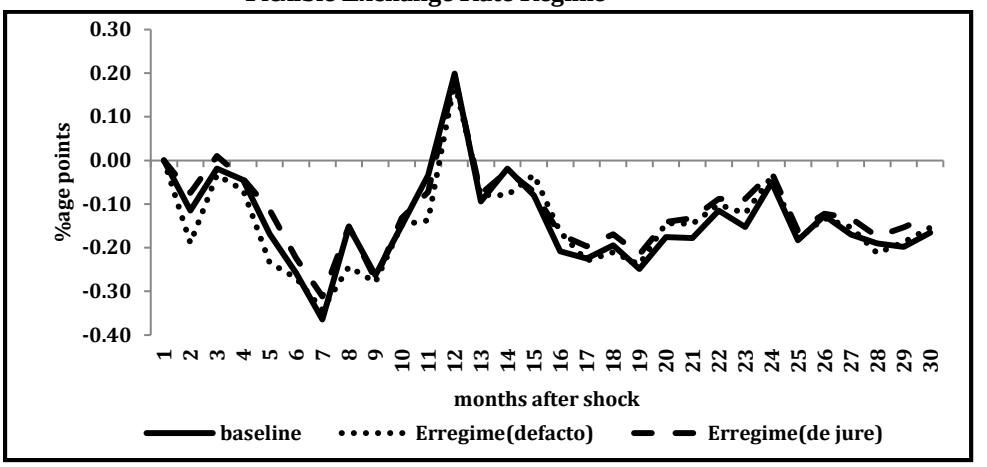
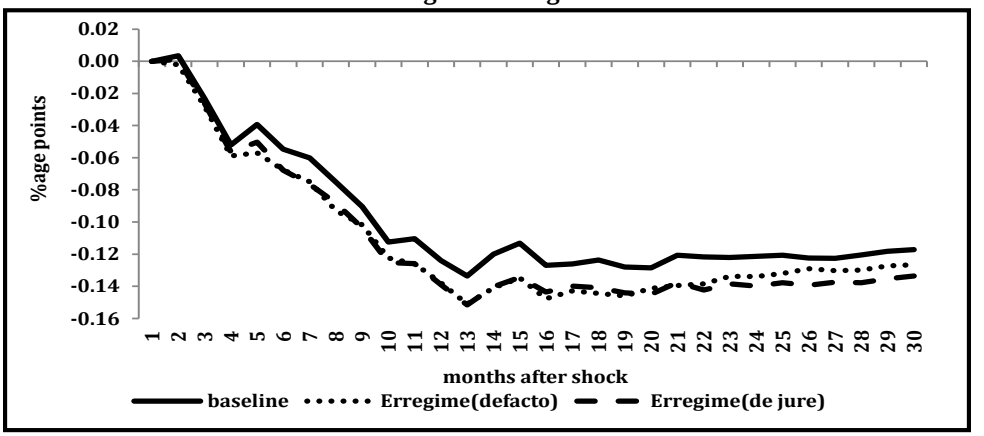


Fig. 7b. Impulse Response of Inflation to Policy Rate under Flexible Exchange Rate Regime



However, this is not true for inflation. Here the exchange rate channel of monetary policy transmission has become stronger under a flexible exchange rate regime. This is true for both de jure and de facto classification of exchange rate regimes.

Variance Decomposition

Variance decomposition of LSM growth shows that initially, a large part of the variation is explained by its lags. However, after ten months, most of the variations in growth are explained by interest rate and exchange rate shocks. More CPI inflation also explains a considerable part of the variation in LSM growth.

Variance decomposition of CPI inflation shows that adaptive expectations explain around ninety percent of the variations in inflation. Interest rate and exchange rate contribute only marginally to variation in overall inflation.

Likewise, variance decomposition of interest rates and exchange rates are predominantly explained by their own lags. Other variables have a minimal role in the variations of these two financial variables.

Fig. 8a. Variance Decomposition of Growth

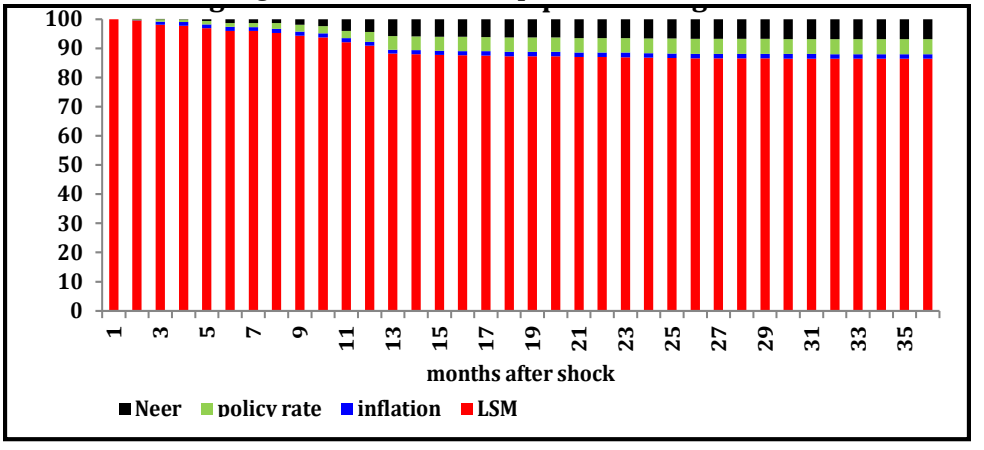


Fig. 8b. Variance Decomposition of Inflation

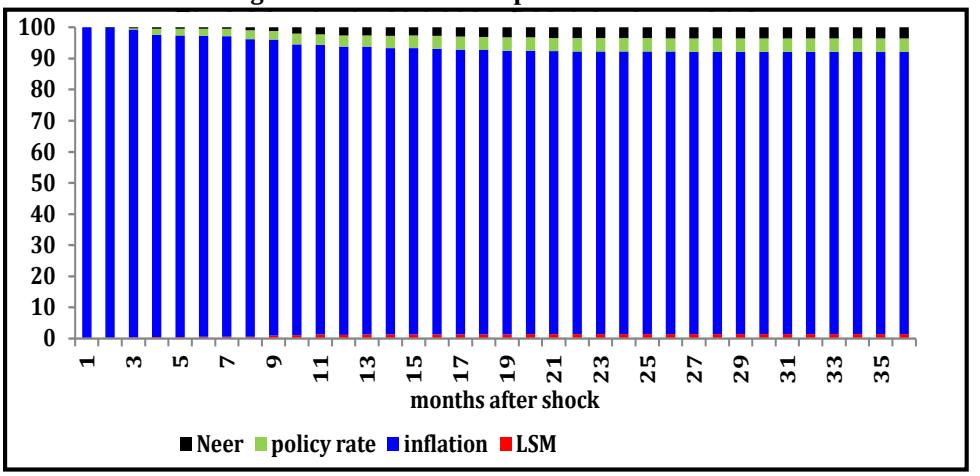


Fig. 8c. Variance Decomposition of Policy Rate

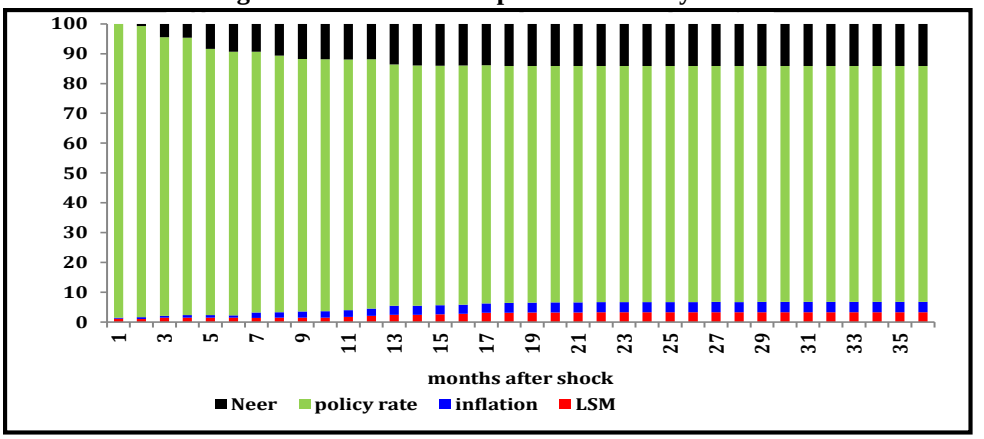
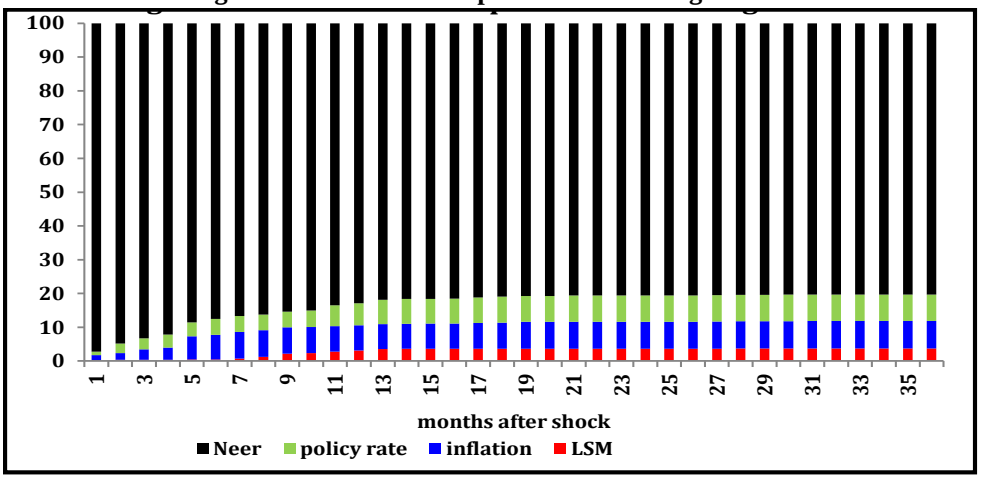


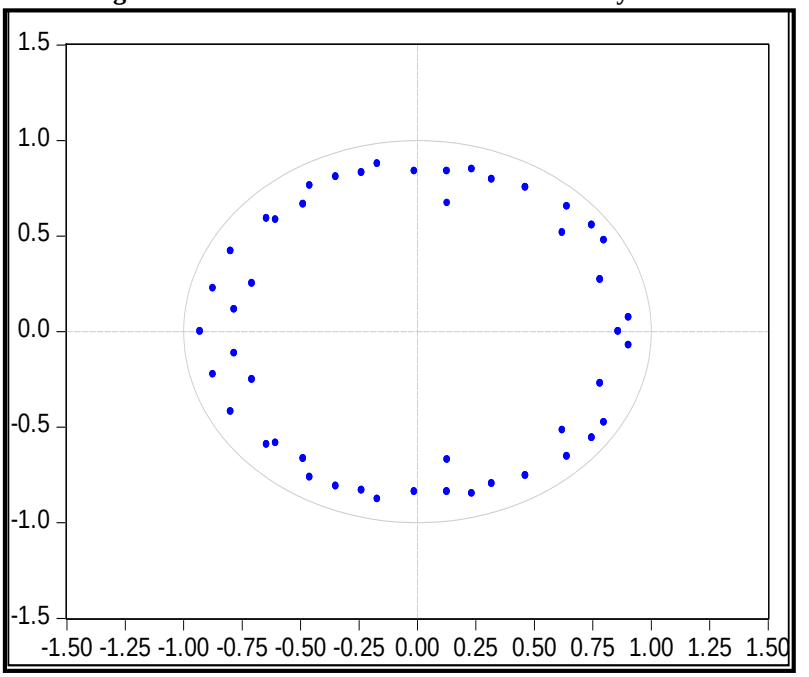
Fig. 8d. Variance Decomposition of Exchange Rate



Diagnostics

In order to check the stability of VAR, we have plotted the AR roots graph. Inverse roots of the AR characteristics polynomial lie within the unit circle that shows the stability of the VAR. We have also applied the autocorrelation LM test to serial correlation in the errors. We fail to reject the null hypothesis of no serial autocorrelation.

Fig. 9. Inverse Roots of AR Characteristic Polynomial



CONCLUSION

This study empirically evaluated the effectiveness of the exchange rate channel of monetary policy transmission. Following the literature on the subject, we benefitted from Vector Autoregressive models for this investigation. We used monthly data on key indicators for the economy that are important for inflation and growth and from a monetary policy formulation and implementation point of view. The data spanned from July 1995 to December 2020.

We did the necessary transformation before using the data in regression. This transformation included seasonal adjustment, taking logs, and differences in the data (for stationary purposes). We also controlled for the exchange rate regime dummy and monetary policy regime dummy in our regression.

The impulse response function showed that monetary policy shocks impact inflation and growth (SBP's goals). It takes almost a year for policy shock to have a significant impact on growth and four months to affect inflation. The impact of monetary policy actions is more pronounced on inflation than growth. One standard deviation positive shock to the exchange rate reduces inflation by around 30 basis points.

Importantly, the effectiveness of the exchange rate channel improves under flexible exchange rate regimes. We also tested the strength of the exchange rate channel of monetary policy transmission by shutting down the exchange rate channel. The impulse response functions showed that the exchange rate channel is relatively stable in impacting inflation. However, its impact on growth is minimal.

Variance decomposition showed that variation in LSM growth was contributed by all the factors like exchange rate and policy shocks. However, variations in inflation were mainly driven by inflation inertia.

Our results passed all the relevant diagnostics, such as inverse roots of AR characteristics polynomial and serial autocorrelation tests.

These findings suggest that adopting a market-based flexible exchange rate by the State Bank of Pakistan will strengthen the effectiveness of the exchange rate channel of monetary policy transmission. Moreover, SBP measures to further liberalise foreign exchange controls would integrate Pakistan with the global financial system. Global financial integration also bodes well for the working of the exchange rate channel.

ANNEXURE 1

Table A1

Cross Correlations of Important Variables in Level

	LSM Index	Consumer Price Index	Policy Rate	NEER	World Food Price	US IPI	Federal Fund Rate	PSB	Global Oil Price
LSM Index	1								
Consumer price index	0.94	1							
Policy rate	-0.66	-0.62	1						
NEER	-0.94	-0.99	0.61	1					
World food price	0.80	0.79	-0.23	-0.79	1				
US IPI	0.82	0.83	-0.67	-0.84	0.50	1			
Federal fund rate	-0.57	-0.67	0.45	0.68	-0.57	-0.32	1		
PSB	0.87	0.97	-0.53	-0.93	0.82	0.69	-0.70	1	
Global oil price	0.88	0.79	-0.47	-0.84	0.84	0.71	-0.49	0.72	1

Except for the policy rate and federal fund rate, all the variables are seasonally adjusted and in log form.

LSM: Large Scale Manufacturing, NEER: Nominal Effective Exchange Rate, IPI: Industrial Production Index, PSB: Public sector borrowing from the banking system, CPI is used with 10th lag while NEER is used with 6th lag

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Exchange Rate Misalignment and Economic Growth in Pakistan: The Role of Financial Development

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INTRODUCTION

Exchange rate misalignment and exchange rate volatility have become two important considerations while formulating exchange rate policy since the new era of exchange rate arrangements. Therefore, policy makers stress the importance of aligning actual exchange rate closer to the long run equilibrium exchange rate. The persistent failure to meet this objective may lead towards the incidence of exchange rate misalignment, which is largely reported as detrimental for macroeconomic performance.

Theoretically, real exchange rate (RER) misalignment may occur due to changes in macroeconomic or structural factors. Macroeconomic induced RER misalignment is a consequence of inconsistencies between macroeconomic policies, particularly monetary policy, and nominal exchange rate. An expansionary monetary policy, for instance, generates a higher increase in domestic prices as compared to world prices, and thus leads to real exchange rate appreciation. This, eventually, diminishes foreign reserves, expands foreign borrowings, and intensifies black market activities. On the other hand, structural misalignment occurs when RER does not immediately respond to changes in its determinants (Edwards, 1988).

Empirically, the existing body of research has widely recognised that exchange rate management is one of the most important channels through which economic policy affects the economic performance of an economy (Cottani et al. 1990). Particularly, the link between exchange rate misalignment and economic growth is widely examined for both large and small open economies. In this regard, the pioneering work is done by Edwards (1988), which empirically proves the adverse impact of RER misalignment on economic growth. Evidence from the developing world specifically supports the view that RER behaviour and economic growth are strongly related (Cottani et al. 1990; McPherson, 1997; Eichengreen, 2008; Rodrik, 2008; Rapetti et al. 2011; Ndlela, 2012; Jordaan & Eita, 2013; Bannaga & Badawi, 2014; Ali et al. 2015; Akram & Rath, 2017). Several studies, employing data for a larger set of countries, have also provided consistent results (Dollar, 1992; Ghura & Grennes, 1993).

Furthermore, some studies test the existence of possible asymmetries in the misalignment-growth relationship such as (Razin & Collins, 1997; Aguirre and Calderon, 2005; Gala, 2008; Rodrik, 2008; MacDonald & Vieira, 2010; Abida, 2011;

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Bhalla, 2012; Akram & Rath, 2017), among others. In particular, an overvalued exchange rate negatively affects economic performance by restricting economic activity, instigating balance of payment emergencies, and stimulating rent-seeking and black market practices (Rodrik, 2008). In contrast, exchange rate undervaluation helps to boost exports, increase employment and achieve higher economic growth (Rodrik, 2008 & Bhalla, 2012). Additionally, another strand of literature has proved that exchange rate misalignment in either form is harmful for economic growth (Sekkat & Varoudakis, 2000; Masunda, 2011; MacDonald & Vieira, 2010) conclude that the adverse impact of RER misalignment is higher for developing and emerging economies than developed countries.[7]

The recent surge in empirical literature, however, is to identify factors that help in plummeting and/or alleviating the unfavourable impact of RER misalignment on macroeconomic performance, specifically economic growth. In this regard, the role of financial development has gained considerable attention. Empirical studies have shown that financial development can limit the adverse impact of RER fluctuations on economic growth (Aghion et al. 2009; Elbadawi et al. 2012; Sekkat, 2012). For instance, financial development enhances economic growth by increasing financial resources and improving the efficiency of financial markets. Furthermore, financial development can provide better hedging tools to safeguard against the uncertainty attached with RER fluctuations and/or misalignment (Abu-Bader & Abu-Qarn, 2008).

Pakistan, being a small open economy, has witnessed misalignment in exchange rate due to both structural and macroeconomic factors. Exchange rate policies pursued by the country have contributed in an important way in determining the extent and span of misalignment in the exchange rate. Exchange rate policies have maintained a depreciated exchange rate most of the time in Pakistan, though the country has also experienced some episodes of appreciation with respect to equilibrium exchange rate (Debowicz & Saeed, 2014; Hyder & Mehboob, 2005).

Historically, factors that have contributed towards an overvalued exchange rate in Pakistan are weakening of the US dollar against other currencies, current government expenditures, and deteriorating terms of trade, among others (Hyder & Mahboob, 2005). The episodes of undervalued exchange rate relative to equilibrium exchange rate during the 1980s (1982 onwards), in contrast, occurred due to appreciation of the US dollar against other major currencies, high domestic inflation relative to trading partners, abandoning of fixed exchange rate system, and trade liberalisation. During the 1990s, the exchange rate was kept undervalued mainly to combat the adverse impact of inflation on real exchange rate. In addition, Hyder and Mahboob (2005) document that during the managed and flexible exchange rate regimes Pakistan experienced not only a lower degree of exchange rate misalignment but also the variations in misalignment were less during these regimes in comparison to the fixed exchange rate regime. Recently, massive undervaluation in PKR was observed and the exchange rate has reached PKR154/$ from historically low rates of PKR18.60/$ in 1988. Insufficient foreign exchange reserves and the escalation of current account deficit are the prominent reasons behind the weakening PKR position against the US dollar.

[7] In addition to economic growth, Nabli et al. (2003) and Ebaidalla (2014) have shown the misalignment of exchange rate also deteriorate export performance of a country.

Thus, it is evident from the above discussion that the relationship between RER movements and economic growth proves to be an important issue from both positive and normative perspectives. Although, there is ample evidence on estimating the equilibrium real exchange rate (Chishiti & Hasan, 1993; Afridi, 1995, & Siddiqui et al. 1996) and computing real effective exchange rate misalignment (Qayyum et al. 2004; Hyder & Mehboob, 2005; Janjua, 2007; Debowicz & Saeed, 2014; Hamid & Mir, 2017 & Bhatti et al. 2018) for Pakistan, these studies are confined only to computation and/or presentation of the trends of RER misalignment in Pakistan over different time periods. These studies conclude, at large, that Pakistan has experienced various episodes of undervaluation and overvaluation. However, the literature is scant on estimating the impact of RER misalignment on economic growth of Pakistan. Notably, there is only one study by Zakaria (2010) which has empirically tested the impact of RER misalignment on economic growth of Pakistan and concludes that undervaluation promotes economic growth in Pakistan. Bhatti et al. (2018) only provide evidence that real effective exchange rate misalignment granger cause economic growth in Pakistan.

A review of existing literature for Pakistan shows that a large body of literature has focused on either computing equilibrium RER or calculating RER misalignment. A dearth of literature on estimating the macroeconomic implications of RER misalignment for Pakistan reflects a gap in existing literature. For instance, only two studies examine the impact of RER misalignment on economic growth. Specifically, Zakaria (2010) has focused on estimating the impact of RER undervaluation on economic growth while Bhatti et al. (2018) have reported pairwise granger causality between RER misalignment and economic growth. No study explores the role of different moderating and/or mediating channels in the RER misalignment-growth relationship. To bridge this gap, this study primarily aims to empirically examine the role of a moderating channel in the RER misalignment-growth relationship. Firstly, we examine the direct impact of RER misalignment on economic growth. Secondly, we estimate the indirect/conditional impact of RER misalignment on economic growth by using the moderating role of financial development. As emphasised by literature such as Aghion et al. (2009), Elbadawi et al. 2012 & Sekkat, 2012), financial development helps in mitigating the adverse impact of exchange rate fluctuations by providing better hedging facilities, and improving the efficiency and transmission mechanism of financial markets. Pakistan's financial sector is still in an embryonic stage although it has gone through various regulations and modifications. Therefore, it is pertinent to examine the role financial development plays in the misalignment-growth relationship. Finally, by using direct and indirect impact, the overall/total impact of misalignment on economic growth is estimated at various percentiles of financial development. Our analysis will be helpful in identifying the importance of financial development in controlling the harmful impact of RER misalignment on economic growth.

To carry out an empirical analysis, the study utilises time series data from 1980 to 2016. RER misalignment is computed by employing the Behavioural Equilibrium Exchange Rate (BEER) approach developed by Clark and MacDonald (1998) whereas, the Fully Modified OLS (FMOLS) approach is employed to empirically estimate the direct and indirect impact of RER misalignment on economic growth. The findings of the study state that RER misalignment hampers while financial development triggers economic

growth of Pakistan. Moreover, the adverse impact of misalignment diminishes with the help of financial development. Therefore, financial development proves an important channel through which misalignment fallouts for economic growth can be controlled. Our findings are consistent with existing literature which supports the moderating role of financial development in misalignment-growth relationship. Being a developing country, Pakistan still needs to focus on its financial sector development so that the exchange rate can be kept closer to its equilibrium and its fallouts on economic growth can be mitigated.

METHODOLOGY AND DATA

The empirical examination comprises two steps: first step explains the computation of RER misalignment while the growth impact of RER misalignment is estimated in the second step.

Computation of Real Exchange Rate Misalignment

Exchange rate misalignment is the persistent departure of the observed exchange rate from the long run equilibrium exchange rate.[8] Therefore, to compute exchange rate misalignment, it is important as a first step to calculate the equilibrium exchange rate.

Broadly, there are three main approaches available to measure exchange rate misalignment, (i) Purchasing Power Parity Approach, (ii) Fundamental Equilibrium Exchange Rate Approach developed by Williamson (1994), and (iii) Behavioural Equilibrium Exchange Rate (BEER) Approach developed by Clark and MacDonald (1998). This study employs BEER approach developed by Clark and MacDonald (1998) for estimating the equilibrium exchange rate as it is suggested by recent literature for computing equilibrium exchange rate (e.g. Aguirre & Calderon, 2005; Hyder & Mehboob, 2005; Sallenave, 2010; MacDonald & Vieira, 2010; Abida, 2011 & Ndlela, 2012, among others). This approach works as follows:

(i) Real exchange rate is estimated against the fundamental determinants of RER.
(ii) The estimated coefficients from the regression in the first step and the permanent components of the determinants of RER are used to compute equilibrium RER.
(iii) RER misalignment is computed as the difference of the observed real exchange rate from the computed equilibrium RER.

In pursuance of Step 1 above, the following model adapted from Berg and Miao 2010; Naseem et al. (2013); Conrad & Jagessar, 2018) has been estimated including both domestic as well as external factors determining equilibrium exchange rate:

$$LRER_t = \beta_0 + \beta_1 G_t + \beta_2 RIRD_t + \beta_3 TO_t + \beta_4 GC_t + \beta_5 NFA_t + \mu_t \qquad \ldots \quad (1)$$

where, *t* is the time period from 1980–2016. $LRER_t$ shows log of real bilateral exchange rate. The US dollar is used as a benchmark currency considering its significance as the vehicle currency in international exchange. Moreover, the foreign exchange of Pakistan is denominated in terms of dollar which justifies the use of USA dollar as the benchmark currency; We use CPI of Pakistan and the USA to convert nominal

[8] The long run equilibrium exchange rate is that rate which is compatible with the simultaneous achievement of external and internal equilibrium.

exchange rate in to real. [$RER = NER * (\frac{CPI^{usa}}{CPI^{pak}})$]. G_t is log of real gross domestic product per capita; $RIRD_t$ indicates short term real interest rate (rir) differential of Pakistan and the USA ($rir^{pak} - rir^{usa}$). As per standard practice, the interest rates are made real by using the inflation rate of the respective countries. The study uses money market rates as the short-term interest rate; TO_t represents trade openness (sum of exports and imports as a percentage of GDP); GC_t is the government consumption expenditure as a percentage of GDP; NFA_t indicates net foreign assets as a percentage of GDP; μ_t is error term.

GDP per capita is expected to cause depreciation in real exchange rate. On the other hand, the impact of trade openness depends on whether it leads to increase exports or imports. Therefore, TO may lead to appreciation or depreciation of RER. The impact of government expenditure depends on the composition of government expenditure. Higher consumption from the tradable sector would create disturbance in current account and depreciates the domestic currency and vice versa. Net foreign assets are expected to affect exchange rate through current account channel, for instance, an increase in foreign reserves leads to appreciation in the domestic currency and vice versa (Lane et al. 2004, & Mariano et al. 2016). Finally, the impact of real interest rate differential depends on whether the differential is positive or negative. A positive interest rate differential is expected to attract more foreign capital thus creating domestic currency appreciation, whereas depreciation of the same is expected due to the negative interest rate differential.

After obtaining these estimates, the above model is fed with the stable/equilibrium values of the determinants of real exchange rate (obtained from HP Filter) to attain the equilibrium real exchange rate. Following Toulaboe (2006) and Nouira and Sekkat (2012), real exchange rate misalignment is thus computed as follows:

$$Mist_t = \frac{RER_t - EERER_t}{EERER_t} X\ 100 \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

where, $Mist_t$ represents Misalignment of RER, RER_t is the Observed RER, $EERER_t$ shows Estimated Equilibrium RER.

Impact of RER Misalignment on Economic Growth

By following Conrad and Jagessar (2018), Akram and Rath (2017), and Naseem et al. (2013)[1], we have estimated the unconditional impact of RER misalignment on economic growth as follows:

$$G_t = \alpha_0 + \alpha_1 LEMP_t + \alpha_2 LGFCF_t + \alpha_3 LTO_t + \alpha_4 GSSE_t + \alpha_5 LRER_t + \alpha_6 Mist_t + \mu_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (3)$$

As explained above, in addition to estimating the direct/unconditional impact of RER misalignment on economic growth, this study also attempts to estimate the indirect/conditional impact of RER misalignment on economic growth. The existing literature on RER-growth relationship has pondered on some transmission channels

[1] These Studies, however, have taken growth of GDP per capita while we proceed by taking log of GDP per capita

which affect the exchange rate and growth relationship (Razin & Colins, 1997; Bhalla, 2012; Levy-Yeyati & Sturzenegger, 2007; Rodrik, 2008). One of the possible channels is the financial sector development which may influence the impact of RER misalignment on economic growth. Therefore, we take financial development to examine its role as a moderator in misalignment-growth relationship. (Schumpeter, 1911; McKinnon, 1973 & Shaw, 1973) have developed the models in which they have shown the importance of financial development in explaining economic growth through innovations and identification and funding productive investment. Moreover, McKinnon (1973) and Shaw (1973) argue that financial development causes increase in savings and capital accumulation that, in turn, lead to economic growth. These growth-enhancing effects of financial development can be strong enough to surpass the adverse effects of RER fluctuations (RER volatility and/or RER misalignment) on economic growth. Moreover, financial development can provide better hedging tools to safeguard against the uncertainty attached with RER fluctuations and/or misalignment (Aghion et al. 2009; Elbadawi et al. 2012, and Basirat et al. 2014). To test whether financial development actually plays this moderating role, the interaction of RER misalignment and financial development has been introduced in model 3, the model then takes the following form:

$$G_t = \gamma_0 + \gamma_1 LGFCF_t + \gamma_2 LEMP_t + \gamma_3 LTO_t + \gamma_4 GSSE_t + \gamma_5 LRER_t + \gamma_6 Mist_t + \gamma_7 FD_t + \gamma_8 Mist * FD_t + \varepsilon_t \quad \ldots \quad \ldots \quad \ldots \quad (4)$$

Where 't' represents time period (1980 to 2016); G_t is the log of real gross domestic product per capita; $LEMP_t$ shows log of employment; $LGFCF_t$Is log of gross fixed capital formation; LTO_tindicates log of trade openness; $LRER_t$shows log of real bilateral exchange rate (Rs/US$); $GSSE_t$ represents human capital measured through gross secondary school enrolment rate; $Mist_t$ indicates RER misalignment (in percent); FD_t is the financial development which is captured through domestic credit to private sector (as % of GDP);

$Mist * FD_t$ is the interaction of RER misalignment and financial development. The interaction term captures the moderating role of financial development in this model. In other words, it indicates the growth impact of RER misalignment through the channel of financial development. μ_t and ε_t are error terms. All variables are taken in constant dollar form with 2010 as the base year. In Eq. 4, $\gamma_6$and $\gamma_7$capture the direct effect of RER misalignment and financial development on economic growth, respectively. Whereas, γ_8 captures the indirect effect of RER misalignment on economic growth, considering the level of financial development.

Real Exchange rate misalignment is expected to retard economic growth. There are many channels through which exchange rate misalignment transmits the harmful effects on economic growth. For instance, a misaligned exchange rate adversely affects the tradable sector and its relative competitiveness thus causes output to decline (Aguire and Calderon, 2005). Moreover, exchange rate misalignment can also lead to sub-optimal allocation of resources across sectors by giving wrong signals based on the distorted relative prices of tradables and non-tradables and consequently may harm the economy (Razin & Collins, 1999). Based on theoretical foundations, financial development, GFCF, level of employment, and the level of education are expected to boost economic growth while trade openness may trigger or hamper the process of economic growth.

The study covers the period from 1980 to 2016. For empirical analysis, the study has accessed data form various data sources namely, World Development Indicators (WDI) published by World Bank (2018), data on the employment level is obtained Penn World Tables 9.0, and Pakistan Economic Survey (2018). The data on interest rate is accessed from International Financial Statistics (2018) published by IMF.

Before empirical proceedings, it is important to test the stationary properties of the time series as it helps in adopting the appropriate econometric technique for estimation. For this purpose, the study uses the most widely recommended test for the order of integration: the Augmented Dickey Fuller (ADF) test. Moreover, for robustness, we use a more efficient test of unit root, Dickey Fuller-Generalised Least Square (DF-GLS) developed by Elliott, Rothenberg and Stock (1996) for the order of integration. This test is more powerful in terms of testing the unit root properties. One of the advantages of this test is that it locally de-trend the data series to efficiently estimate the deterministic parameter of the series and use the transform data to perform the usual ADF test.

Next, to establish econometric relationship among the selected variables, the present study employs the Fully Modified Ordinary Least Squares (FMOLS) technique to estimate Equilibrium RER as well as direct and indirect impact of RER misalignment on economic growth (Equation 1, 3 & 4). FMOLS, proposed by Phillip and Hansen (1990), is a semi-parametric approach to co-integration. One of the prerequisites of the FMOLS is that it is used to estimate the single equation co-integration relationship with the combination of variables that are integrated of order one. Particularly, the dependent variable should be I (1). One of the important properties of FMOLS is that it caters the problem of possible endogeneity in the model which makes it more relevant in our case.[2]

DISCUSSION OF RESULTS

Descriptive Statistics

The descriptive statistics presented in Table 1, The RER misalignment values, highlight that the extent of negative misalignment (–59.26), on average, remains greater than the positive (26.41 percent). The largest spell of overvaluation was experienced post 2001 by the country due to huge inflow of capital after the initiation of war on terror. However, the positive misalignment is experienced for a longer time span in the selected time period of the study. By looking at the exchange rate movements, we can observe that the lowest rate is 40.86 while the highest is 113.24, in real terms. Interestingly, the minimum and maximum values of equilibrium RER remain higher than the actual RER. The real GDP per capita growth is 6.7 percent, on average with a minimum value of 6.3 and a maximum of 7.1. This indicates nearly stagnant economic growth over the sample period.

[2] For robustness, we have also estimated our models by employing an alternate technique i.e. Dynamic OLS (DOLS). The results from DOLS are reported in the Appendix.

Table 1

Descriptive Statistics

Variable	No of Obs.	Mean	Std.Dev.	Min	Max
G	38	6.738	0.213	6.321	7.108
GFCF	38	16.114	1.668	12.521	19.235
GC	38	11.227	2.064	7.781	16.785
GSSE	38	26.510	8.349	16.956	46.109
LRER	38	4.329	0.241	3.701	4.729
TO	38	33.542	3.269	25.306	38.909
FD	38	23.501	3.956	15.386	29.786
NFA	38	1.521	4.985	–6.578	11.561
RIRD	38	–1.193	3.375	–8.655	4.439
Mist	38	18.407	29.548	–59.264	26.412
Mist_FD	38	–3.865	6.899	–15.931	6.386
LEmp	37	3.552	0.296	3.097	4.053

Notably, the level of financial development proxied by domestic credit is very low, indicating that the country needs to focus more on improving the level of financial development. Interestingly, on average, the real interest rate differential is negative indicating that the US real interest rate remains higher than Pakistan.

Unit Root Tests

The unit root test is applied on two sets of variables: (a) the set of variables that are used to measure real exchange rate misalignment (b) variables required to estimate the misalignment impact on economic growth. The unit root estimates are presented in Table 2. Both the test statistics (ADF and DF-GLS) confirm that the selected set of variables are integrated by order of one.

Equilibrium Real Exchange Rate

The estimates of real exchange rate are presented in Table 3. The results depict expected signs and portray significant impact of selected indicators on real exchange rate. We have used the coefficients of these variables and their trend components to compute the equilibrium exchange rate. Finally, substituting the values of actual exchange rate and equilibrium exchange rate in Equation 2 generates a measure of real exchange rate misalignment.

Table 2

Unit Root Estimates

Panel A: Estimates of Unit Root Test for Regression 1 (First Stage)

Variable	Levels		First Difference		Order of Integration
	ADF	DF-GLS	ADF	DF-GLS	
IR	–2.011	1.968	–7.089***	–7.217***	I(1)
	(3.51)	(–3.190)	(–3.496)	(–3.184)	
NFA	–2.352	–1.742	–6.419***	–6.515***	I(1)
	(–3.491)	(–3.167)	(–3.494)	(–3.171)	
GC	–2.060	–2.062	–7.269***	–7.204***	I(1)
	(–3.491)	(–3.168)	(–3.492)	(–3.171)	
G	–2.435	–1.349	–6.359***	–6.444***	I(1)
	(–3.490)	(–3.167)	(–3.492)	(–3.171)	
LTO	–1.973	–2.091	–7.929***	–6.756***	I(1)
	(–3.502)	(–3.190)	(–3.504)	(–3.190)	
Panel B: Estimates of Unit Root Test for Regression 3&4 (Second Stage)					
Mist	–2.430	–1.999	–6.051***	–6.123***	I(1)
	(–3.511)	(–3.190)	(–3.504)	(–3.190)	
LRER	–1.177	–1.312	–6.775***	–6.778***	I(1)
	(–3.491)	(–3.167)	(–3.492)	(–3.171)	
G	–2.435	–1.349	–6.359***	–6.444***	I(1)
	(–3.490)	(–3.167)	(–3.492)	(–3.171)	
LGFCF	–1.298	–0.969	–4.952***	–3.593**	I(1)
	(–3.508)	(–3.190)	(–3.511)	(–3.171)	
LTO	–1.973	–2.091	–7.929***	–6.756***	I(1)
	(–3.502)	(–3.190)	(–3.504)	(–3.190)	
LEMP	–2.598	–2.016	–7.312***	–7.302***	I(1)
	(–3.492)	(–3.171)	(–3.494)	(–3.174)	
FD	–2.917	–1.549	–6.194***	–6.296***	I(1)
	(–3.491)	(–3.167)	(–3.492)	(–3.171)	
Mist_FD	–2.561	–2.191	–6.161***	–6.282***	I(1)
	(–3.511)	(–3.190)	(–3.504)	(–3.190)	
GSSE	–0.865	–1.201	–4.784***	–4.896***	I(1)
	(–3.515)	(–3.190)	(–3.516)	(–3.190)	

Note: ***, ** refers to 1 percent and 5 percent level of significance.

Table 3

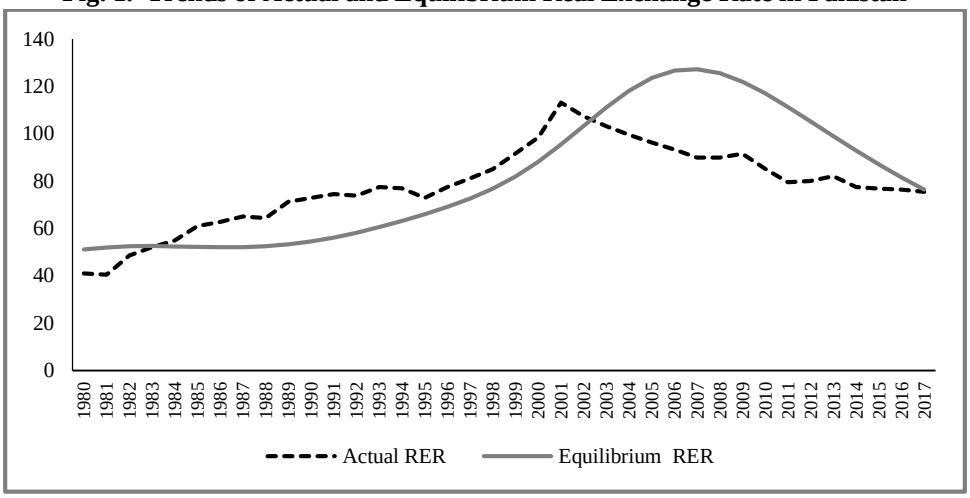
FMOLS Estimates of Exchange Rate Determination

Variable	Coefficient	t-stat	P-Value
G	0.917***	8.168	0.000
RIRD	–0.026***	–3.787	0.005
NFA	0.048***	6.503	0.000
TO	0.945***	5.039	0.000
GOV	–0.032*	–1.857	0.070
C	–4.731***	–5.928	0.000

Note: *, ***, indicates level of significance at 10 percent and 1 percent levels.

Figure 1 plots both real exchange rate and the estimated equilibrium exchange rate where the difference between these two is identified as real exchange rate misalignment. It is evident from the figure that the two lines do not overlap each other signifying that the real exchange rate in Pakistan has always remained misaligned, either in the form of overvaluation or undervaluation. A positive value shows undervaluation while the negative value shows overvaluation in the actual exchange rate.

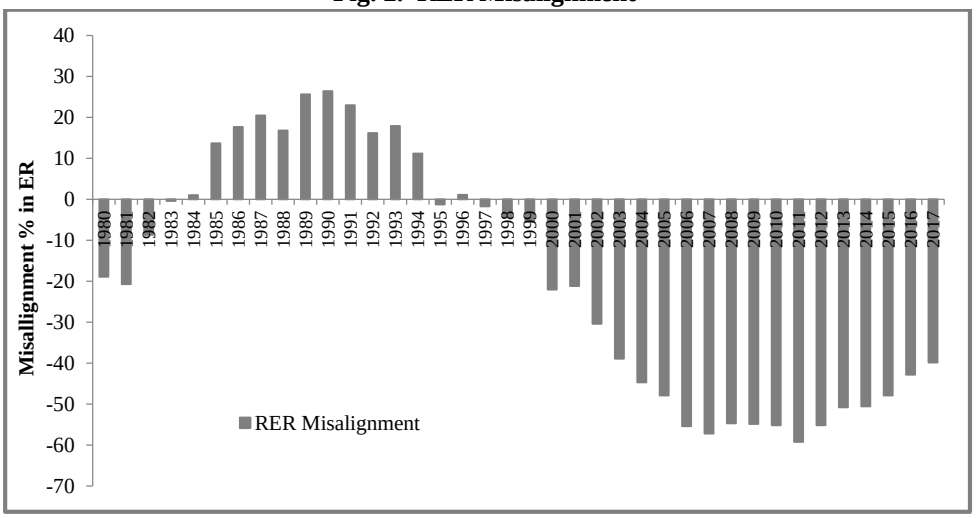
Fig. 1. Trends of Actual and Equilibrium Real Exchange Rate in Pakistan



As is depicted in Figure 1 above, the real exchange rate of Pakistan has remained overvalued until 1982. However, it remained undervalued from 1983 to 2000 and it has remained overvalued. The magnitude of undervaluation is less as compared to the magnitude of overvaluation.

Furthermore, Figure 2 displays the trends of RER misalignment of the PKR against the US dollar. As mentioned above, on average, misalignment appears as 18 percent during the selected period. The main reason for the overvaluation of the PKR, before the adoption of flexible exchange rates regime in 1982, is the overvaluation of the US$. In the early 1980s, the US increased its interest rate in order to reduce its large budget deficits, which resulted in capital inflow and overvaluation of the US dollar. As the PKR was linked to the US dollar, it was also overvalued. This has further resulted in a decrease in Pakistan's competitiveness in the international market.

Fig. 2. RER Misalignment



Later, in order to maintain international competitiveness and to reduce the resulting trade deficit, in 1982 the State Bank of Pakistan adopted the floating exchange rate regime, although it was controlled floating where the PKR was tied to a band of trade weighted currencies. Thus, it resulted in the devaluation of the PKR. From the 1990s to 2000, the depreciation in the PKR was observed in order to combat the inflationary pressure on RER (Janjua, 2007).

From 2001, the PKR remained overvalued. This estimate is consistent with a recent study by the IMF (2012) that reports that the Pakistani currency has appreciated by more than 17 percent, which is higher than that of the currencies of other countries in the region. The authors argue that the poor export performance and dependence of the economy on remittances for maintaining the reserves position at a sustainable level are indications of the prevalence of overvaluation of the PKR.

Growth Impact of RER Misalignment

Table 3 reports both the direct and indirect impact of RER misalignment on economic growth. Column 2 displays the direct impact while Column 3 demonstrates the indirect impact of misalignment on economic growth by using the financial development channel.

It is evident that all the estimates presented in Table 4 are statistically significant and carry expected signs. As emphasised by Neoclassical growth models, labour and capital are the two important factors of production in growth models. Therefore, to incorporate this aspect of the production function, we use both employment level (a measure labour input), and GFCF (a measure of physical capital stock), in order to check

Table 4

Growth Impact of Misalignment: Direct and Indirect Impact

Dependent Variable: Log of GDP Per Capita	Model 1		Model 2	
Variable	Coefficient	P-Value	Coefficient	P-Value
LRER	0.042***	0.000	0.148***	0.000
	(0.008)		(0.009)	
Mist	–0.134***	0.000	–0.078**	0.019
	(0.006)		(0.031)	
FD	0.002***	0.000	0.006***	0.001
	(0.000)		(0.000)	
Mist*FD	–	–	0.004***	0.004
			(0.001)	
LGFCF	0.309***	0.000	0.170***	0.000
	(0.014)		(0.020)	
LEMP	0.441***	0.000	0.615***	0.000
	(0.018)		(0.019)	
LTO	–0.098***	0.000	0.120***	0.000
	(0.009)		(0.010)	
GSSE	0.005***	0.000	0.003***	0.000
	(0.000)		(0.000)	
R-Squared	0.956		0.982	

Note: **, *** indicates level of significance at 5 percent and 1 percent level of significance. Values in parenthesis are standard errors.

their significance in economic growth for Pakistan. The estimates in both specifications reveal a statistically significant and positive impact of both factors of production on GDP per capita of Pakistan. This finding aligns with existing literature such as Toulaboe 2006; Abida 2011 & Masunda 2011, among others. Moreover, the study has also incorporated the role of secondary school enrolment, which demonstrates a positive and significant impact on economic growth. Barro (1991) undoubtedly emphasises the vital role of human capital for growth through its positive effect on productivity and, thus, on economic growth.

The significant role of trade in growth has been advocated by both trade and growth theories. The empirical literature, however, has provided mixed findings. The positive role of trade in economic growth has been documented by various studies such as (Cottani et al. 1990; Aguirre and Calderon, 2005; Béreau et al. 2009; Dufrenot et al. 2009 & Abida, 2011, among others). In contrast, another strand of literature provides empirical evidence for the unfavourable impact of trade on growth. Trade may lead to lower economic growth, particularly in developing countries. For Pakistan, our findings suggest a favourable impact of trade openness for per capita GDP growth (Model 2).

Our findings regarding the impact of RER on economic growth are in line with theoretical expectations where an increase in RER is expected to increase exports, employment, and thus economic growth, by making exports relatively cheaper in the international market. This result is also consistent with the findings of other studies like (Eichengreen, 2008; Rodrik, 2008 & Rapetti et al. 2011, among others).

In contrast to RER, misalignment in RER appears detrimental for economic growth in both specifications. This finding is statistically significant at a conventional level and in accordance with our theoretical expectations. Theoretically, misalignment distorts relative prices, which, in turn, lead to sub optimal allocation of resources and thus retards economic growth. In addition, investment decisions and the capital accumulation process is also sensitive towards the deviation of exchange rate from its equilibrium point. As investment is an important contributor to growth, exchange rate misalignment reduces economic growth by distorting investment. Similar findings are reported by (Edwards, 1988; Ghura & Grennes, 1993; Aguirre & Calderon, 2005; Toulaboe, 2006; Rodrik, 2008; Eichengreen, 2008L; Berg & Miao, 2010; Abida, 2011; Ndlela, 2012; Bannaga & Badawi, 2014; Akram & Rath, 2017; among others).

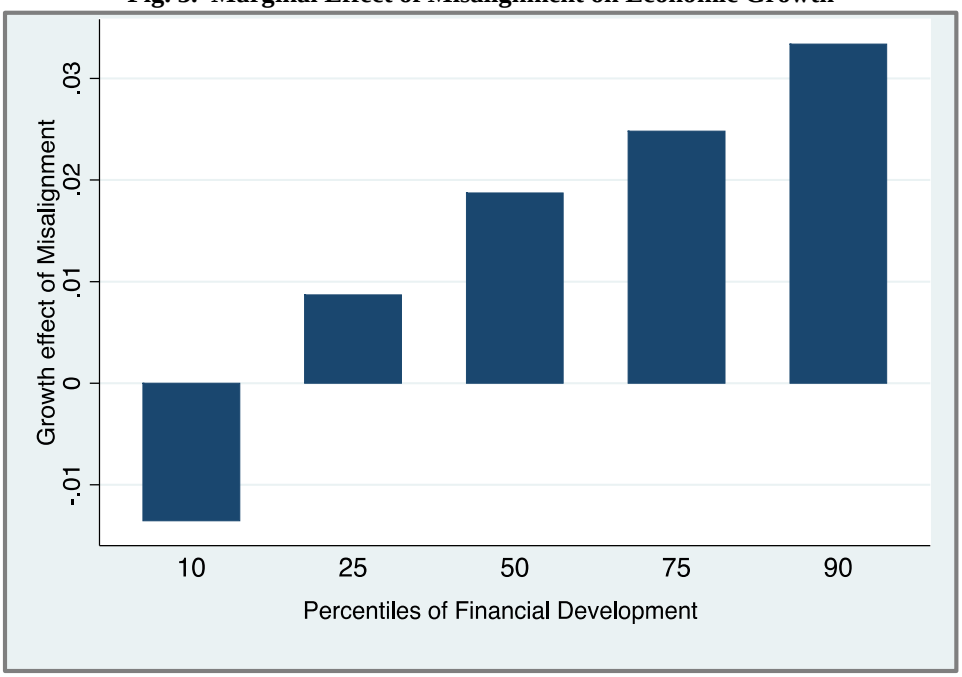
This finding supports the argument that exchange rate policy significantly affects economic growth particularly in developing countries like Pakistan. Thus countries, which are able to maintain their actual exchange rate closer to equilibrium, do witness a higher per capita growth.

In addition to management of exchange rate, the level of financial development also determines economic performance. An improved financial sector not only helps to channel resources into more efficient uses through innovation, and by introducing new financial services, but also creates new opportunities for savers and lenders. Consequently, it leads to higher economic growth. Levine (1997) describes the importance of financial development as an excellent predictor of not only economic growth but also of capital accumulation and technological change that further accelerates economic growth. Our findings also suggest a significant contribution of financial development in economic growth.

We now discuss the moderating role of financial development between misalignment-growth relationships. The coefficient of the interaction term of RER misalignment with financial development, capturing the indirect effect of misalignment on economic growth by using the financial development channel, is positive as shown in Regression 4. This finding implies that the level of financial development in Pakistan is helpful in transforming the adverse impact of misalignment into favourable for GDP per capita. The impact, however, is very small. This finding suggests that as the level of financial development increases, the adverse impact of RER misalignment on economic growth reduces. This further suggests that Pakistan still needs to improve the structure, performance, and efficiency of the financial sector in order to benefit from it.

For a better understanding of the role of financial development in the misalignment-growth relationship, by following Aghion et al. (2009), we have computed the impact of RER misalignment on economic growth at various levels of financial development.[3] These levels are determined by using the percentiles of financial development. Figure 3 depicts that at the lowest level of financial development (10th percentile), the impact of misalignment remains negative. However, as we move to the higher percentiles of financial development, the growth impact of misalignment becomes positive. This finding is supported by the existing studies of a similar nature such as (Aghion et al. 2009; Sekkat, 2012 & Elbadawi et al. 2012). These studies have also proved that financial development limits the adverse impact of RER fluctuations on economic growth by providing protection through better hedging tools against RER risks.

Fig. 3. Marginal Effect of Misalignment on Economic Growth



[3] This is done by taking the first derivate of Equation 4 with respect to FD and substituting the values of FD at different percentiles.

In conclusion, our findings are new in terms of their contribution to the existing stock of empirical literature on various aspects of exchange rates, particularly for Pakistan. The above findings suggest that exchange rate policies need to be managed more cautiously to keep the actual exchange rate closer to its long run equilibrium exchange rate. Moreover, the stabilising role of financial development is required to be more rigorous to combat the adverse impact of RER misalignment.

CONCLUSION AND POLICY RECOMENDATIONS

The era of flexible exchange rate system has been challenging for policy makers on various grounds. These challenges include controlling exchange rate volatility and maintaining the actual exchange rate closer to its long run equilibrium. Therefore, much literature is devoted to providing theoretical background and empirical evidence on underlying causes of exchange rate fluctuations and their impact on economic growth.

This study aimed to provide some new evidence on exchange rate misalignment for Pakistan, an important dimension of exchange rate management. The findings of our study reveal an adverse impact of misalignment while a favourable impact of financial development on economic growth was observed. For the indirect impact, we have used an interaction term of RER misalignment and financial development. The coefficient of this interaction term appears as positive. Therefore, we conclude that the level of financial development transforms the negative impact of RER misalignment into positive for economic growth in Pakistan. However, when we combine the direct and indirect impact, the overall impact is still negative. This finding implies that the financial sector development, in Pakistan does require improvements to help to eliminate the unfavourable impact of RER misalignment on economic performance.

Based on empirical findings, the study suggests a cautious management of exchange rate policies that can help the actual exchange rate to remain closer to its equilibrium point thus reducing its adverse impact. It is indeed a hard challenge for a country like Pakistan, which undergoes various economic and political glitches that impede successful implementation of market oriented exchange rate policies. Moreover, exchange rate is mostly set to cover an ever-increasing current account deficit. Pakistan needs to review the existing exchange rate management and adopt measures that not only reduce the extent of misalignment but also support the process of economic development.

To strengthen the role of financial development, the country should improve the domestic banking system, develop capital markets, and introduce new and advanced financial instruments. The financial system must be improved so better hedging facilities are available to investors. This helps in boosting investor confidence and triggers economic growth.

Keeping in view the current economic situation and exchange rate fluctuations in the country, our study is timely and relevant. Pakistan is facing an extreme undervaluation of the PKR against the US dollar due to both economic and political factors. This current wave of exchange rate misalignment has serious socioeconomic and political implications by creating uncertainty in the economy. For instance, it has not only reduced domestic investment but also restrained foreign direct investment. Investment decisions are on hold. Consumer preferences between saving and consumption are changed because investor and consumer confidence is shattered. A decline in overall economic activity is evident. On the external sector, the exchange

rate undervaluation has led to an increasing current account deficit due to huge increase in import bills and mounting external debt.

Notably, the financial markets and financial institutions in Pakistan do not encompass appropriate hedging tools to safeguard against massive fluctuations in exchange rate and/or against speculative attacks. The structure and efficiency of financial systems in Pakistan must be improved to make them more predictive and responsive towards fluctuations in financial indicators. Additionally, a large proportion of the foreign exchange inflow/outflow is not documented; therefore, policy-makers must streamline the process of currency inflow and outflow. This will help in minimising the exchange rate fluctuations.

Finally, the importance of a credit channel is empirically verified as a significant transmission mechanism. However, due to less advancement in our financial markets, information asymmetry, adverse selection and moral hazard problems are common which reduces the effectiveness of this channel. To improve the functioning of the credit channel, regulation of financial services, and transparency and accountability of financial markets are critical aspects to ponder.

Table A1

Growth Impact of Misalignment: Direct and Indirect Impact (DOLS)

Dependent Variable: Log of GDP Per Capita	Model I		Model II	
Variable	Coefficient	P-Value	Coefficient	P-Value
LRER	0.479***	0.000	0.292*	0.086
	(0.082)		(0.039)	
Mist	–0.083**	0.019	–0.407**	0.052
	(0.028)		(0.033)	
FD	0.004***	0.054	0.009**	0.042
	(0.002)		(0.001)	
Mist*FD	–	–	0.014**	0.036
			(0.001)	
GFCF	0.225**	0.017	0.180	0.171
	(0.075)		(0.049)	
LEMP	–0.075	0.685	–1.586*	0.071
	(0.178)		(0.178)	
LTO	0.037	0.734	0.042	0.133
	(0.104)		(0.009)	
GSSE	0.027***	0.001	0.025*	0.064
	(0.006)		(0.002)	
R-Squared	0.999		0.999	

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Part 3:
Inflation

Drivers of Inflation: From Roots to Regressions

ABDUL JALIL*

Inflation has become a topic of serious discussion since the 1970s due to its well-documented cost (see Box 1), and the policy-makers always try to concentrate on inflation-averse policies. Therefore, the understanding of the drivers of inflation is essential for designing policies to control inflation. The understanding of inflation is not only an academic discussion, but the source of inflation also shapes the policy to control inflation (Khan and Schimmelpfennig, 2006). For example, if inflation is a monetary phenomenon, then it is the country's fiscal and monetary authorities' concern. On the other hand, if it comes from supply-side issue, the solution often lies in excessive regulation, barriers to movement of goods and a closed economy.

Box 1: Inflation and Why does it Matter

Definition and Measurement: Inflation is persistent, appreciable and general price rise. The measurement of inflation is not a straight forward task. No single measure is an appropriate representative of whole population. However, the most of the central banks and monetary authorities use the consumer price index (CPI) as their main measure of inflation. This study also uses CPI to gauge inflation.

Cost of Inflation: it is well documented that high inflation is often associated with lower economic growth and financial uncertainties (Mishkin 2008). Furthermore, it is linked to weaker investor confidence, reduce the saving incentives, hurt the public sector balance sheets and hurts the poor (Haque and Qayyum, 2006).

Friedman (1963) documents that inflation is always and everywhere a monetary phenomenon. However, other equally prominent studies identify that there are many other important drivers of inflation. These are supply-side constraints, rising cost, exchange rate, commodity prices, taxes, global shocks and administrative prices (Haque and Qayyum, 2006). Ha, et al. (2019), along with others, suggest several important inflation drivers at the macro-level (see Box 2).[9]

Box 2: Important Drivers of Inflation

Ha et al. (2019) identify seven major factors which may drive inflation at macro level. These are:

- oil prices
- external demand shocks
- external supply shocks
- internal demand
- internal supply
- monetary policy and
- exchange rate

Following Freidman (1963) there is a debate that unless accommodated by monetary expansion, real shocks will not persist and hence inflation will die out over time.

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[9] It is also important to mention that various studies use different names for external shocks like global shocks and international shocks. Similarly, the domestic shocks for the internal shocks. However, the present study uses the standard jargons like internal shocks and external shocks. Specifically, the study explains the variation of domestic inflation by using Factor Augmented Vector Auto Regressive (FVAR) Model and quantify the role of seven factors in driving the inflation for 29 advanced economies and 26 developing economies.

This brief attempts to understand the sources of inflation for better suggestions to the policy-makers and other stakeholders. Specifically, this brief will try to answer three major questions:

- What are the major drivers of inflation?
- How these drivers differ according to the countries characteristics?
- What are the major drivers of inflation in Pakistan at micro and macro level?

1. THE DRIVERS OF INFLATION ACROSS THE WORLD

A comprehensive review of the literature is presented in Table 1, and the key takeaways from the literature are as follows:

- There are five primary drivers of inflation, along with some others. These are internal demand, internal supply, monetary policy, exchange rate and external shocks (see Box 2).
- The contribution of external shocks remains dominant in advanced economies. It explains around 33 percent of the total inflation in the advanced economies. On the other hand, in developing economies, the internal supply remains the largest contributor (around 30 percent) following exchange rate, internal demand, monetary policy and external shocks (see Figure 1).
- It is also important to note that the internal supply has a significant role in all three samples.

Fig. 1. Major Drivers of Domestic Inflation by Country

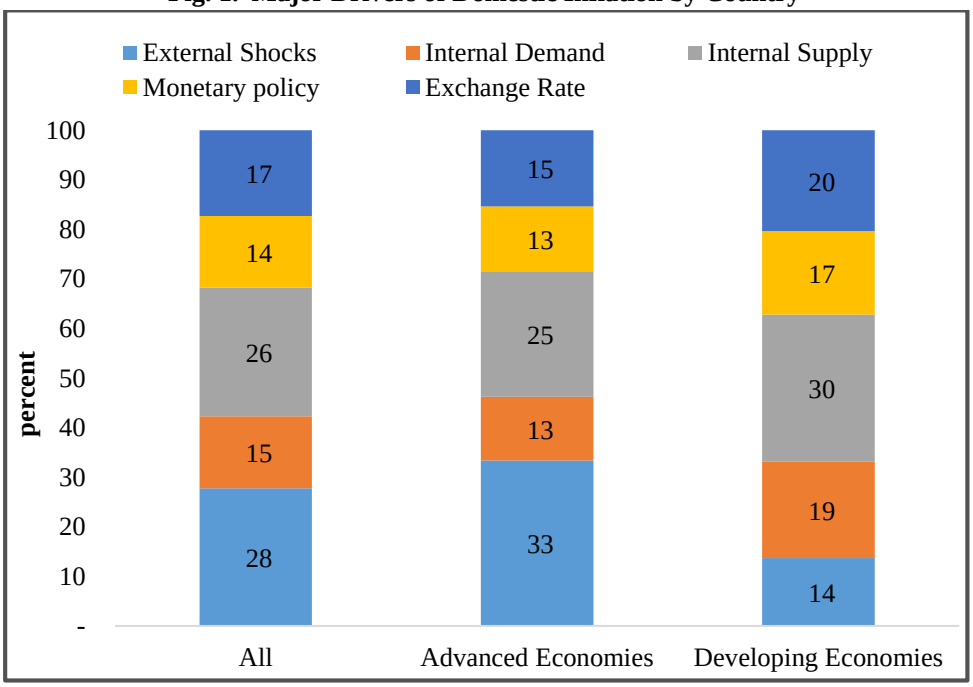


Table 1

Important Studies on the Drivers of Inflation

Study	Sample Economies	Sample Period	Dominant Shocks			
			Internal Demand	Internal Supply	Monetary Policy	Exchange Rate
Mohanty and Klau (2001)	14 EMDEs	1981-1999	X	X	X	X
Canova and De Nicolò (2002)	G7 Economies	1973-95	--	--	X	--
Pain, et al. (2006)	OECD Countries	1985-2005	--	X	--	--
Amisano and Tristani (2007)	Euro Countries	1970-2004	--	X	X	--
Gambetti, et al. (2008)	US	1970-2002	X	X	X	--
Hasan and Alogeel (2008)	Saudi Arabia and Kuwait	1966-2007	X	X	--	--
Jongwanich and Park (2008)	Southeast Asia and India	1996-2008	X	--	--	X
Neaime (2008)	Middle East and North Africa (MENA)	1999s-2000s	--	--	X	X
Bhattacharya, et al. (2009)	India	1997-2009	--	--	X	X
Kandil and Morsy (2010)	Six Arab States	1970-2007	--	--	X	X
Porter (2010)	China	1996-2010	X	--	X	X
Dua and Gaur (2010)	Nine Asian Countries	1990-2005	X	X	--	X
Vašíček (2011)	Central Europe	1998-2007	X	X	--	X
Mumtaz, et al. (2011)	UK	1964-2005	X	X	X	--
Ahmad and Pentecost (2012)	22 African Countries	1980-2015	X	X	--	--
Khan and Hanif (2012)	Pakistan	1992-2011	X	X	X	--
Osorio and Unsal (2013)	33 Asian Countries	1986-2010	X	X	X	X
Globan, et al. (2015)	Eastern European Region	2001-13	--	X	X	--
Melolinna (2015)	Euro Area, UK, U.S.	1975-2012	X	X	X	--
Jongwanich, et al. (2016)	ASEAN Countries	2000-2015	--	--	X	X
Halka and Kotlowski (2017)	Sweden, Czech Republic, and Poland	2000-2014	X	X	--	X
Bobeica and Jarociński (2017)	Euro Countries and USA	1990-2014	X	X	X	X
Nguyen, et al. (2017)	33 Sub-Saharan African Countries	1988-2013	X	X	X	X
Conti, Neri, and Nobili (2017)	Euro Countries	1995-2015	X	--	X	--

Box 3. Cross-Countries Characteristics

The drivers of inflation are sensitive to several cross-countries characteristics. For example, the exchange rate may derive inflation differently in floating exchange rate regime as compared to fixed exchange rate. Therefore, the empirical studies control regression with several cross-countries characteristics. We shall discuss four important characteristics in this brief. These are trade openness, financial openness/capital openness, inflation targeting regime and exchange rate regimes. Specifically, these are defined as follows:

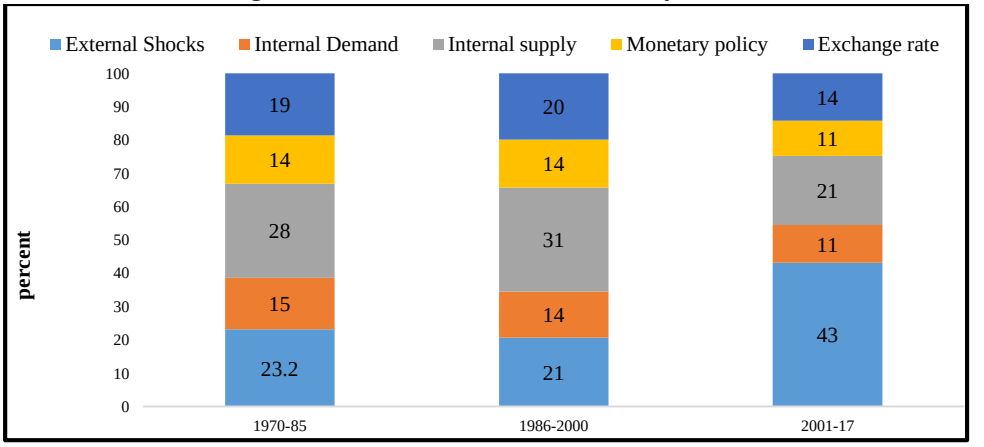
Trade Openness: The trade to GDP ratio is taken from world development indicators and then median is calculated. The economies which are above the median are termed as 'high' and below the median are termed as 'low.

Capital Openness: Chinn and Ito (2017) classification is used for the capital /financial openness. The economies which are above the median are termed as 'high' and below the median are termed as 'low' capital openness.

***Inflation Targeting*:** The dummies for the inflation targeting regime are taken according to IMF (2016).

Exchange Rate Regime: Ilzetzki et al (2017) classifications are used for defining the exchange rate regimes. We demarcate only two regimes. Free floating and managed floating are termed as *flexible* exchange rate regime and rest all others are combined as *Fixed* exchange rate regime.

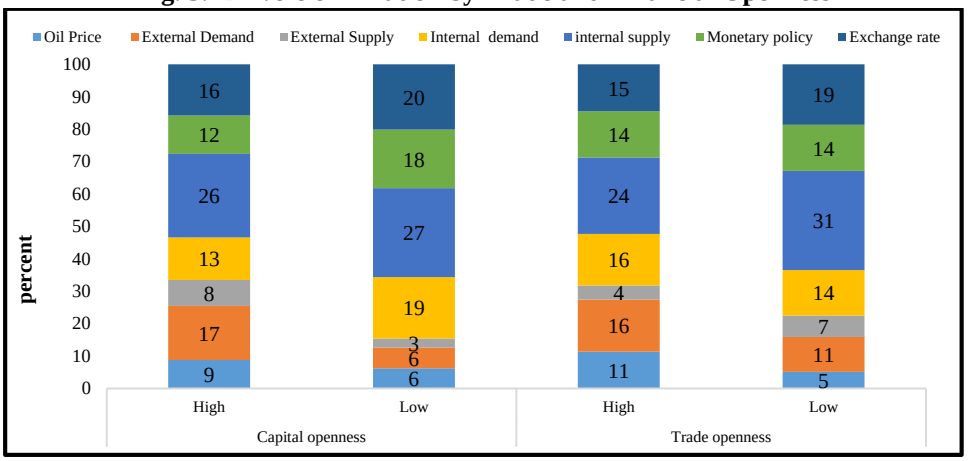
Fig. 2. Drivers of Domestic Inflation by Time



- The role of external shocks in explaining inflation has increased over the last two decades. Its contribution has become more than double from 20 percent to 43 percent. The role of internal supply and monetary policy has decreased significantly, from 31 percent to 20 percent and from 15 percent to 10 percent, respectively, over the last two decades (see Figure 2).
- The literature considers four other important cross-country characteristics to evaluate the role of different shock in explaining inflation variation. These are trade openness, financial openness (capital openness), exchange rate regime and monetary policy regime (see Box 3)

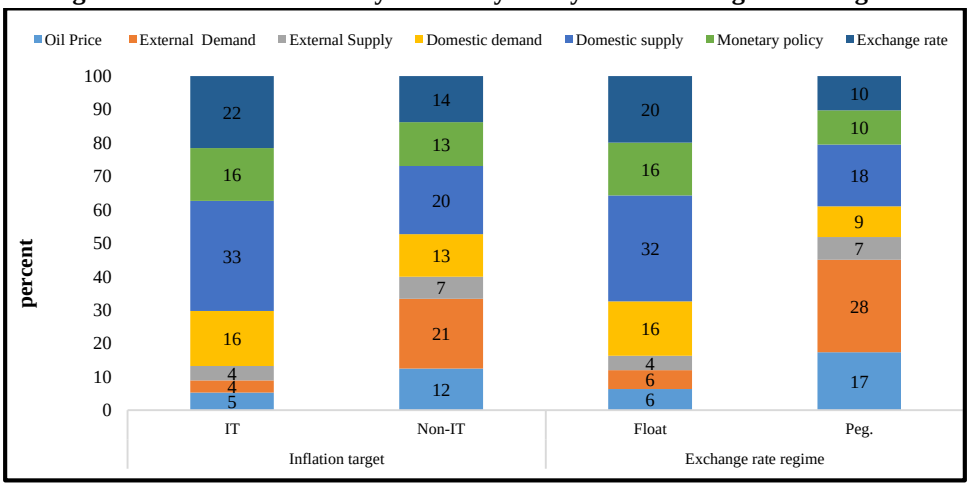
- The average contribution of external shocks was considerably larger in countries that were more open to trade and capital account (see Figure 3).

Fig. 3. Drivers of Inflation by Trade and Financial Openness



Specifically, external shocks contribute 32 percent to the domestic inflation in high trade open countries, while this contribution is 22 percent in low trade open countries. Similarly, global shocks contribute around 34 percent towards domestic inflation in high capital open countries while 15 percent in low capital open countries. Furthermore, commodity importer countries have also the same tendency.

Fig. 4. Drivers of Inflation by Monetary Policy and Exchange Rate Regimes



However, the global shocks have three times less contribution in inflation, targeting regime-around 13 percent compared to the non-inflation targeting regime- around 40 percent (see Figure 4).

Similarly, the countries with a fixed exchange rate regime are more vulnerable to global shocks as compared to the floating exchange rate regime (see Figure 4).

2. THE CASE OF PAKISTAN

The final inflation figure is a complicated thing encapsulating uncountable activities on both the economic and political front. The sources and the drivers of inflation vary from country to country. However, some essential contributors can be identified in the case of Pakistan. These are administrative prices on micro side. While money supply, government borrowing and exchange rate are the major drivers on the macro side.

2.1. Micro Determinants of the Inflation in Pakistan

From the micro side, administrative control over the prices is the primary tool that government authorities utilise to keep the prices in control. Generally, wheat, sugar and utility prices are considered in this group. The government may control/derive inflation through these prices. This brief attempt to check the estimated contribution of administered prices in inflation of the rural and the urban areas of Pakistan (see Table 2). Three important commodities or commodity groups are taken to analyse, both for rural and urban areas, which have the administered prices. These are wheat and related products, sugar and utilities (energy group). The table shows that the weights in the CPI basket and simulated changes in general inflation of rural and urban areas by changes in the 10 percent price of the commodity. The details are given below:

Table 2

The Estimated Contribution of Administered Prices in Inflation

	Urban Area			Rural Area		
	Weights in CPI Basket*	Price Changes in Percentage (Assumed)	Changes is BPS**	Weights in CPI Basket*	Price Changes in Percentage (Assumed)	Changes in BPS**
Wheat	0.61	10	6.12	3.47	10	34.70
Wheat Flour	3.01	10	30.08	3.43	10	34.30
Wheat Products	0.09	10	0.94	0.11	10	1.10
Total	3.71		37.13	7.01		70.10
Sugar	1.11	10	11.13	2.03	10	20.296
Electricity Charges	4.56	10	45.56	3.44	10	34.40
Gas Charges	1.08	10	10.81	1.00	10	10.00
Motor Fuel	2.91	10	29.10	2.49	10	24.90
Total	8.55		85.47	6.93		69.30

Note: * The weights are taken from the Pakistan Bureau of Statistics https://www.pbs.gov.pk/cpi-nb

** bps stands from basis points. 100 bps means 1 percent and, in our case, 37.13 bps means 0.37 percent.

Utility Prices

The most prominent ones are utility prices (Gas, electricity) and petroleum products. These items carry a weight of 8.5 percent in the urban basket and 6.9 percent in the rural basket, and an approximate average of 7.7 percent in the overall basket. So, if the government increases the prices of administrated utility commodities by 10 percent, it will increase 75 basis points (bps) in the general inflation level.[2] It may be considered that this

[2] To calculate the pass through on inflation of an increase of specific price, we use simple formula weight *Change , that is, 0.075*10= 0.75.

is the direct impact, and a second-round impact of an equal amount can be generated in the following months.

Wheat and Related Products

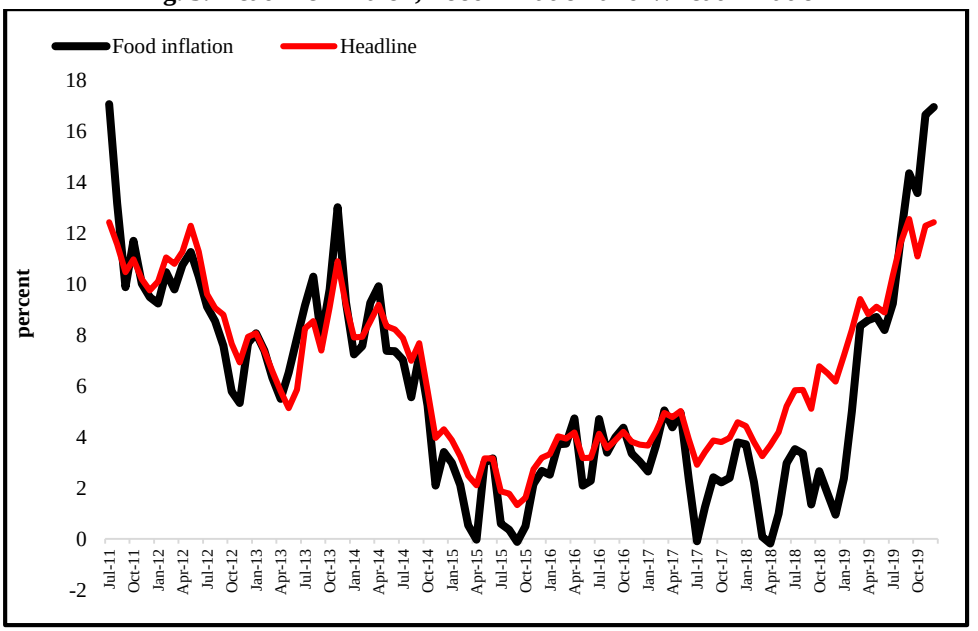
Wheat as a raw commodity carries the weights of 3.5 and 0.6 percent in Rural and Urban CPI baskets, respectively. Therefore, an increase of 10 percent in the wheat support prices increases the overall inflation by 0.35 percent and 0.06 percent in the rural and urban CPI basket, respectively. Wheat flour, suji, and vermicelli carry weights of 3.5 and 3.1 percent in Rural and Urban CPI baskets, respectively. In the case of complete pass-through of wheat prices to these products, the rural CPI would increase by 35 bps, and the urban CPI would increase by 31 bps. Finally, bakery and *tandoori roti* carry weights of 0.9 and 1.4 percent in Rural and Urban CPI baskets, respectively. In the case of complete pass-through of wheat prices to these products, the rural CPI would increase by 0.09 bps, and the urban CPI would increase by 0.14 bps.

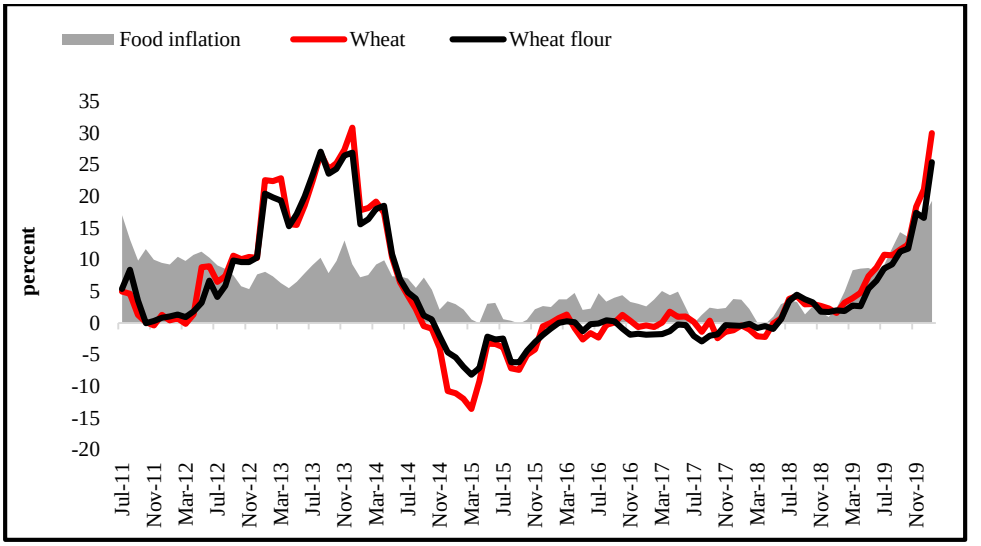
Aggregating all these impacts indicate that the rural CPI would increase by 79 bps and the urban CPI would increase by 51 bps due to increase in prices of wheat and its products along with the second round impacts.

The second-round effect will be carried by the expectations and expectation momentum, causing more severe than the first-round effect. Khan and Schimmelpfennig (2006) estimate that the wheat support price's pass-through price is 0.4 percent in Pakistan.

The Figure 5 shows that there is a close connection between the food inflation and the headline inflation. The lower part of the figure shows more interesting part that the wheat and wheat flour is the major contributor in the food inflation.

Fig. 5. Headline Inflaion, Food Inflation and Wheat Inflation





Sugar Prices

The sugar carries weights of 2.03 and 1.11 percent in Rural and Urban CPI baskets, respectively. Therefore, pass-through will 20 bps and 10 bps in the rural and urban basket, respectively, by increasing 10 percent of the sugar prices.

2.2. Macro Determinants of Inflation in Pakistan

In addition to the direct impact through administrative measures, the general prices have deep roots attached with other macroeconomic activities like growth, money supply, exchange rate and government borrowing (see Box 4).

Box 4: The Estimation Strategy for Inflation Forecast

The estimation of Inflation forecast is taken by using a multivariate model in a Structural Vector Autoregressive (SVAR) model. The key features of the multivariate models can be depicted by the following function form:

CPI=f(oil price, exchange rate, trade, M2, Public Sector Borrowing, Private Sector Credit, and Large Scale Manufacturing Index).

The usual theoretical restrictions are applied to get the meaningful estimates. The data frequency is 1990-to date.

According to our estimates, the elasticity of inflation to broad money supply growth is around 8 percent, which means that a 10 percent rise in money supply will add around 80 basis points to the average inflation rate.

The government borrowing remained a major source of financing over the last 15 years. It is well settled in the literature that the government borrowing is inflationary. The elasticity of inflation with respect to government shows that the inflation may rise 100 bps with a 10 percent increase in the government borrowing.

Finally, the widely discussed economic variable, depreciation of exchange rate. According to estimates, 1 percent of exchange rate depreciation brings an increase of around 14-16 basis points in the general inflation level (see Jalil, 2020). The Figures 6A, 6B and 6C also confirm that government borrowing, M2 growth; exchange rate movements may explain the variation of the inflation.

Fig. 6A. M2 and Infaltion

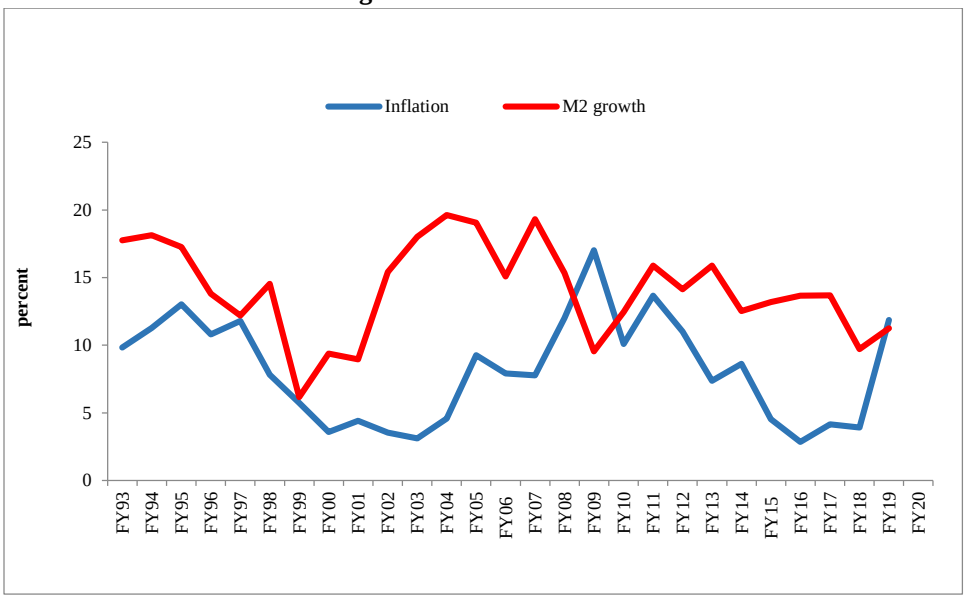


Fig. 6B. Govt Sector Borrowing and Inflation

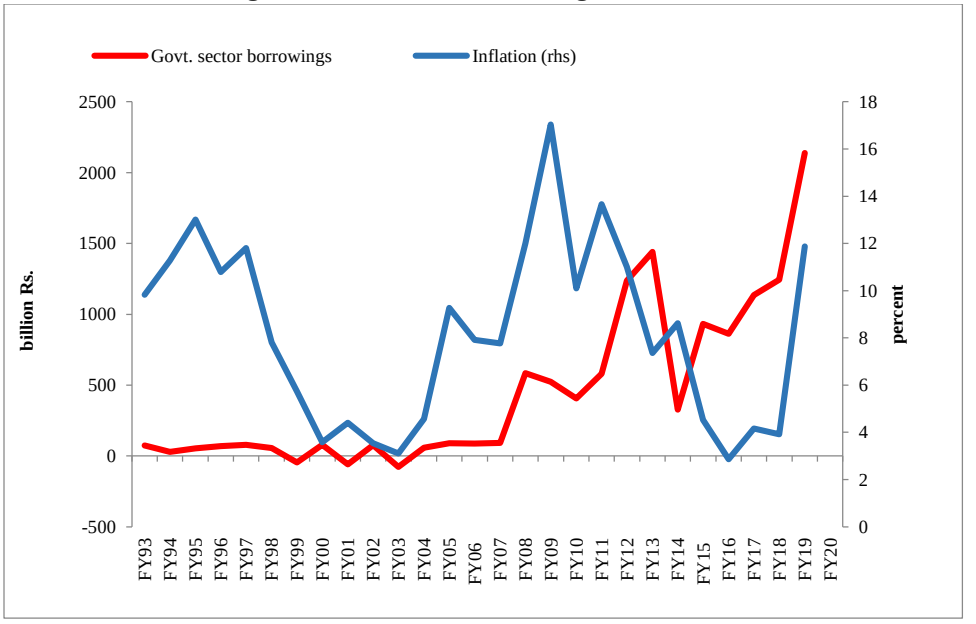
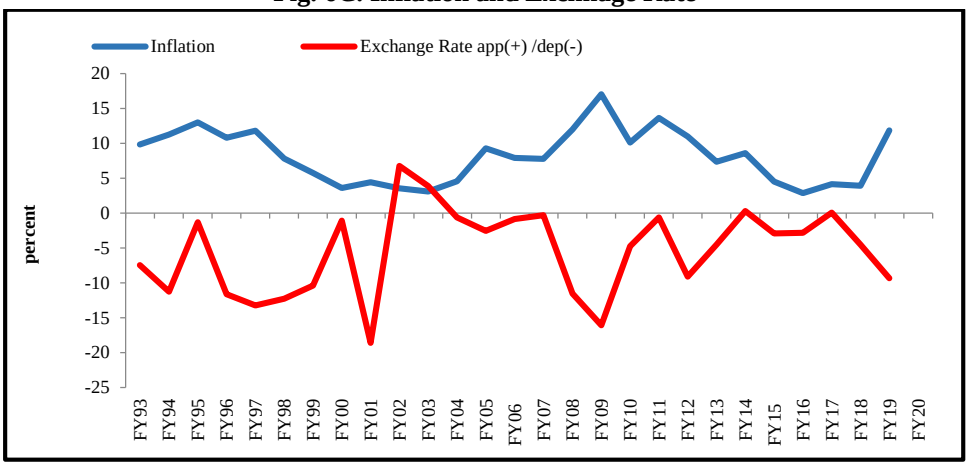


Fig. 6C. Inflation and Exchnage Rate



CONCLUSION AND MESSAGES

The following important messages can be drawn from this knowledge brief:

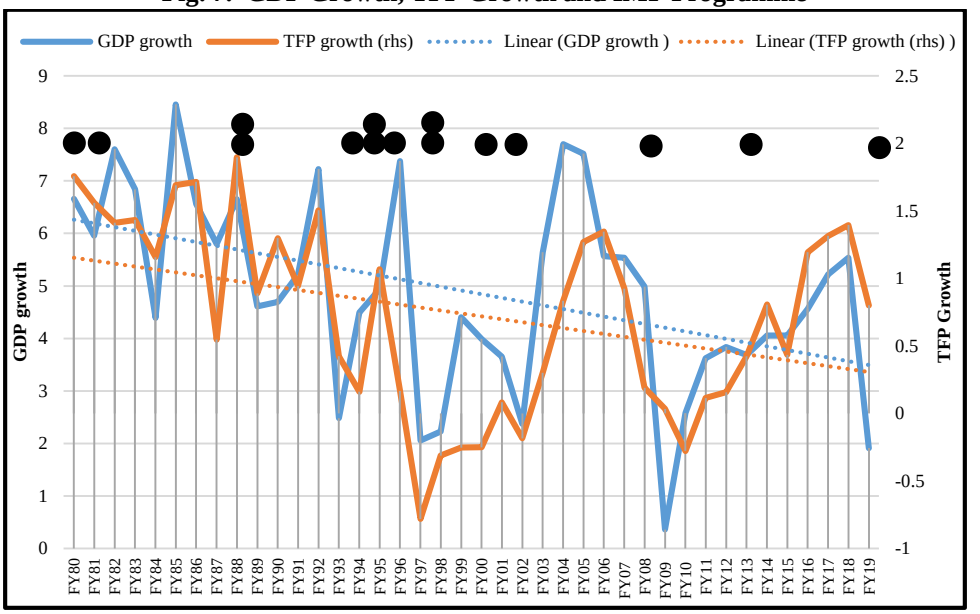
- The internal supply shocks (a rise in domestic output growth) and external supply shocks (a rise in the global output growth) are the most important drivers of the inflation.
- The internal supply is also an important driver when an economy follows flexible /floating exchange rate regime, with high trade openness, high capital openness and inflation targeting policies.
- The administered prices do not have a very high proportion in the inflation of Pakistan. Its ranging from 11 bps to 80 bps.
- On macro side, the government borrowing remains the major source of inflation in the last fifteen years.

These outcomes guide us that the policy makers need to build resilience to internal supply shocks and global supply shocks. This is particularly relevant for policy makers in small, open economies like Pakistan with deep or rapidly growing integration into global trade and financial networks and supply chains. Pakistan's output growth difficulties are longstanding and adopting stabilisation policies that reduce growth. Both economic growth and productivity are low and declining (see Figure 7; black Dots are IMF programs in the corresponding year). The economic growth is still below 4 percent. If there is any excess demand, our efforts should be geared to improving supply rather than suppressing growth at this level. If our economy cannot sustain 4 percent growth, then there are some serious issues and solution lies on the supply side. Monetary policy cannot improve food supply and cannot help produce electricity at lower cost. Therefore, the growth is the panacea.

Second important message for the policy maker is that administered prices do not have a huge a contribution in the inflation of Pakistan. But, it may cost the economy from the fiscal side- subsidies and circular debts and the market distortions.

Finally, it must be noted that this estimate is not an argument against low inflation. This estimate merely informs policy-makers of what to expect for economic growth and employment in an adjustment programme.

Fig. 7. GDP Growth, TFP Growth and IMF Programme



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The Cost of Disinflation: The Sacrifice Ratio

NADEEM UL HAQUE and ABDUL JALIL*

Price Stability Is Important

Price stability is an imperative in economics. Independent central banks have therefore been encouraged by the IMF in all countries with a clear mandate to achieve a low inflation target. It is well accepted that long run sustained growth requires a stable low inflation environment (Barro, 1996 and Feldstein, 1996).

Curbing inflationary pressures is not costless. The tradeoff between growth and inflation is well known ever since the famous Phillips curve. The recessionary impact of IMF programs at least in their early stages is also well known (Haque and Khan, 1998). Studies also show that disinflation is associated with possibilities of a recession in United States of America (Romer and Romer, 1989) and Japan (Fernandez, 1992) among other countries.

Yet in most economies there is no clear growth target, nor an agency for attaining it.

One approach to measuring the tradeoff between growth and inflation is the *Sacrifice Ratio* (SR) which is defined by the ratio of accumulated loss in real GDP during a particular episode of disinflation to the overall fall in inflation during this particular episode (See Box 1). Several methodologies are suggested by the existing literature for the calculation of SR (see Box 2).

Box 1: Definition of Sacrifice Ratio (SR)

It is well accepted that disinflation produces output losses. The quantification of these losses due to disinflation is termed as SR. More clearly, SR is used to gauge the cost of disinflation in terms of accumulated loss in real gross domestic product (GDP) due to monetary policy.

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Box 2: Sacrifice Ratio Methodology

There are four well known methodologies to calculate SR

1. Philips Curve Methodology

Okun (1978) and Gordon and King (1982) document that the theoretical foundations of SR are based on the expectations augmented Phillips curve.

$$(y - y^p) = \beta(\pi_t - \pi_{t-1}) + \varepsilon_t$$

where y is actual output, y^p is potential output, πt is inflation, β is cost of disinflation and ε is error term.

2. Ball (1994) Methodology

Ball (1994) argues that the SR is identical in each and every episode of the disinflation in Philips Curve methodology and this is not a plausible assumption. Ball (1994) introduces episode specific concept of SR.

$$SR\,\frac{\Sigma(y-y^p)}{(\pi_t-\pi_{t-1})}$$

Here $(\pi_t - \pi_{t-1})$ is change in inflation rate from start to end in an *identified episode* of disinflation.

3. Zhang (2005) Methodology

Zhang (2005) notes that the effects of a disinflation can be more persistent than it was assumed by Ball (1994). The major difference between Ball (1994) and Zhang (2005) is the calculation of potential output. Zhang (2005) assumes that output at its potential at the beginning of the disinflation episode instead of each period.

4. Structural Vector Autoregressive (SVAR) methodology

Cecchetti (1994) criticizes Ball (1994) and Zhang (2005) methodologies for not incorporating the other important dynamics of economy, e.g., monetary policy. Therefore, Cecchetti and Rich (2001) suggest that each country should specify a SVAR model according to the dynamics of its economy to measure the output loss of disinflation.

In this *Knowledge Brief, we* will:

- Review estimated SR in various countries.
- Develop estimates of the SR for Pakistan based on Ball (1994).

SR Around the World

Estimates of SR from many emerging markets are presented in Table 1.[10] In understanding these estimates the following considerations should be borne in mind.

[10]We present the findings which are based on Ball (1994) methodology to allow us to capture a larger comparable sample of countries.

- Estimates may vary with specifications.
- The SR may vary with the level of inflation and its history.

We will also examine the determinants of the SR such as speed of disinflation, length of episode from inflation to disinflation, credibility and independence of monetary authority to pursue disinflation policy, initial level of inflation in later studies (see Box 3).[11] This particular study discusses the size of SR.

Box 3: Determinants of Sacrifice Ratio

The literature on the loss of output due to disinflation suggests that the size of SR depends on several factors. These include speed of disinflation, trade openness, central bank independence, inflation targeting, governance and political regime. It appears that SR ratio will be lower in

- a quick disinflation episode (Ball, 1994),
- a stable political regime (Caporale, 2011), and
- more open economies (Temple, 2002 and Bowldler, 2009),
- the presence of good governance (Caporale and Caporale, 2008).

The role of central bank independence and inflation targeting in determining the size of SR is less clear.

- Brumm and Krashevski (2003) and Diana and Sidiropoulos (2004) and Daniels et al. (2005) suggest that SR will be lower where the central banks are more independent whereas Fischer (1996), Jordan (1997), and Down (2004) find evidence to the contrary.
- Goncalves and Carvalho (2008, 2009) find lower SR in the countries which are pursuing inflation targeting while Brito (2010) notes that the sample of Goncalves and Carvalho (2008, 2009) is based on only low inflationary OECD countries. If the sample is expanded, then the inflation targeting does not matter a lot for a lower SR.

Table 1 reports 77 episodes of disinflation of 17 different countries. It is observed that the ratio is positive in 64 of 77 cases. This suggests that disinflation is usually costly.[12] More clearly, on average there is 0.7 percent accumulated loss in real GDP during a particular episode of disinflation to the overall

1 percent fall in inflation during in the case of **Australia**. It is also evident from the table 1 that there is a huge variation in the SR of different countries.[13] One can infer that the cost of disinflation may vary from country to country. However, it is also important to note that the direct comparison among countries is not sensible due to several reasons (see Box 4).

[11]As mentioned earlier, we only present the size of SR. This note will follow Senda and Smith (2008) by taking the average SR for every country.

[12] The negative SR may imply that the disinflation may have a positive impact on economic growth.

[13] Cecchetti and Rich (2001) is a good read in this context. Their estimates range from about 1 to nearly 10, suggesting that somewhere between 1% and 10% of one year's GDP must be sacrificed for inflation to fall one percentage point only in the case of United States based on the different specifications of SVAR.

Table 1

Episode-Wise and Average SR by Using Ball (1994) Methodology

Country	Episode	SR	Average	Country	Episode	SR	Average	Country	Episode	SR	Average	Country	Episode	SR	Average
	60–62	1.68			62–64	0.94			63–67	2.41			66–68	0.42	
	74–78	0.54			67–69	-0.39			74–78	2.79			76–78	2.65	
Australia	82–84	1.06	**0.70**	**Denmark**	74–76	0.81	**0.60**	**Italy**	80–87	1.37	**1.39**	**Sweden**	80–82	0.41	**1.24**
	86–88	-0.20			80–86	1.18			90–93	0.19			83–86	-0.34	
	89–92	0.74			88–90	0.46			95–98	0.22			90–97	3.08	
	95–97	0.36			63–65	-0.78			62–64	3.01			66–68	1.35	
	64–66	0.02			67–69	0.95			65–66	-0.01			74–77	1.77	
	74–78	1.47		**Finland**	74–78	1.45	**1.44**	**Japan**	70–71	1.23	**1.14**	**Switzerland**	81–83	1.70	**0.89**
Austria	80–82	1.25	**1.03**		80–86	0.64			74–78	0.40			84–86	-1.16	
	84–86	-0.17			89–94	4.92			80–87	1.84			90–94	0.78	
	92–98	2.55			62–66	-0.83			90–95	0.38			61–63	2.03	
	65–67	0.52		**France**	74–77	1.54	**0.00**		65–67	1.53		**United Kingdom**	74–78	0.69	
Belgium	74–78	0.60	**0.90**		81–86	0.23		**The Netherlands**	75–78	-1.19	**2.47**		80–83	0.60	**1.07**
	82–87	1.59			89–94	-0.93			80–86	2.74			84–86	0.35	
	68–70	0.28			65–67	1.22			91–97	6.78			89–93	1.69	
Canada	74–76	0.41	**1.23**	**Germany**	73–78	3.86	**2.33**		75–78	1.79			69–71	2.70	
	81–85	1.90			80–86	1.91			80–83	0.54			74–76	1.41	**2.55**
	90–93	2.34			75–78	-0.70		**New Zealand**	86–88	-0.91	**0.51**	**United States**	79–83	1.98	
--	--	--	--	**Norway**	81–85	1.31	**1.30**		89–92	2.14			89–94	4.11	
--	--	--	--		87–93	3.28			94–98	-1.00			--	--	--

Note: Senda and Smith (2008). The 'average' is the arithmetic mean of all episode of the specific country. Several other studies estimate average SR for developing countries like Direkccedil (2011) for Brazil (0.43), Sethi et al. (2018) for China (0.49), Reyes (2003) for Colombia (0.92) , Roux and Hofstetter (2014) for Czech Rep. (0.68), Roux and Hofstetter (2014) for Greece (2.15), Mitra (2015) for India (2.3), Sethi et al (2018) for Indonesia (1.15), Sethi et al. (2018) for Malaysia (4.95) , Roux and Hofstetter (2014) for Portugal (0.24), Sethi et al (2018) for South Africa (0.72), Sethi et al. (2018) for Sri Lanka (0.67) and Roux and Hofstetter (2014) for Turkey (0.39). These estimates also show that the disinflation is costly in developing countries as well.

Box 4: Interpretation of Sacrifice Ratio

As mentioned earlier, SR is a ratio of *accumulated* loss in real GDP during a particular episode of disinflation to the *overall* fall in inflation during this particular episode. By definition, there are two major parts of the ratio. First, the *loss* in real output (relative to trend) in the numerator and the *slowing* of the consumer price index in the denominator. Therefore, the magnitude of SR can be determined by two different elements.

- First, the accumulation of output loss (numerator) and
- second, the slowing of consumer price index (denominator).

It simply implies that the magnitude of SR will be different with a different denominator even if the nominator (loss of output) is same for each country and vice versa. Suppose, a country has a smaller difference between start and end of the disinflation episode of a country as compared to any other country, then the SR of this country will be higher even with the same loss of output. This means that the SR of two different countries are not directly comparable. We must take care of a number of issues.

First, the numerator. The numerator is the accumulated difference between potential output and actual output. It is well accepted in the literature that calculation of potential output is sensitive to the methodology. Therefore, the SR may differ due to the change in the methodology of calculating the potential GDP.

Second, *the denominator*. There are several concerns in the denominator like the definition of the episode of disinflation, length of the disinflation episode, peak and trough of inflation in that particular episode and speed of disinflation.

Therefore, we must have same elements/assumptions both in numerator and denominator to calculate a comparable SR for different countries.

SACRIFICE RATIO IN PAKISTAN

We calculate SR by well-known Ball (1994) methodology using HP filter method for potential real output and three years centered moving average inflate rate from period of 1973 to 2018. We find four episodes of inflation in the case of Pakistan (see Table 2). It is evident that from the table that SR is different for all four episodes. It ranges from 0.458 to 0.903 and the average of all four episodes is 0.662. It implies that on average 0.662 percent of the real GDP will be forgone for the permanent reduction of one percent of inflation. However, these findings are highly sensitive to measuring of SR and real output loss.

Table 2
Sacrifice Ratio for Pakistan

Episode	Sacrifice Ratio Ball (1994) Method
1974-78	0.797
1980-86	0.458
1995-02	0.903
1998-17	0.491
Average	0.662

CONCLUDING REMARKS

This note serves two purposes. First, it reviews the literature on the estimated size of SR for several countries. Second, it estimates SR for Pakistan, based on the most prominent methodology of Ball (1994). We estimate that the average SR is 0.667 in the case of Pakistan which implies that the disinflation is costly in the case of Pakistan as well. Disinflation will, therefore, be costly as expected.

It must be noted that this estimate is not an argument against disinflation. This estimate merely informs policy-makers of what to expect for growth and employment in an adjustment program. With an employment elasticity of 0.1, we can expect that employment will be reduced by 0.06% (Zulfiqar and Choudhry, 2008). Policy must seek structural reform in a disinflation episode (adjustment program) to generate some growth momentum in the economy, if costs of disinflation are to be mitigated.

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Inflation Targeting Skepticism: Myth or Reality? A Way Forward for Pakistan

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INTRODUCTION

Since adopting inflation targeting (IT) as a monetary policy framework by New Zealand in 1990, the multifaceted critique put forth by the skeptics has overwhelmed it. The main concern about IT essentially emanated from the theoretical postulation that under IT a central bank gives more weight to inflation stabilisation, which in turn increases output variability (Rogoff, 1985; Herrendorf, 1998). Later, Truman (2003) broadly classified the views of skeptics under three major categories. First, the belief that IT is too hard; second, the opinion that IT is too soft, and third—rather extreme—is the view that IT would not work. IT has been perceived by skeptics to be a monetary policy set up that 'only focuses on inflation objective', thereby unnecessarily increasing the variability of growth (Friedman and Kuttner, 1996; Blanchard, 2003). A relatively less popular but contrasting view is that IT is too soft (Genberg, 2002; Kumhof, 2002), especially when compared to exchange rate regimes. The idea is that, in a limited sense, under IT, discretion allowed to central banks in the form of target ranges for inflation weakens the strength of the target as an anchor of inflation expectations. The viewpoint that IT would not work was primarily based on the argument that it is too demanding, and due to the absence of technical and institutional preconditions, this strategy may not be implemented successfully. This dimension of the IT-skepticism pertains mainly to developing countries, particularly, in terms of lacking expertise and inadequate status of the preconditions of IT (Masson, et al. 1997; Calvo and Mishkin, 2003), which may affect credibility, thereby leading to poor macroeconomic outcomes.

Epstein and Yeldan (2010) believed that inflation should be controlled but did not agree with the prescription of inflation in the 2 percent to 4 percent band. They advocated broadening the responsibilities of central banks by including real variables, such as investment allocation or real exchange rate that directly impact poverty, employment, and economic growth. Chowdhury and Islam (2011) remained skeptical that being an important component of IMF's macroeconomic policy advice, IT has proven to be a hindrance in achieving the millennium development goals, particularly in terms of poverty reduction. They believe that too much focus on price stability may cause output volatility and hence lower economic growth, especially in the developing economies, which are prone to supply shocks.

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Negligence in the financial sector is yet another area where skepticism prevailed. Blanchard, et al. (2010) argued that the scope for monetary policy to respond to shocks at lower inflation is limited. Aydin and Volkan (2011) made a similar point that under a conventional IT-framework, monetary policy does not respond to shocks of financial nature unless its effects become visible in inflation and output and that, in general, such a framework does not respond to shocks preemptively (see also Frappa and Mesonnier, 2010; Woodford, 2012; Baxa, et al. 2013 for similar arguments).

In line with the prevailing skepticism regarding IT, numerous Pakistan-specific studies, such as Chaudhry and Choudhry (2006), Akbari and Rankaduwa (2006), Felipe (2009), and Naqvi and Rizvi (2010), also opposed its adoption. By and large, these authors based their argument against the adoption of IT on two significant points. First, they are skeptical that the strategy may hurt economic growth, and second, the preconditions for IT in Pakistan are not in place and, therefore, should not be adopted.

Amid all this multidimensional skepticism around IT, not only an increasing number of countries have adopted IT, but its popularity has grown over time. The SBP also envisions its adoption by 2020 (SBP Strategic Plan 2016–2020). With this background, if the highlighted skepticism is more of a myth than reality, only then the SBP's decision to adopt IT could be justified. However, if the skepticism is more of a reality, then the decision of the SBP to adopt IT may not be a prudent move. The focus of this paper thus is to critically review the empirical evidence to assess whether the highlighted skepticism—along its key dimensions—is a myth or reality to seek lessons and a way forward for the future course of the thus far failed monetary policy set up in Pakistan (Hayat, et al. 2016; Hayat, et al. 2017).[1]

The review of the critical mass of literature in terms of empirical evidence shows that the prevailing skepticism around IT is more of a myth than reality. By and large, the IT countries (both developed and developing) have performed credibly well not only in terms of performance of the key macroeconomic indicators i.e., inflation, output, interest rate, exchange rate, and their variants, but also in terms of the ability to deal with external shocks as big as the financial crisis. Further, the existing state of the preconditions and the operational prerequisites in Pakistan seems adequate, and therefore the SBP is likely to have attained ground for successful adoption and implementation of IT. Nevertheless, it will have to work out inflation targets consistent with price stability while prioritising the latter to help build credibility and institutional accountability mechanisms with the concerned ministry to ensure its adoption in letter and spirit.

IT IN THEORY AND PRACTICE AND THE SCOPE OF ALTERNATE MONETARY POLICY STRATEGIES IN COMBATING INFLATION BIAS

The theoretical foundations of the time-inconsistency problem put forth by Kydland and Prescott (1977) and Barro and Gordon (1983) attracted considerable research (see

[1] It is important to acknowledge that adoption of IT by Pakistan has been proposed by several studies including Khalid (2006); Zaidi (2006); Moinuddin (2009); Saleem (2010) and Zaidi and Zaidi (2011). They, however, founded their arguments in favour of IT either on the basis of 'instability of money demand function' which potentially renders continuation of monetary targeting less favourable, or that 'IT has performed well in emerging market countries', and therefore it is appropriate for Pakistan to move towards IT.

Gartner (1994) and Gartner (2000) for surveys). The essence of the theory is the well-known outcome of inflation bias, which results from the conduct of monetary policy in a discretionary manner—especially when it tries to attain a higher than the potential growth rate of the economy. Since inflation bias is not desirable, many studies in this context focused on ways of conducting monetary policy, particularly institutional arrangements that may help mitigate inflation bias by constraining discretion.

Broadly, four solutions to the problem have been suggested in the literature; punishment equilibria, incentive contracts, reputation, and delegation. The latter gained relatively more popularity after the influential work of Rogoff (1985), who suggested delegation of the conduct of monetary authority to a central banker who is independent and gives more importance to the inflation objective vis-à-vis the output objective. In subsequent research, the delegation of the monetary authority to an independent central banker is emphasised largely under two main arrangements. The first, is the implementation of the performance contracts, and the second, is the implementation of inflation targets. Person and Tabellini (1993) and Walsh (1995) modeled performance contracts with the presumption that central banks have both instruments as well as goal independence. Under the arrangement of instrument independence, the central bank can choose its policy without government interference, and under the arrangement of goal independence, the central bank can also choose the policy goal (Beetsma and Jensen, 1998).

Later, Svensson (1995) examined the IT regime's performance in addressing the inflation bias problem. The study interpreted IT as the delegation of authority to a policy maker with three main responsibilities: an explicit inflation target, implicit output target, and an implicit weight on output stabilisation. In addition, while following Rogoff's terminology, the study showed that an inflation target can achieve the second-best equilibrium. He, therefore, suggested 'delegation' of the monetary authority to a policy maker with a low inflation target and a relatively higher consideration for inflation stabilisation. Technically, the band of the inflation target should be relatively narrow as the width of the band represents an implicit consideration for output stabilisation. Thus, the broader the band width of the inflation target, the more would be the scope for inflation bias. Similarly, Herrendorf (1998) concluded that IT under instrument independence mitigates the inflation bias. Although, it does not entirely eliminate the phenomenon because the government still has the discretion to revise the target, implying that the central bank does not have goal independence.

With this discussion about the evolution of IT as an outcome of the endeavor against inflation bias, the attention is now turned to briefly discuss alternative strategies to IT and their relative standing in offering a solution to the problem of inflation bias. In practice, central banks use various monetary policy strategies to achieve the goal of price stability. These strategies include exchange rate pegging, monetary targeting, 'just do it', and IT (Mishkin, 1997).[2] Although all these strategies have their own advantages and disadvantages, the focus of the current study is to circumscribe the implications of these strategies for inflation bias and output stabilisation.

[2] Just do it monetary policy strategy refers to the conduct of monetary policy in a pre-emptive manner without having an explicit nominal anchor. Moreover, there is no unique definition of IT, however, refer to Leiderman and Svensson (1995) and Bernanke, et al. (1999) for some related discussion on the framework.

The strategy of exchange rate pegging, for example, does not allow discretion to pursue an expansionary monetary policy to reap the gains from the output, hence limiting the scope for the creation of inflation bias. On the other hand, monetary targeting possesses a considerable scope to create inflation bias. Bernanke and Mishkin (1992) are of the view that central banks have hardly been able to adhere to strict rules for monetary expansion. To meet the short-term objectives, such as real output growth and exchange rate stabilisation, the central banks using the monetary targeting strategy to control inflation often deviate from their targets.[3] Similarly, the 'just do it' monetary policy strategy, although forward-looking, offers monetary policy makers an untamed discretion to deal with unforeseen economic shocks. This discretion may potentially create inflation bias. IT, however, is a framework best described as 'constrained discretion' (Bernanke, et al. 1999; Svensson, 2009). An explicit inflation target makes a central bank accountable for its policy actions and, simultaneously, allows flexibilityfor the policy maker to deal with supply shocks. For example, the band of the inflation target provides flexibility for monetary policy makers to adjust to supply shocks. Another source of flexibility with IT central bank is its accountability in terms of core inflation, which is an indicator of inflation adjusted for supply shocks.

Both IT and 'just do it' strategies of monetary policy are prone to create inflation bias via political pressures. The former, however is relatively immune in the sense of being accountable and hence cannot use its discretion to systematically raise the level of output. Moreover, transparency is another distinguishing feature that places IT above the 'just do it' strategy (Mishkin, 1997). McCallum (1996) concluded that IT is generally attractive as compared to other discretionary modes of monetary policy strategies and is likely to yield superior results in the long run. IT derives its superiority from the fact that other discretionary modes of monetary policy lead to inflation bias that results from the pressures on the central bank emanating from the pursuit of short-term gains.

Thus, from the discussion above, it may be inferred that although IT is not a panacea for the inflation bias problem, it seems the best available framework among the alternatives to cure it. The framework confines discretion only to the short-run (to deal with shocks) and enhances long-term commitment to the inflation objective, and therefore helps mitigate the inflation bias problem of a discretionary monetary policy strategy.

SKEPTICISM OF AND EMPIRICAL EVIDENCE ON THE MACROECONOMIC PERFORMANCE OF IT

As mentioned earlier, skeptics have broadly questioned IT based on the possibility of macroeconomic nonperformance, inattention to financial sector developments, and inadequacy of preconditions before its adoption. This section critically reviews the empirical evidence to determine whether IT led to improved macroeconomic outcomes, and to what extent the notion of the neglect of the financial sector is founded to support the conclusion of nonperformance and adoption of IT.

Inflation: Average, Volatility, Persistence, and Expectations

Although the theoretical foundations envisage an improvement in terms of inflation due to the adoption of IT, Ball and Sheridan (2003)—perhaps the pioneering empirical

[3] See Mishkin and Posen (1997) and Clarida and Gertler (1997). Also see Omar and Saqib (2009) for related evidence in case of Pakistan.

study that is critical of the performance of IT—found evidence, which to the contrary suggested that IT did not seem to have improved the inflation performance. They argued that since the non-targeters exhibited improved inflation performance over the same time, the better performance may not be attributed to the adoption of IT but to factors other than targeting. In their view, since the ITers had higher inflation rates before adopting IT, their results may mark an exaggerated outcome. Ball and Sheridan put this notion in the words, "Just as short people on average have children who are taller than they are, countries with unusually high and unstable inflation tend to see these problems diminish, regardless of whether they adopt inflation targeting. Once we control for this effect, the apparent benefits of targeting disappear" p. 3.

An important criterion to judge the performance of IT strategy, thus, could be its performance in terms of inflation, as price stability is the overriding objective of monetary policy under IT. Being fully aware of the importance of price stability, not only developed but also developing countries (being persuaded by the framework's effective performance and the higher rates of inflation in these countries) adopted IT (Mishkin and Schmidt-Hebbel, 2007; Walsh, 2009) and still others are planning on it.[4] Given the findings of Ball and Sheridan (2003) for nonperformance of the IT in terms of inflation, it is expedient to survey whether this notion is supported by empirical evidence as per the findings of other studies as well? For an extensive assessment in terms of this crucial indicator, various dimensions, including average inflation, inflation persistence, inflation variability, and inflation expectations, are considered.[5]

Average Inflation

While assessing IT, Corbo, et al. (2001) attempted to answer the question of ITers success in reducing inflation rates and found that, on average, they tend to have met the targets for inflation. The study reported that the average deviation from its target in the case of ITers was 12 basis points. Ammer and Freeman (1995), Haldane (1995), Mishkin and Posen (1997), Kuttner and Posen (1999), Bernanke, et al. (1999), Cecchetti and Ehrmann (1999), and Neumann and Von (2002) are some of the other studies with similar findings of a considerable reduction in inflation after the adoption of IT. Petursson (2005), however, documented that the deviation from the target approach is too narrow a perspective for the assessment of IT, and therefore used average inflation both before and after adoption of IT for a sample containing 21 ITers and 6 non-targeting industrial countries. The findings of the study revealed that inflation was successfully reduced in the last five years prior to the adoption of IT from over 30 percent to 4.5 percent in the ITers. In contrast, in non-targeting industrial countries, the inflation was subdued from 5 percent to 2.5 percent. Several other studies (Vega and Winkelried, 2005; Batini and Laxton, 2006), while including developing countries in their samples, found IT to be successful in lowering inflation not only in developed but also in developing economies. Vega and Winkelried (2005) controlled for the level of inflation prior to the adoption and found that adoption of IT decreased average levels of inflation both in developed and developing countries, particularly with a strong effect on the latter.

[4] Roger and Stone (2005) noted that despite frequent target misses no country has left IT strategy due to its flexibility, lack of realistic alternatives and high standards of transparency and accountability.

[5] See Fuhrer (2009) for definition and measurement of inflation persistence.

Concalves and Salles (2008) and Lin and Ye (2009) addressed the self-selection problem highlighted by Ball and Sheridan (2003)—through the technique of propensity score matching—in the context of emerging market economies with extended data sets and found robust evidence contrary to that of Ball and Sheridan. As per their results, emerging and developing countries significantly reduced average inflation rates due to the adoption of IT. While extending the analysis to a set of 180 countries, Mendonca and Souza (2012) found supporting evidence for the reduction in inflation by ITers. They concluded that IT is an ideal framework for developing economies.

Inflation Volatility

Since the critique of Ball and Sheridan (2003) involved the dimension of inflation volatility, evidence of the inflation performance of the IT regime has also been sought in terms of the inflation variability. On this point, Levin, et al. (2004) found that the overall inflation variance in both the ITers and non-ITers is roughly similar. They, however further argued that shocks to inflation in the IT countries under the sample period have been larger compared to the non-IT countries, which is indicative of the relatively better performance of ITers. Petursson (2005) also found that inflation variability (using standard deviations) has reduced after the adoption of IT by the ITers. Addressing the mean reversion notion of Ball and Sheridan (2003) for a set of 36 emerging market economies, Conclaves, and Salles (2008) found that the adoption of IT significantly reduced inflation volatility. Similarly, Lin and Ye (2009), while exploring if IT makes a difference in developing countries, found that 13 developing countries which adopted the strategy successfully lowered not only their inflation but also inflation variability (see also Mendonca and Souza, 2012 for supporting evidence from a larger sample).

Inflation Persistence

Inflation persistence is yet another dimension of inflation in the empirical literature through which the performance of IT has been assessed. For instance, Siklos (1999) found a significant reduction in inflation persistence after adopting IT for a subset of countries, including New Zealand, Canada, Spain, Finland, the United Kingdom, and Sweden. Several other studies have also reached similar conclusions, such as Kuttner and Posen (1999), King (2002), Levin, et al. (2004), and Petursson (2005).

Inflation Expectations

Lastly, inflation expectations are an important dimension in assessing the inflation performance of the IT strategy. Johnson (2002) analysed the expected inflation behaviour change for a set of 11 countries. The panel included five IT countries (New Zealand, Australia, Canada, Sweden, and United Kingdom) and six non-targeting industrial countries (Germany, Netherland, France, Italy, United States, and Japan). The study concluded with strong evidence of a large reduction in expected inflation after announcing the inflation targets.[6] Similarly, Gavin (2003) concluded that IT central banks by

[6] It is however pertinent to mention that the previous literature including Laidler and Robson (1993); Bowen (1995) and Bernanke, et al. (1999) did not find satisfactory evidence of the impact of inflation targets on inflation expectations. The apparent reasons for the lack of such evidence are the limitations in terms of the short time period of IT and only analysing the unconditional impact of inflation targets on expected inflation (Johnson, 2003).

announcing their objectives effectively are able to anchor expectations. This, in turn, makes it easier for them to achieve the objective of price stability. Levin, et al. (2004) also reached similar conclusions that IT has played an important role in anchoring long-run inflation expectations.

Demir and Yigit (2008), while investigating whether the announcement of inflation targets has been instrumental in building credibility and shaping inflation expectations, found supporting evidence (see also Libich, 2008). Gurkaynak, et al. (2010), while examining the cases of U.K, U.S and Sweden found that in the case of the former (an IT country), long-run inflation expectations are far better anchored than the latter where the volatility of expectations is higher. Johnson (2003) investigated the effect of inflation targets on the level of expected inflation. His results indicate that, after the announcement of targets, predicted forecasts are less than actual forecasts in Australia, Canada, New Zealand, and Sweden. It provides enough evidence that targets reduced the level of expected inflation. Recently Capistran and Ramos-Francia (2010) in order to explore whether IT affects the dispersion of inflation expectations found that the dispersion is smaller in targeting regimes. They further found that the dispersion in inflation expectations in developing countries is smaller and more significant than in advanced countries.

Output, Output Variability, and Pro-poor Growth

Like other monetary policy strategies, IT has also been subject to criticism, especially concerning output stabilisation. IT is sometimes perceived as 'inflation only' targeting perhaps with no flexibility or consideration for output and employment. Bryant (1996) and Rivlin (2002), for example, view IT as the choice of a trade-off between inflation and output (Philips curve) and inflation variability and output variability (Taylor curve). However, since a few studies have argued that IT allows reasonable flexibility with the central banker to deal with the output shocks, Debelle (1999) therefore deems this kind of criticism misplaced. He argued that the framework is sufficiently flexible while deriving its flexibility from the targeting bands and policy horizons. In practice, short-run inflation variability is allowed to a certain degree, leaving some room for output variability at low levels to maintain medium-term price stability. Debelle (1999), while exploring wether IT pays adequate attention to output stabilisation, concluded that even in the case of strict IT, output considerations are important due to their crucial role in determining future inflation.

As far as the empirical evidence is concerned, Cecchetti and Eahrman (2000) found results suggesting that both IT and non-IT countries increased their revealed aversion to inflation variability and therefore suffered increases in their output volatility. Ball and Sheridan (2003) and Gambetti and Pappa (2009) explored whether IT made a difference along the dimension of output and output volatility and output and inflation volatility but could not find supporting evidence for improvement. However, Brito and Bystedt (2010) came up with partially contrasting results from Concalves and Salles (2008). They re-evaluated the performance of 36 developing countries and concluded that although the IT countries have lowered their inflation rates but when the inflation-output trade-off is accounted for, there is no significant indication of improvement.

Arestis, et al. (2008) found evidence that adopting IT helped improve the trade-off between the output gap and inflation variability, which in their view, might have occurred due to a relatively higher degree of monetary policy transparency and flexibility in the institutional framework. Truman (2003) and Hu (2003a, 2003b) found that IT has resulted in a significant positive relationship with growth and a significant negative relationship with inflation. Levin, et al. (2004) documented that IT has improved the trade-off between inflation and output volatility in the IT countries. Corbo, et al. (2001), Neuman and Von (2002), and Petursson (2005), among others, have also come up with similar conclusions. Apergis et al. (2005) concluded that forward-looking rules help ensure greater macroeconomic stability.

Concalves and Salles (2008) explored whether IT matters for developing countries while addressing the issues with Ball and Sheridans (2003) methodology. The overall number of countries analysed was 36, out of which 13 countries were those that had already adopted IT. It was found that IT countries witnessed significant decreases in inflation and output variability as compared to the rest with alternative monetary policy regimes. Roger (2010) also reached a similar conclusion in his research.

Mollick, et al. (2011) found that IT has led to improved output growth both in developed and developing countries during marked globalisation years from 1986–2004. They noted that since IT ensures economic growth along with price stability, it is more pro-poor. For example, Kakwani and Son (2008) argued that growth associated with low levels of inflation is pro-poor because this type of growth benefits the poor proportionately more than the non-poor and that a higher level of inflation is related to anti-poor growth.[7] Attention has been drawn in Hayat (2016) towards this crucial point that since a bigger chunk of Pakistan's populace is either living below the poverty line or is close to it, price stability may be beneficial, as on one hand, inflation would be low, and on the other hand sustainable economic growth can be achieved. Consistent with the aforementioned, Hayat (2018) found that in the case of Pakistan, inflation exceeding the 5 percent level is detrimental to real growth, and inflation ranging between 1 percent to 3 percent is significantly growth enhancing. He argued that the existing discretionary monetary policy strategy had induced significant losses to the Pakistani society because historically, in almost 68 percent of the 50 years' time from 1961 to 2010, actual inflation has exceeded the threshold level of 5 percent, thereby causing twofold losses to the society i.e., in terms of high inflation and lower growth than otherwise was achievable.

Interest Rate Volatility

Interest rates are the primary policy instruments central banks use in monetary policy (Sellon and Weiner, 1996). Several studies have used interest rates to assess the performance of IT strategy. Ball and Sheridan (2003) did not find any significant evidence

[7] Recently, Nuguer and Powel (2020) concluded on similar lines that a higher inflation implies high, interest and unemployment rates. Consequently, the poor relying on wage incomes tend to have more debt than savings and are more likely to losing jobs as inflation and interest rates rise. This study also demonstrated that not only low inflation is associated with a reduction in poverty, but a growing middle class i.e., negatively correlated with inequality. For instance, their model suggests that increasing inflation by 1 percent increases the percentage of low-income households by around 7 percent and reduces the percentage of high-income households by around 1 percent.

in terms of reduction of interest rate variability that can be advocated to IT. Nevertheless, Kahn and Parrish (1998) observed that short-term nominal interest rates are lower and less volatile in the post-adoption period compared to the pre-adoption period in IT countries. For the real interest rates, they observed that IT countries had witnessed an increase in the real interest rates reflecting tight monetary policy. A similar finding was reached by Neumann and Hagen (2002) that, on average, the short-term interest rates and volatility have fallen in the IT economies after its adoption. While comparing the variability in short-term interest rates before and after the adoption of IT, Petursson (2005) also found a general decrease in variability after the adoption of IT, a result consistent with the earlier findings of Kahn and Parrish (1998) and Neumann and Hagen (2002).

Exchange Rate Pass-through and Variability

Vulnerability in exchange rate shocks is one of the concerns— especially from a developing country's perspective—because an increase in imported prices, when passed on to domestic prices, may affect the performance of the IT in terms of achieving its inflation targets. Much, however depends on whether the adoption of IT increases or decreases the exchange rate pass-through. To explore the effect of IT adoption on exchange rate pass-through, Coulibaly and Kempf (2010) found that not only the contribution of exchange rate shock to price fluctuations in emerging targeters is, more important than the non-targeters, but in the former case the pass-through had declined after the adoption of IT.[8] This finding is consistent with Taylor (2000), who argued that exchange rate pass-through is lower in a low inflation environment because firms expect a deviation from inflation to be less persistent and therefore pass on less of an exchange rate-induced increase in the price of imported inputs to its selling prices. A step further, evidence of a considerable decline in exchange rate pass-through in Indonesia and Thailand at domestic level to the prices of tradable and non-tradable goods was also found by Siregar and Goo (2010)—except in the case of tradable goods for Indonesia.

In terms of the variability of the exchange rate, Petursson (2005) found results consistent with the theoretical arguments that price stability at lower levels is positively related to exchange rate stability. He concluded that IT had decreased exchange rate volatility on average, specifically in countries with a floating exchange rate regime before they adopted IT. It was argued that the increased volatility in the exchange rate in some IT countries is due to the fact that prior to IT those countries practiced a fixed exchange rate regime.

Lin (2010) extended the analysis of Lin and Ye (2009) to see the effects of IT on exchange rate volatility and international reserves while using the propensity score matching methods. He found significantly different impacts on developing and advanced countries. The developing countries showed significant improvements in nominal/real exchange rates and international reserves stability, while such significant improvements were lacking in the latter.

Response to Financial Sector Developments

As indicated in the introduction, one skepticism about IT is that it is too narrowly focused on price stability to the extent that financial sector developments are ignored

[8] A similar result was also reached by Mishkin and Schmidt-Hebbel (2007) but their sample did not include emerging inflation no-targeters as control group (Coulibaly and Kempf, 2010).

(Frappa and Mesonnier, 2010; Woodford, 2012).[9] Several economists even went to strong conclusions about the health of the IT in dealing with the financial sector crisis. For example, the crisis has 'unveiled the fallacy' of IT (Grauwe and Vansteenkiste, 2007); the IT 'has failed' (Leijonhufvud (2008)) and that the IT 'can increase the likelihood of financial crisis' (Giavazzi and Giovannini, 2010). Woodford (2012) nevertheless argued that these charges on IT are not directly relevant to the central claims put forth by the proponents of IT. In his view, the main thesis against IT could be justified only on one aspect of the IT doctrine (which, for some reasons, developed in the previous two decades) that an IT central bank need not pay attention to financial developments except to the extent that they tend to affect the inflation outlook. In part, it was therefore concluded that an IT central bank should take into account the possibility of intermittent disruptions as experienced during the crisis. To this end, Frappa and Mesonnier (2010) found supporting evidence; however, they stressed further exploration of the matter.

Amidst this critique, there exist opposing views and empirical evidence, which may not be overlooked. For example, Svenson (2009) argued that conditions that led to the crisis are associated mainly with supervisory and regulatory failures rather than monetary policy failures. He concluded IT as the best monetary policy framework among the alternatives in the wake of a financial crisis. Dale (2009) argued that the characteristics of IT in the form of low stable inflation and transparency have proven helpful in combating the crisis and stresses the need to consider asset prices while conducting monetary policy as it may hinder the achievement of an inflation target. Filho (2010) concluded that IT has suitably dealt with the crisis. On average, IT countries have effectively managed the crisis; particularly, they were able to reduce nominal policy rates more than the non-targeting countries. They also found some evidence that IT countries not only performed well on the unemployment front but showed relatively higher industrial production and output growth rates. Recently, Andersen, et al. (2014) attempted to explore if IT conferred benefits in terms of economic growth to the adopting countries during the financial crisis and found that IT countries performed well vis-à-vis countries with other monetary regimes.

In a most recent attempt, Fouejieu (2017)—a study that is more directly related to the mainstream skepticism put forth by Woodford (2012)—investigated whether the emerging market ITers are financially more vulnerable than the non-targeters and are the former less responsive to developments in financial sector than the latter. In contrast to the Woodford's view, his results based on empirical evidence indicate that the ITers are more responsive to financial risks than the non-targeters.

IT PRECONDITIONS AND THEIR EXISTING STATE IN THE CASE OF PAKISTAN

In principle, any monetary policy strategy, whether monetary targeting, exchange rate pegging, 'just do it' or IT, requires certain preconditions to be in place for its successful implementation and effective performance (Mishkin, 2000). For IT, these preconditions have been evolved and identified with the increasing experience of the framework over time. Several authors nevertheless seem to have built their arguments for and against the

[9] See also Woodford (2012).

adoption of IT framework based on such preconditions; particularly in the context of emerging market economies. The more these preconditions exist, the more successful would be the implementation of the IT framework, and thereby the more would be the chances of favourable outcomes. Although this assertion is implicitly assumed in the literature on preconditions yet Amato and Gerlach (2002) found that the IT has successfully been implemented without preconditions being in place.

This section critically reviews what these preconditions are, what their existing state is—with particular reference to their efficacy in Pakistan— and is it necessary for all these preconditions or some of them to be fully in place right before the adoption of IT.

Central Bank's Independence

Central bank's independence—although equally desirable and important for implementing other monetary policy strategies (Amato and Gerlach, 2002)—is considered one of the preconditions for the successful implementation of IT framework. Central bank independence can better be understood as 'goal independence' and 'instrument independence'. The former implies that the central bank has the authority to set the goal itself rather than the government or any other entity. Instrument independence, on the other hand, implies that the central bank can choose an appropriate instrument or set of instruments for the achievement of its goal(s).

It is the instrument independence rather than goal independence, which is desirable for the appropriate conduct of monetary policy (Blinder, 1998; Masson, et al. 1997 Amato and Gerlach, 2002). In the case of Pakistan, the SBP enjoys complete instrument independence. Whereas, in terms of the goal independence, the SBP—as required by the statutes—has to consider the government's inflation and growth targets while formulating monetary policy. In a recent study, Hayat (2017) noted that in the case of Pakistan, the way the government's annual inflation and growth targets are set, they do not provide a fundamental framework for achieving price stability.Rather if the SBP would try to achieve the ad-hoc and inconsistent inflation and growth targets of the government, the policy would instead lead to price instability. He further argued that since monetary policy may not be directed or adjusted contemporaneously to achieve explicit growth targets in the same year they are set, statutory amendments in line with the best monetary policy practices across the globe, therefore may help the SBP to successfully implement the IT to yield desirable outcomes.

Another dimension of the central bank's independence is the government's involvement in the monetary policy decision-making process, which normally takes place through the presence of government official(s) on the Board or designated monetary policy committee. Encouragingly, through a recent amendment in the SBP Act 1956, the direct involvement of government via its member on the monetary policy committee has been eliminated (Hayat, 2017), which therefore builds a certain degree of confidence in terms of central bank's independence on statutory front.

Central Banks' Accountability

Carare, et al. (2002) argued that the central bank's accountability for achieving the prime objective (target) of price stability is another precondition that can help in the successful implementation of IT. This is an essential feature as on the one hand, it keeps

the policy maker focused on the target for inflation—which is presumed to be set in a way that leads to and ensures medium to long-term price stability—and on the other hand, it provides insulation against political pressures. Further, it is argued that accountability in the IT framework is ensured through increased transparency and communication with the public—a dimension which is much likely to be under the control of the central bank itself, and as long as willingness is there, improvements are possible—therefore, it should neither be a source of concern nor should it act as an impediment in the way of adoption of IT.

As far as Pakistan's specific case is concerned, proper accountability mechanisms will have to be put in place. Since currently the SBP Act does not stipulate any accountability mechanism for the SBP in case of non-achievement of inflation goal, Hayat (2017) noted that necessary statutory amendments to the SBP Act 1956 (that are currently missing) in line with the best monetary policy practices are required to ensure accountability of the SBP.

Price Stability as the Superseding Objective of Monetary Policy

Under an IT framework, price stability is the overriding objective of monetary policy (Mishkin, 2004). Clear inflation targets, either in the form of a point or a range, are set and the monetary policy is expected to be geared to achieve those targets. This, however, may not necessarily mean that price stability is the only objective. The experience with the ITers shows that they pursue other macroeconomic objectives if the achievement of such objectives remains consistent with the inflation target (Debelle, 1998). In the case of a conflict with other objectives, more weight is given to price stability. In summary, there remains a clear institutional commitment to price stability rather than other nominal anchors (Mishkin and Schmidt-Hebbel, 2001; Jonas and Mishkin, 2003).

Hayat (2017) noted that the SBP tends to define and achieve price stability in terms of the government's assigned inflation targets, which essentially is a flawed and misleading practice because the government-assigned inflation targets are too high and erratic to be able to lead to price stability in any form. While recognising the acute price instability problem, he advocated the need to define price stability and suggested clear-cut price stability consistent numerical inflation targets band—preferably between 1 percent to 3 percent. It is further argued that since the SBP has dual objectives of inflation and real growth and targets a higher than natural rate of the economy, it would tend to produce higher (price stability inconsistent) inflation rates unless discretion is granted to the SBP is constrained. Therefore, constraining discretion by making price stability as the overriding objective of monetary policy in Pakistan remains one of the major impediments, which will have to be worked on;otherwise, adoption of IT by the SBP may not yield any desirable outcomes.

Forecasting Inflation

The ability to forecast inflation has been identified as another prerequisite for successful implementation of IT (Debelle, 1998; Carare, et al. 2002; Jonas and Mishkin, 2003; Batini and Laxton, 2006). The IT monetary policy regime is forward-looking by nature and therefore, inflation forecasts are needed for a central bank to be able to act preemptively to counter inflation before it begins to rise (Debelle, 1998). Central banks' capabilities to forecast inflation accurately depends mainly on the level of development of

ITers at the time of adoption. However in general, the ITers tends to improve their forecasting capacities. Therefore, central banks may rely on simple models in the initial stages of IT adoption and simultaneously devote resources to its development (Batini and Laxton, 2006). Countries like Brazil, Czech Republic, and Israel used simple three or four equation models for the purpose of forecasting (Carare, et al. 2002). On the other hand, developed countries like New Zealand and Canada used more sophisticated models for forecasting (Drew and Hunt, 1998).

Batini and Laxton (2006), however found that most ITers had little or no forecasting capability at the time of adoption of IT. In practice, the central banks along with other qualitative, relevant information and judgment, adopt a certain monetary policy stance supported by the forecasts of inflation (Carare, et al. 2002). Similarly, Debelle (1998) argued that complete reliance on a model-based forecast of inflation is not the practice even in industrial countries, instead, the decisions regarding the monetary policy stance are taken on the basis of other information and judgment supported by forecasts. Therefore, such models can be developed over time and should not be treated as a hindrance in the way of adopting IT frameworks by developing countries.

Many studies have highlighted and developed models to forecast inflation for Pakistan. For example, Bokil and Schimmelpfennig (2005) gave a leading indicator model (LIM), (ii) ARIMA, and (iii) a VAR model to forecast inflation in Pakistan. Haider and Hanif (2009) attempted to forecast inflation using artificial neural networks (ANN). Riaz (2012) evaluated the forecast efficiency of food price inflation and consumer price index by using the rationality criterion of forecasts. Hanif and Malik (2015) appraised the forecast performance of different multivariate models against univariate models across Pakistan's low, moderate and high inflation regimes. Hussain and Hayat (2016) showed that the incorporation of inflation expectations improved the forecast performance of univariate models at the SBP.

Recently, the forecasting and policy analysis system (FPAS) has endogenously been developed and implemented by the SBP for internal use. Although the inflation forecasts are currently presented in the SBP's quarterly and annual reports, regular reporting of the medium and long-term forecasts—as is practiced by ITers—remains the need of the hour. From all this discussion, it may be inferred that the SBP has made sufficient advancement in forecasting inflation that may conveniently fulfill the needs of IT to start with.

Healthy Financial System

The literature related to preconditions of IT suggests that financial system should be sufficiently sound to allow effective transmission mechanisms of monetary policy instruments (Jonas and Mishkin, 2003). Financial stability relieves central bankers from the concerns of health of financial sector as it may be in conflict with inflation targets (Carare, et al. 2002).

In the case of Pakistan, Sophastienphong and Kulathunga (2008) observed that banking sector reforms implemented by the SBP have resulted in notable improvements in the soundness indicators of the financial sector and that Pakistan leads the region in performance and efficiency as well as corporate governance. As per the Financial Stability Review (FSR), issued by the SBP in 2015, the financial system of Pakistan was in a sound and stable state by the end of 2015. The report stated that the asset base of the overall

financial sector in Pakistan has increased at a decent pace, and the financial depth has improved. More recently, the financial stress testing exercises of the SBP indicates that the country's financial system is resilient enough to sustain the adverse impact of the Covid-19 international crisis. Thus, the current state of the financial soundness of Pakistan seems good enough to support the adoption of IT.

Can IT be Adopted if All or Some Preconditions are not Met?

At times the preconditions are misperceived to be the set of conditions that are necessary for adoption of IT (Lucotte, 2012). If this were the case, New Zealand being the first ITer must have had at least a theoretical model before the adoption of IT at least with the so-called preconditions as the set of necessary assumptions for the IT model (to work) before its implementation. Thus, it is surprising to note that although widely quoted as preconditions, no study, to the best of author's knowledge, seems to have laid down the minimum acceptable yardsticks that must be in place before the adoption of IT. For example, how was the financial sector's health measured—what indicators were used—and how was the minimum level of such indicators determined by the ITers before the adoption of IT? On this point, Lucotte (2012) noted that the experience of emerging countries shows that non-fulfillment of the preconditions is not an impediment to the adoption and success of this monetary policy framework.

Debelle (1998) does not regard it compulsory for all the prerequisites to be in place at the same time in the case of developing countries. Batini and Laxton (2006), to assess the role of preconditions in adopting IT, conducted a survey of 21 IT and 10 non-targeting central banks in emerging markets. They found that although the industrial ITers as compared to emerging market ITers were better in some dimensions, all the preconditions were not in place before adopting IT in any of these countries. They also found that no precondition significantly explained the improvement in macroeconomic performance after adopting IT. In addition to the aforementioned, Svensson (1997), Bernanke, et al. (1999), and Mishkin (1999) believe that the adoption of IT will lead to better macroeconomic outcomes because the initial credibility in these countries is low. Hence, the scope for improvement is greater.

In a recent study, Alpanda and Honig (2014) argued that IT may not only promote some of the preconditions but may be more successful when these conditions are lacking because there is ample room for improvement and preconditions therefore, as such should not stand in the way of adopting IT. This generalisation may work very well for Pakistan. For example, the SBP may achieve price stability if it focuses on inflation i.e. it will not only have to build its capacity to forecast inflation as accurately as possible but will act against it preemptively before the inflation begins to rise. This, in turn, will help effectively anchor inflation expectations if supplemented by appropriate communication policies and forward guidance.

Masson, et al. (1997), while assessing the scope for IT in developing countries, concluded that developing countries can choose IT provided *two* prerequisites are satisfied. The first, is the central bank's independence in terms of fiscal dominance, and the second is the absence of any other nominal anchor rather than inflation, such as exchange rate and output-stabilisation. It was argued that developing countries are plagued either with (i) the issue of fiscal dominance—i.e., seigniorage is an important source of financing— or (ii)

low inflation does not tend to be the overriding objective of monetary policy. Although there does not seem to exist a compelling case for Masson et al. (1997)'s arguments, even if it is presumed that these two preconditions are necessary, the question remains whether Pakistan can still adopt IT?

As far as fiscal dominance is concerned, the current institutional set up of the SBP board indicates that there is no direct role of finance secretary in monetary policy decision making process as the monetary policy committee is now independent in its decisions. It is also important to note that empirical evidence for Pakistan indicates that fiscal dominance—as measured by seigniorage and government outstanding debt—is an irrelevant and fragile source of inflation bias in the long run (Hayat, et al. 2017). As far as the argument of the absence of any other nominal anchors—such as exchange rate and output stabilisation—is concerned, the latter, in the case of Pakistan, has been found to be the most relevant and relatively robust source of inflation bias. By and large, this problem—of inducing excess inflation to stimulate real growth—however, can be overcome through self-restraint by the SBP in terms of using the monetary policy for output stimulation at the expense of higher inflation rates as has also been suggested by Hayat, et al. (2016), and Hayat, et al. (2019).

OPERATIONAL PREREQUISITES AND THEIR STATE FOR EFFECTIVE IMPLEMENTATION OF IT IN PAKISTAN

In addition to the preconditions, three other prerequisites of operational nature have been identified that may help in the effective implementation of IT. This section is advocated to bring forth these prerequisites from the literature and assess the current state of the preparedness of the SBP for adopting IT along these lines.

The Choice of an Appropriate Price Measure

To start with, one of the most important requirements under IT is the choice of an appropriate price index that can be used to determine the target rate for inflation, which can be conveniently communicated and may be well understood by the public. This is the nominal anchor, which is used to anchor the expectations of the public and economic agents. This essentially works as a tool for the central bank to develop its credibility by putting its endless efforts to achieve it.

The consumer price index (CPI) is the most popular and widely used index by IT countries (Haldane, 1995; Debelle, 1998; Schaechter, et al. 2000). As CPI overstates the inflation due to substitution bias, an alternative measure is the GDP deflator which has a wide coverage; however, it is not used by the ITers because it is not readily available and is subject to frequent revisions (Debelle, 1998; Schaechter, et al. 2000). Most of the ITers use either CPI or some variant of CPI commonly referred to as 'core inflation' or 'underlying inflation'. There is no unique definition of core inflation. Various authors, however, have defined it in the context of their studies. For example, Eckstein (1981) defined it as 'the trend increase in the cost of the factors of production', Blinder (1997) defined it as a 'persistence part of aggregate inflation', Bryan and Cecchetti (1994) defined it as a measure that is most correlated with money growth and Bryan, et al. (1997) predicted it as a measure, which is more correlated with a smoothed trend inflation rate. Quah and Vahey (1995) gave its definition in terms of inflation having no long-run impact on output,

which they estimated through a VAR system. Cogley (2002) defines core inflation as a response to changes in mean inflation, and Smith (2004) described it as the best forecaster of inflation.

The use of core inflation as a target allows central banks some flexibility to deal with supply shocks. It is also qualified with certain exemptions or escape clauses that allow some flexibility to the central bank (Haldane, 1995). The purpose of using core inflation is that the CPI is sensitive to supply-side shocks. A movement in CPI may result fromsupply-side factors on which the central bank has no control (Haldane, 1995; Debelle, 1998; Amato and Gerlach, 2002). Core inflation measures may also be used as an operational guide by the monetary authorities for analytical and forecasting purposes for the achievement of the target. One of the purposes of the use of the core inflation measures is to guide and keep the monetary policy focused in an appropriate direction (Cutler, 2001).

The use of core inflation thus helps fix the responsibility of the central bank for the price movements over which it has control. Moreover, these measures direct and help the monetary policy makers focus on the demand-driven price movements. Researchers have developed and devised various techniques for the computation and evaluation of core inflation measures. Broadly, core inflation measures are computed through the exclusion approach, limited influence estimators (trimmed mean and median), and the model-based techniques.[10] The most widely used approach for the computation of core inflation is the exclusion approach (Wynne, 1999), practiced since the 1970s (Vega and Wynne, 2001). Silver (2007) argued that countries often use exclusion-based methods when they first instigate inflation targets because they are timely, easy to understand, and transparent in that the user can replicate the measure.

The SBP has been reporting core inflation indicators since 2000s. Tahir (2006) constructed alternative core inflation measures for Pakistan using exclusion and trim-based measures and found that the latter is a better indicator. Similarly, Lodhi (2007) constructed nine alternative core inflation measures and evaluated them against an absolute criterion given by Marques, et al. (2000). Recently, Riazuddin, et al. (2013) obtained a new measure of core inflation through a new method by permanently excluding relatively volatile commodities from CPI basket in Pakistan. The Pakistan Bureau of Statistics now publishes indicators of core inflation even with a bifurcation as core rural and core urban on a monthly basis. Thus, given that not only sufficient and frequent data is available on CPI in Pakistan and that several indicators of core inflation have already been developed, which are regularly reported by the SBP, the issue remains trivial—i.e., it's just about making a choice between the headline and core inflation measures as a nominal anchor.

Specification of the Inflation Target (Point or Band)

Another operational prerequisite under an IT framework is the specification of an appropriate inflation target, which generally is specified either in the form of a point or a

[10] The concept of limited influence estimators (trimmed mean and median) was first proposed by Bryan and Pike (1991) and Bryan and Cechetti, (1994). Subsequently, the methods have been used in various studies and practically numerous central banks estimate such measures for their use. Whereas, Quah and Vahey (1995) brought a new multivariate approach to the core inflation measurement while bringing in some economic theory to distinguish between core and non-core inflation.

band using a headline or a certain measure of core inflation.[11] Practice varies across IT countries; for example, Australia, Brazil, Chile, Finland, Sweden and U.K. have point targets, whereas most ITers, including Canada, the Czech Republic, Israel, and New Zealand, have bands for inflation targets (Haldane, 2000). The choice between a point and a band inflation target essentially involves a trade-off between a stronger commitment to the inflation target and a certain level of necessary flexibility with the monetary policy makers (Debelle, 1998). A wider band allows greater flexibility, but at the same time, it allows more volatility in observed inflation, which in turn has adverse consequences both for future inflation (see e.g. Wilson, 2006 and Hossain, 2014) and central bank's credibility as the very idea of a strong commitment to the inflation objective is undermined. A wider band may also potentially induce lethargic behaviour on the part of the central bank as being vigilant and proactive in terms of inflation stabilisation.

There are advantages and disadvantages of both the point and band targets. Haldane (2000), while discussing the reasons why U.K. chose a point inflation target, highlighted three main relative advantages. First, it provides a clear point of referral for the monetary policy makers, thereby keeping them focused, and at the same time, it encourages transparency. Second, it helps anchor inflation expectations of the private sector agents and third is that it enables the conduct of monetary policy in a symmetric way, particularly, when the inflation is on its long-term target. A point target, however, has the disadvantage of increasing the variability in output and has the potential to induce instrument instability of monetary policy (Debelle, 1998). For example, in case of instrument instability, the economy experiences excessive swings in the monetary policy instruments when central banks try to hit the inflation target. Moreover, point targets have been observed to be missed more often, which in turn may create the problem of credibility and reputation if not properly and effectively communicated and explained to the public.

Dennis (1997) noted that although theoretically, the point and band target/s are distinguished, it does not provide a basis for the choice of an appropriate bandwidth. On the other hand, empirical literature tries to address the problem of optimal bandwidth using the criterion that 95 percent of the inflation observations should fall within the target range (see Debelle and Stevens, 1995; Fillion and Tetlow, 1993; and Turner, 1996). Dennis, therefore, argued that the bands produced by these studies are appropriate for the central bank's accountability purposes but are less suited to reflect on the economic costs of inflation.

In the case of Pakistan, although few studies, e.g., Mubarik (2005), Hussain (2005), and Iqbal and Nawaz (2010) have empirically computed threshold inflation rates at 9 percent, 5 percent, and 4 percent–6 percent, respectively, the rates may not be used as inflation targets by the SBP because by definition a threshold inflation rate is a rate of inflation beyond which the inflation starts affecting the real growth negatively, which may not be desirable when viewed from the society's perspective (Hayat, et al. 2017, and Hayat, et al. 2018). A step further, they also investigated if all the historically observed inflation rates below the threshold level are equally beneficial to the society in the context of Pakistan. Consistent with the theory and practice of the notion of price stability, their empirical results indicated that inflation within the range of 1 percent–3 percent is beneficial to society in two ways. First, in this range, the inflation

[11] There is a slight distinction between a point IT and band IT frameworks. In the former the centre of the target band is explicitly mentioned (Dennis, 1997).

is already low enough to be desired by society as compared to any other higher inflation rates. Second, inflation in this range is desirable because it significantly enhances the real growth as compared to any other historically observed inflation rate (s) in Pakistan. Since inflation rates in the 1 percent–3 percent band closely conform to the very definition of price stability, these rates therefore, may form the basis of an appropriate choice for inflation targets. For example, a point of 2 percent or a band of 1 percent to 3 percent may be considered. This may not only allow achieving a low average inflation and low volatility in inflation but also a stable growth in real economic activity. Technically, the stabilisation of inflation in 1 percent–3 percent range also implies that the policy rates would eventually settle at low levels, and there will be no unnecessary pressures on the exchange rate, which will help stabilise the external sector. The low and stable interest rate environment would also allow dealing with the unsustainably high accumulated debts, thereby creating space for healthy expenditures in the budget. The price stability in turn would also help promote saving, investment, and growth and will help provide a reasonable cushion to maneuver macroeconomic policies to deal with inundated shocks and crisis.

Costs of Disinflation

One of the widely discussed operational issues in the literature related to IT is the cost associated with disinflation (King, 1996; Mishkin and Schmidt-Hebbel, 2001). This is particularly applicable in countries where inflation rates are reasonably high (in double digits, for instance) before the adoption of IT. King (1996) argued that the costs of disinflation increase more than proportionately with the increasing speed of disinflation—if the countries have long experienced high inflation rates—because it takes time for the private sector to adjust expectations. Similarly, Mishkin and Schmidt-Hebbel (2001) argued that due to the imperfect credibility of central banks on the back of past higher inflation rates, the inflation inertia is more enormous. This makes a quicker disinflation potentially more costly. Sargent (1986), on the other hand, preferred a sharp decrease in inflation since expectations adjust quickly.

Practical experiences may vary from country to country regarding the speed of bringing down inflation to their desired levels. Canada, for example, attempted to bring down inflation from around 6 percent to a band of 1 percent–3 percent in four years, and New Zealand, on the other hand, aimed to bring down inflation into the band of 0 percent–2 percent rather quickly (King, 1996). Emerging market economies dealt with the disinflation problem by phasing IT gradually from informal to formal with an increasing success in lowering inflation (Mishkin and Savastano, 2000; Mishkin, 2000b; Mishkin and Schmidt-Hebbel, 2001). Although there is no consensus in the literature over a particular speed of disinflation to be optimal, two approaches are often cited: gradualism (Taylor, 1983) and the cold turkey approach (Sargent, 1986). The former view devotes a gradual approach to the disinflation so that wages and prices adjust smoothly to tight monetary policy due to the presence of inertia. The latter prefers a relatively quicker disinflation because inflation expectations adjust sharply, and it is supported by empirical studies, which found lower sacrifice ratios such as Ball (1993) and Zhang (2001).

Deciding on the appropriate speed of disinflation for Pakistan nevertheless is a non-issue for several reasons. First, currently, the inflation is already at higher levels beyond the threshold (5 percent level), which is inimical for growth; therefore the sooner the

inflation is brought down to benign levels, the better (Hayat, et al. 2018). Secondly, since there is an inverse relationship between inflation (bias) and real growth (see Hayat, et al. 2018), technically, a relatively quicker disinflation would imply lower inflation bias and higher growth gains. Lastly, if the disinflation is done through a well-informed communication strategy, this would, along the way, not only help the SBP to build its credibility but will also help ease off the political/interest groups' pressures.

CONCLUSION

The synthesis of the literature highlights that in the set of monetary policy strategies being practiced; IT is an appropriate available strategy, which helps mitigate the problem of inflation bias along with enough flexibility to deal with shocks. Although there remained some skepticism and uncertainty regarding IT in the sense that IT is rigid and may affect growth and other macroeconomic indicators adversely, however, no study to the best of author's knowledge has been able to produce substantive evidence to this effect. In contrast, the evidence indicates that IT has performed satisfactorily well in both developed and developing countries. By and large, it has improved the effectiveness of the monetary policy, which is evident from the improved macroeconomic indicators compared to other monetary policy regimes. The skepticism, therefore, seems to be a myth rather than reality. The literature, however, has identified some preconditions, which arguably are important but not strictly necessary for the successful implementation of the IT monetary policy framework before its adoption. Nevertheless, the so-called preconditions as well as IT-related operational prerequisites in the case of Pakistan seem a non-problem, as to a considerable extent, they are already in place while further improvements can be made along the way after adoption. Setting up inflation targets consistent with price stability, chalking out appropriate accountability mechanisms for non-achievement of inflation targets, and dealing with inflation preemptively are some of the main areas that need the attention of the concerned authorities in Pakistan.

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Sources to Finance Fiscal Deficit and Their Impact on Inflation: A Case Study of Pakistan

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INTRODUCTION

Borrowing at the government level may be good as well as bad for economic development of any country like any other business borrowing. It is beneficial for the economy as long as it is exercised with diligence and economic rationality. For governments, the debt becomes a problem if their debt servicing capacity does not grow with the increase in their level of indebtedness. In such situation borrowing adversely impacts the economy as governments tend to borrow more for debt servicing, a situation widely known as the Ponzi Games. Besides inflation, high interest rate and unstable exchange rate are some of the major problems that may arise from such kind of borrowings. While inflation is generally related to monetary expansion [Agha and Khan (2006)], it is generally argued that in developing countries fiscal imbalances might play a key role in generating inflation [Catao and Torrens (2005)]. As Sargent and Wallace (1981) pointed out that those governments who have persistent fiscal deficit have to finance with monetisation, causing high inflation in the long run.

Fiscal deficit is financed through various methods i.e. printing of money, using foreign reserves, borrowing from external sources, and borrowing domestically [Fischer and Easterly (1990)]. In Pakistan domestic borrowing comprises of bank borrowing and non-bank borrowings. Bank borrowing is further categorised as borrowing from State Bank of Pakistan (SBP) and borrowing from scheduled banks, while non-bank borrowing is mainly through National Saving Schemes (NSS) and others [SBP (2010)].

Along with the overall fiscal deficit, each mode of financing has its own disadvantages [Fischer and Easterly (1990)]. The government may choose to borrow from domestic sources. This would cause the interest rate to rise, which can lead to inflation by reduction in investment and shift in aggregate supply [Tullius (2007)]. Financing from scheduled banks may result in higher cost of lending to the private sector which may crowd out private investment and contribute to inflation. On the other hand, deficit financed from central bank directly by seignorage would create excess demand in the economy thereby causing inflation [Fischer and Easterly (1990)].

The restrictions imposed by the autonomous central bank on government borrowing facility from the banking system may compel the government not to borrow more from the

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banking sector [Feltenstein and Iwata (2002)].[1] This hard ceiling suggests that the government must search for other sources of financing. The government may borrow from external sources which will swell the current account deficit and depreciate the real exchange rate, causing price level to increase in the economy [Pasha and Ghaus (1996)]. Given its limited access to foreign borrowing; non-bank borrowing may become the other source of financing for the government. After getting funds from the two sources (domestic banking sector, including central banks and foreign sources), the rest of the funds may be raised by the non-bank borrowing [Feltenstein and Iwata (2002)], which in the case of Pakistan is mainly from the National Saving Schemes (NSS).

It is generally believed that non-bank borrowing has low inflationary impact, but it has adverse effect on domestic debt sustainability. In Pakistan, NSS borrowing is very costly due to high servicing cost associated with it, becoming as high as 18 percent in 1996-97. This high interest rate not only leads to decrease in the bank deposits, which not only deteriorates the banking sector services but also adds to the high debt servicing obligations of the government. Hence more money creation will be required for repayment, which will bring more inflation [Agha and Khan (2006)].

In Pakistan, there may be several factors of supply side as well as demand side being responsible for inflation. From supply side, prices of food items and oil are considered very much responsible for inflation. Prices of most consumer goods fluctuate with oil price swings. However, the role of food prices is statistically insignificant [Khan, *et al*. (2007)], therefore high inflation may mainly result from persistent fiscal deficit [Khan and Agha (2006); Sarfarz and Anwar (2009)].

The impact of borrowing on inflation varies by the source of borrowing i.e. borrowing from some sources will lead to inflation more than the other and the impact may vary in short term and long term. The question thus arise as to which source of financing the fiscal deficit is is less inflationary and thus optimal? This study attempts to answer this question empirically, by using the data from 1976 to 2014 of Pakistan. The analysis will help to identify economic cost through inflation associated with each type of borrowing so that government may choose such mode which would not hurt the economy severely in terms of higher inflation, besides looking at the accounting cost of borrowing.

SELECTED LITERATURE REVIEW

Starting from the classical debate, Sargent and Wallace (1981) questioned the statement of Friedman (1956) that inflation is always and everywhere a monetary phenomenon. They are of the view that inflation is a fiscal driven phenomenon because fiscal authority moves first and sets the budget independently about revenue generation through government bonds and seignorage. In such situation government will sooner or later monetise this budget deficit which will lead to inflation. But Leeper (1991) and Sims (1994) presented the idea of fiscal theory of price level (FTPL); strongly suggesting that inflation is a fiscal phenomenon. They put forward considerations that government deficit must be financed in a sustainable manner and inter temporal budget constraint should be adhered to. However FTPL is empirically tested for many countries with mixed results.

[1] Although we found that there is no restriction on the government borrowings from central bank in Pakistan, in the act named as Fiscal Responsibility and Debt Limitation [FRDL (2005)], which is not strictly binding in Pakistan, is devoid of it [Qasim and Khalid (2012)].

Different studies have been conducted to investigate the link between fiscal deficit and inflation. Developed economies show weak or no association between budget deficit and inflation.[2] While in developing economies, most of the studies show that there is a positive relationship between fiscal deficit and inflation in high inflation episodes [see Catao and Terrones (2005), Habibullah, *et al*. (2011) and Lin, *et al.* (2013)].[3] On the other hand, Koru and Özmen (2003) and Samimi (2011) established for Turkish and Iranian economies that no long run relationship between fiscal deficit and inflation holds. According to Catao and Terrones (2005) this may be because of selection bias, using wrong model specification and/or wrong econometric techniques. Once these limitations are addressed, the argument that fiscal deficit having inflationary impact is strongly supported.

The literature related to Pakistan also gives mix results. Kemal (2006), Malik (2006) and Qayyum (2006) found that inflation is a monetary phenomenon in Pakistan. But they ignored fiscal deficit as an important factor in the determination of inflation. Mukhtar and Zakaria (2010) included both money supply and fiscal deficit in their econometric modelling and found that inflation is a monetary phenomenon, while Shabbir and Ahmad (1994) reported that fiscal deficit is directly linked with inflation. Agha and Khan (2006), using Johanson Cointegration technique, also found that changes in inflation do not take place only by the money supply but also by the fiscal deficit. This supports the argument that in Pakistan inflation may be a fiscal phenomenon. Mughal and Khan (2011) showed that inflation is granger caused by fiscal deficit in Pakistan. Similar results were found by Jalil and Bibi (2014) using panel ARDL model. The results are in line with Chaudhary and Ahmed (1995), suggesting that money supply is not exogenous rather it is endogenous. They found that money supply and deficit financing from domestic sources especially from banking sector positively affect inflation.

Agha and Khan (2006) found that inflation is positively influenced by the total domestic bank borrowings. The study concluded that if there is increase of 1 billion rupees in domestic bank borrowing for budgetary support, the prices would go up by 0.0048 percentage points. Sarfaraz and Anwar (2009) found a positive relationship between total domestic borrowings, including banking and non-banking borrowings for financing fiscal deficit. Furthermore, it is concluded that borrowing from international sources are also inflationary in nature.

The review of the relevant literature shows that while there are a number of studies which have analysed the role of monetary and fiscal policies in inflation, no study has been conducted on the relationship between the sources of the deficit finances (bank borrowings, borrowings from commercial banks, borrowings from central bank and non-bank borrowings for fiscal deficit financing) and inflation. Also, the existing literature does not provide any empirical evidence on how the composition of borrowing impacts inflation and which source is more inflationary than the other. So this study aims to fill this literature gap for Pakistan.

THEORETICAL BACKGROUND AND ESTIMATION METHOD

According to Catao and Torrens (2005) inflation(CPI_t) is a function of fiscal deficit (FD_t) and may be written as:

$$CPI_t = f(FD_t) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (3.1)$$

[2] See also King and Plosser (1985), Catao and Terrones (2005), Vieira (2000).

[3] See also Chaudhary and Parai (1991), Anoruo (2003), Lozano (2008), Sahan (2010), Metin (1998), Kia (2010), and Erkam and Çetinkaya (2014).

The above function shows that fiscal deficit is inflationary in nature. We have modified the function by extending it to incorporate the ways and means of financing fiscal deficit in Pakistan. Government can finance the deficit by making changes in money supply stock (dM_t); borrowing from domestic sources (dDB_t) as well as from external sources (dE_t), thus 3.1 can be written as follows:

$$CPI_t = f(dM_t, dDB_t, dE_t) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (3.2)$$

Domestic interest bearing debt can be further categorised as bank(BB_t) and non-bank borrowings (NBB_t). Therefore 3.2 may take the following functional form:

$$CPI_t = f(\mathrm{d}M_t, dBB_t, dNBB_t, dE_t) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (3.3)$$

Similarly the bank borrowings are decomposed into borrowing from scheduled banks (SBB_t) and state bank(CBB_t), while non-bank borrowing is equal to the debt comprised of national saving scheme (NSS_t), thus 3.3 becomes,

$$CPI_t = f(dM_t, dCBB_t, dSBB_t, dNSS_t, dE_t) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (3.4)$$

Equations (3.1), (3.2), (3.3) and (3.4) are estimated in four different stages. Data has been taken from *Pakistan Economic Survey* (various issues), Pakistan Bureau of Statistics and State Bank of Pakistan for the period of 1976 to 2014.

It is well known that most of the time series data follow a unit root process. So with the presence of unit root, simple regression analysis gives spurious results. If non-stationary data is converted into a stationary process, the results of regression analysis are only applicable for the short run analysis, while economists are generally interested in long run relationship. To solve this problem, Engle and Granger (1987), Stock and Watson (1988), Johansen cointegration technique (1988) and Autoregressive Distributed Lags (ARDL) can be used. This study uses Johansen's cointegration technique and ARDL method, as they are mostly used in the empirical work and are considered superior to others.

Data and Variables

This section discusses the data and construction of variables as follows:

Consumer Price Index (CPI_t)

In empirical analysis, CPI is the most commonly used gauge of the level of prices in an economy [Mankiw (2005)]. Therefore this study incorporates CPI as a measure of inflation.[4]

Fiscal Deficit (FD_t)

Budget deficit is the difference between total revenue and expenditure during a fiscal year. If BD_t is the budget deficit, SAB_t is the surplus of autonomous bodies and D_t is the discrepancy, then budget deficit can be converted into fiscal deficit (FD_t) as follows:

$$FD_t = BD_t + SAB_t - D_t$$

[4] CPI is broader measure than WPI and SPI, comparison is given in Appendix I.

Money Supply $(M2_t)$

M2 is defined as the sum of currency in circulation, other deposits with State Bank of Pakistan, demand and time deposits, including resident foreign currency deposits with scheduled banks.

Central Bank Borrowing for Budgetary Support (CBB_t)

It is the government borrowing from State Bank of Pakistan directly for fiscal deficit financing through new money creation in the economy and/or borrowing through Ways and Means Advances.

Scheduled Banks Borrowing for Budgetary Support $(\boldsymbol{SBB_t})$

It is the bank borrowing from all commercial banks and specialised banks.

Bank Borrowing for Budgetary Support $(\boldsymbol{BB_t})$

Bank borrowing for budgetary support is the borrowing of a government from banking sector within the economy during a specific fiscal year.[5]

Borrowing from National Saving Scheme for Budgetary Support $(\boldsymbol{NSS_t})$

NSS funds are generated through different schemes, i.e. Certificates,[6] Accounts[7] and prize bonds by Central Directorate of National Saving (CDNS) under Ministry of Finance (MOF).

Non-Bank Borrowing for Budgetary Support $(\boldsymbol{NBB_t})$

Non-bank borrowing includes the funds through NSS and other bonds, issued through SBP to the individuals and other Non-Bank Financial Institutions (NBFIs).

Domestic Borrowing for Budgetary Support (DB)

It includes both bank and non-bank sources of financing.

External Borrowing for Budgetary Support (EB)

External borrowing for budgetary support is the fiscal deficit financing through external sources of financing, including governments and international financial agencies.

Data Sources

The data is collected from State Bank of Pakistan (SBP), Ministry of Finance (MOF) and Pakistan Bureau of Statistics (PBS). [8]

[5] The Sum of Central bank borrowing and scheduled bank borrowing is called the Bank borrowing.

[6] (a)Defense Saving Certificates (DSC), (b) Special Saving Certificates Registered (SSCR), (c) Regular Income Certificates (RIC), Bahbood Saving Certificates (BSC).

[7] (a) Saving Account (SA), (b) Special Saving Account (SSA), (c) Pensioner's Benefit Account (PBA).

[8] All of the Variables are taken as flow variables in the analysis. All are measured in Millions of Pak Rupees except CPI.

RESULTS AND DISCUSSION

Table 4.1 provides the summary statistics of the data.

Table 4.1

Descriptive Statistics of the Data

	Mean	Maximum	Minimum	Std. Dev.
CPI_t	55.61309	189.58	8.191269	49.46567
FD_t	295889.5	1833864	12480	448859.5
$M2_t$	1980858	9807088	46417.6	2605489
$RGDP_t$	5380594	10640381	1737139	2652184
DB_t	234023.3	1835540	5711	403825.4
EB_t	61866.18	511727	–5900	91618.01
BB_t	126627.3	1457500	–73811	281231.5
NBB_t	107396	553330	–515	152628.2
CBB_t	101.0794	688.724	–249.238	214.8509
SBB_t	136.6532	939.5683	–134.173	273.3708
NSS_t	169500.1	553330	8050	178180.8

The starting point of the analysis of time series data is to test the stationarity of the given series used in the analysis. For this purpose, Augmented Dickey and Fuller (ADF) test was used. The results of the unit root tests are presented in the following table.

Table 4.2

Results of ADF Test

	Variables[9]	At Level	At First Difference	Conclusion
DEPENDENT VARIABLE	cpi_t	–2.688	–3.117*	I(1)
CONTROL VARIABLE	$m2_t$	–3.357	–4.511*	I(1)
	$rgdp_t$	–2.376	–3.681*	I(1)
STAGE 1	fd_t	–2.442	–5.304*	I(1)
STAGE 2	db_t	–2.448	9.479*	I(1)
	eb_t	–6.689*	–	I(0)
STAGE 3	bb_t[10]	–5.347*	–	I(0)
	nbb_t	–5.507*	–	I(0)
STAGE 4	cbb_t	–3.837*	–	I(0)
	sbb_t	–3.927*	–	I(0)
	nss_t	–2.303	–3.588*	I(1)

[9] Small alphabets represent that variables are in log form.

[10] Unit root results are mentioned with trend and intercept in Level, except NBB, SBB and NSS, they have only intercept. There is no trend at first difference in all variables.

The tests show that variables that are used in the first stage of estimation are stationary at first difference whereas variables of the second, third and fourth stage estimations are of mixed order of integration, i.e. some are integrated of order zero and some are one.

4.1. First Stage Estimation

In the very first stage this study shows that fiscal deficit and inflation has a long run relationship. The specified model[11] is given below.

$$cpi_t = \alpha_1 + \beta_1 fd_t + \beta_2 m2_t + \beta_3 rgdp_t + \nu_t \quad \ldots \quad \ldots \quad \ldots \quad (4.1)$$

ν_t is a stochastic process. Both fiscal deficit (fd_t) and money supply ($m2_t$) are considered as endogenous variables while real gross domestic product ($rgdp_t$) is employed as a control variable. Table 4.2 indicates that all of the variables used in the first stage estimation are of I(1) for long run relationship, therefore Johansen cointegration technique is used.

Results of the Johansen cointegration technique are given in Table 4.2. After specifying the appropriate lag length of 2 lags, the Trace test indicates that two cointegrating vectors may exist in the system, whereas Maximum Eigen value test indicates only one cointegrating vector.

Table 4.3

Results of Johansen Cointegration Technique

Trace Test				
H_0	H_1	Trace Statistic	95% Critical Value	Probability
r = 0	r = 1	43.9145*	29.7971	0.0007
r = 1	r = 2	15.8346*	15.4947	0.0444
r = 2	r = 3	2.3965	3.8415	0.1216
Maximum Eigen Value Test				
H_0	H_1	Max-Eigen Statistic	95% Critical Value	Probability
r = 0	r ≥ 0	28.0800*	21.1316	0.0045
r = 1	r ≥ 1	13.4381	14.2646	0.0672
r = 2	r ≥ 2	2.3965	3.8415	0.1216

Note: *indicates rejection of null hypothesis at 5 percent level of significance.

According to Toda (1994) and Lutkipohl, *et al*. (2000) the trace test is size distorted; therefore we may conclude on the basis of Eigenvalue test statistic that there may be only one cointegrating vector.[12]

The estimated long run relationship is given below:

$$\widehat{cpi}_t = \underset{(0.02693)}{0.1665 fd_t} + \underset{(0.05152)}{0.6644 m2_t} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (4.2)$$

[13]

[11] Used by Agha and Khan (2006).

[12] If Trace test is true and we have two cointegrating vectors, Qayyum (2005) argued that conventionally the first vector may be used as a long run equation; otherwise we have to use restricted VECM. First the system should be identified then VECM results can be interpreted.

[13] In parenthesis standard error of the corresponding coefficient is mentioned. Both fiscal deficit and inflation are statistically significant at 1 percent level of significance. Their corresponding *t*-value are *t*-calculated for fd= 6.18 while for m2 it is 12.9.

Equation (4.2) shows that inflation is positively affected by money supply and fiscal deficit in the long run. The results are in line with Shabbir and Ahmad (1994), Agha and Khan (2006) and Jalil and Bibi (2014), while these are in contrast to Mukhtar and Zakaria (2010).

Vector Error Correction Model

In three variables case, VECM is given in the following equations.

$$\Delta cpi_t = \alpha_0 + \sum \alpha_i \Delta cpi_{t-i} + \sum \beta_i \Delta fd_{t-i} + \sum \gamma_i \Delta m2_{t-i} + \varphi_1 \mu_{t-1} + \varepsilon_{1t} \quad \ldots (4.3)$$

$$\Delta fd_t = \alpha_0 + \sum \alpha_i \Delta fd_{t-i} + \sum \beta_i \Delta cpi_{t-i} + \sum \gamma_i \Delta m2_{t-i} + \varphi_2 \mu_{t-1} + \varepsilon_{2t} \quad \ldots (4.4)$$

$$\Delta m2_t = \alpha_0 + \sum \alpha_i \Delta m2_{t-i} + \sum \beta_i \Delta fd_{t-i} + \sum \gamma_i \Delta cpi_{t-i} + \varphi_3 \mu_{t-1} + \varepsilon_{3t} \quad \ldots (4.5)$$

If $\varphi_k < 0$ and statistically significant then the cointegration relationship is confirmed between variables based on the underlying theory. VECM results are given in Table 4.4.

Table 4.4

Results of VECM[14]

	Coefficient	Std. Error	t-Statistic	Prob.
ECM_{t-1}	–0.4649	0.0973	–4.7794	0.0001
Δcpi_{t-1}	0.5383	0.1460	3.6873	0.0010
Δcpi_{t-2}	0.1088	0.1368	0.7953	0.4334
Δfd_{t-1}	–0.0567	0.0201	–2.8218	0.0088
Δfd_{t-2}	–0.0560	0.0195	–2.8677	0.0079
$\Delta m2_{t-1}$	0.0090	0.1170	0.0773	0.9389
$\Delta m2_{t-2}$	0.0784	0.1095	0.7153	0.4806
Constant	5.2013	1.1359	4.5791	0.0001
$rgdp_t$	–0.3347	0.0729	–4.5937	0.0001
R-squared	0.7317	$\chi^2_{auto}(2)$	0.4561	
Adjusted R-squared	0.6522	$\chi^2_{ARCH}(2)$	0.3402	
$\chi^2_{Normality}(2)$	0.5650			

$\chi^2_{auto}(2)$is the LM statistic of the autocorrelation test

$\chi^2_{Normality}(2)$is the LM statistic of the Jerque-Berra Normality test

$\chi^2_{ARCH}(2)$is the LM Statistic of the ARCH test.

Results of the VECM for Δcpi_t, as a dependent variable depict the short run dynamics. According to the above table, 46.5 percent of the disequilibrium in the short run will be corrected in the following year. The model qualifies all the diagnostic tests[15] i.e. autocorrelation, heteroscedasticity, normality and stability. On the basis of these results, we may therefore conclude that there is a long run relationship between fiscal deficit and inflation.

[14] One cointegration equation is reported as per the convention in the presence of size-distorted trace test.

[15] The model is also checked for stability of the parameters by CUSUM and CUSUM-Square test. Parameters are stable in the system.

4.2. Second Stage Estimation

To estimate Equation (3.2) the econometric model may be treated as,

$$cpi_t = \alpha_2 + \beta_1 db_t + \beta_2 eb_{t\,16} + \beta_3 m2_t + \beta_4 rgdp_t + \nu_{2t} \quad \ldots \quad \ldots \quad (4.6)$$

Where, db_t is domestic borrowing, eb_t is external borrowing and ν_{2t} is white noise. As access to foreign funds is limited, therefore most of the financing relies on the domestic borrowings. So domestic borrowing is considered as endogenous while external borrowing is partly exogenous, but for comparison purpose external borrowing is also considered as endogenous variable.[17]

Results of Bound Test of Cointegration

The existence of long run relationship is checked by conducting Bound test of cointegration. Results of the Bound test are given in Table 4.5.

Table 4.5

Results of Bound Test of Cointegration

Test Statistic	Value[18]	K
F-statistic	6.002	3
Critical Value Bounds		
Significance	I_0 Bound	I_1 Bound
10%	2.618	3.532
5%	3.164	4.194
1%	4.428	5.816

Note: Critical values are taken from Narayan (2005).

Even at 1 percent level of significance, F-statistic is greater than the critical bound; therefore the null hypothesis of no cointegration may be rejected. This allows us to establish the long run relationship between variables. The estimated long run relationship is expressed in Equation 4.7.

$$\widehat{cpi}_t = \underset{(2.486)}{4.539} + \underset{(0.026)}{0.055} db_t + \underset{(0.006)}{0.006} eb_t + \underset{(0.076)}{0.775} m2_t - \underset{(0.226)}{0.772} rgdp_t \quad \ldots \quad (4.7)$$

Equation (4.7) shows that domestic borrowing money supply along with real GDP contribute to inflation in the long run as their coefficients are highly significant;[19] while external borrowing is statistically insignificant. The reason of external borrowing to be

[16] As the stock of foreign debt is likely to be positively related to inflation but here we use foreign borrowing rather than foreign debt because of the following reasons: (1) we are interested in bifurcating the fiscal deficit, which is a flow variable, (2) the result remains almost the same even if we use the stock of foreign debt.

[17] As M2 carries both components, i.e. domestic borrowing and external borrowing, to avoid duplication in the data residual, part of the M2 should be used but due to data limitation we use M2 rather than the residual part of the M2.

[18] The bound test also shows long run relationship at 1 percent, even by the critical bound generated by Pesaran, *et al*. (2001).

[19] Real GDP has negative relationship with inflation; results are same with Aysha, *et al*. (2013).

statistically insignificant may be that whenever a government borrows from external sources, it does not put upward pressure on the money supply to monetise the borrowing. Therefore external borrowing is insignificant. So in comparison with domestic borrowing, external borrowing is less inflationary.[20]

To verify convergence from short run to long run equilibrium, the results of the ECM are given in Table 4.6.

Table 4.6

Results of ECM

	Coefficient	Std. Error	t-Statistic	Prob.
ECM_{t-1}	–0.337	0.071	–4.767	0.0000
Δcpi_{t-1}	0.509	0.131	3.895	0.0005
Δdb_t	0.019	0.009	2.051	0.0494
Δeb_t	0.002	0.002	0.986	0.3324
$\Delta m2_t$	–0.057	0.106	–0.541	0.5929
$\Delta rgdp_t$	–0.260	0.101	–2.569	0.0156
R-Square	0.9995	$\chi^2{}_{ARCH}(1)$		0.9597
Std. Error of Regression	0.0215	$\chi^2{}_{ARCH}(2)$		0.1469
$\chi^2{}_{auto}(1)$	0.7913	$\chi^2{}_{Norm}(2)$		0.8386
$\chi^2{}_{auto}(2)$	0.8938	$F_{RESET}(1,28)$		0.7853

Note: P-values of the LM test are reported for Diagnostic test.[21]

$\chi^2{}_{auto}(.)$Represents LM statistic of BG test.

$\chi^2{}_{ARCH}(.)$ Indicates LM Statistic of ARCH test.

$\chi^2{}_{Norm}(2)$is thep-value of LM statistic of Jerque-Berra Normality test.

$F_{RESET}(1,28)$ is p-value of F-Statistic of Ramsey RESET.

Same notes are applicable for results of ARDL in the third and fourth stage of estimations too.

The negative and statistically significant error correction term (ECM_{t-1}) confirms the long run convergence. Adjustment in the error is quite good, almost 34 percent per year and the model is also a good fit as it qualifies all the diagnostic; therefore, we may conclude that there may be long run relationship of borrowing from domestic sources, external sources and money supply with inflation.[22]

Third Stage Estimation

As it has been confirmed from the second stage estimations that there is a long run relationship between borrowing from domestic sources and inflation. Next we test whether bank borrowing is more inflationary than non-bank borrowing. For this, Equation (3.3) can be written as:

$$cpi_t = \alpha_3 + \beta_1 bb_t + \beta_2 nbb_t + \beta_3 m2_t + \beta_4 eb_t + \nu_{3t} \quad \ldots \quad \ldots \quad (4.8)$$

[20] Even if external borrowing is considered as exogenous, same results will be found.

[21] Both LM and F-statistics have asymptotically same distribution, while in small sample F is preferred [Pesaran and Pesaran (1997)] therefore only chi square probability values are reported.

[22] VECM have same diagnostics as of ARDL, not mentioned in Table 4.6.

Where bb_t represents domestic bank borrowing for financing fiscal imbalances, nbb_t is non-bank borrowing to finance fiscal deficit. $m2_t$ is money supply and eb_t is external borrowing. Except external borrowings all of the variables are considered as endogenous.[14]

Results of Bound Test of Cointegration

The results of the Bound test of cointegration is given in Table 4.7

Table 4.7

Bound Test of Cointegration

Test Statistic	Value	K
F-statistic	4.575	3
	Critical Value Bounds	
Significance	I_0 Bound	I_1 Bound
10%	2.618	3.532
5%	3.164	4.194
1%	4.428	5.816

Note: Critical values are taken from Narayan (2005) for 35 observations.

The null of no cointegration may not be accepted at 5 percent level of significance, as F-statistic (4.575) lies outside the upper bound (4.194). Therefore, long run relationship is concluded. The existence of long run relationship permits us to interpret the long run relationship among the variables. The estimated relationship between inflation, non-bank and banking sectors, in the long run are given in Equation 4.9.

$$\widehat{cpi}_t = \underset{(0.0209)}{0.0354}bb_t - \underset{(0.0143)}{0.0088}nbb_t + \underset{(0.0197)}{0.5708}m2_t + \underset{(0.0115)}{0.0051}eb_t - \underset{(0.2501)}{4.0655} \quad \ldots \quad (4.9)$$

The long run estimates of the third stage analysis indicate that bank borrowing has positive impact on inflation at 10 percent level of significance, while non-bank borrowing decreases inflation. The non-bank borrowing is insignificant but has a negative sign. As quoted by Agha and Khan (2006), non-bank borrowing is theoretically non-inflationary in nature and historical context of the non-bank borrowing also shows negative association with inflation. In case of non-bank borrowing money goes in the hands of the government and aggregate demand remains the same causing no change in price level. So this may be the reason that non-bank borrowing is statistically insignificant, showing no impact on inflation. Another justification may be that borrowing from non-banking sector does not increase the monetary base, and hence does not contribute to inflation. Money supply plays an important role in determining inflation.

The Error Correction Mechanism

The ECM of the ARDL model shows short run fluctuations along with error correction. The results of the ECM is given in Table 4.8.

[14]Although there are restrictions on bank borrowing which makes it partly exogenous, but they are not in practice and for comparison purpose too, it is considered as endogenous.

Bank borrowing is the part of total money supply (m2) but correlation between them is just 23 percent. So it is expected that multicollinearity problem may not be there.

Table 4.8

Results of Error Correction Mechanism

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECM_{t-1}	–0.1824	0.0568	–3.2123	0.0033
Δbb_t	0.0036	0.0021	1.7397	0.0929
Δnbb_t	–0.0016	0.0025	–0.6548	0.5179
$\Delta m2_t$	–0.2155	0.1312	–1.6423	0.1117
Δeb_t	0.0009	0.0021	0.4444	0.6602
Δcpi_{t-1}	0.5400	0.1327	4.0684	0.0003
R-Square	0.9993	$\chi^2_{ARCH}(1)$		0.4653
Std. Error of Regression	0.0229	$\chi^2_{ARCH}(2)$		0.3026
$\chi^2_{auto}(1)$	0.4969	$\chi^2_{Norm}(2)$		0.7077
$\chi^2_{auto}(2)$	0.6433	$F_{RESET}(1,27)$		0.2454

According to the short run analysis (Table 4.8) money supply and non-bank borrowing play no role in determining inflation, as they are statistically insignificant. The previous year's inflation plays a major role in determination of inflation in the short run. The reason may be that people expect more inflation in the next period, which may increase the demand for goods, increasing the price level in the economy. Correction in the error is 18.24 percent every year which is a bit low. This may be because of the insignificance of the major variables in the model. However, on the basis of the analysis we can say that bank borrowing is inflationary in nature as compared to non-bank borrowing.

Fourth Stage Estimation

It has been confirmed that both bank and non-bank borrowing have long run relationship with inflation. To check which part of the bank borrowing and non-bank borrowing is inflationary, bank borrowing is further bifurcated into two components, central bank borrowing (CBB) and scheduled bank borrowing (SBB); while non-bank borrowing is comprised of National Saving Scheme (NSS), Pakistan Investment Bonds (PIBs) to individuals and other non-bank institutions. The privatisation proceeds are also included in non-bank borrowing, for budgetary support. But due to data limitations, NSS is calculated as non-bank borrowing minus privatisation proceeds.[15] In the same manner, central bank borrowing and scheduled bank borrowings are parts of broad money M2. So to avoid duplication, both CBB and SBB are subtracted from M2 and named as M2M.

In this stage we have tested which source of domestic financing of fiscal deficit is less inflationary, keeping external borrowing (EB) and M2 less CBB and SBB as exogenous, the following equation is tested:

$$cpi_t = \beta_1 cbb_t + \beta_2 sbb_t + \beta_3 nss_t + \beta_4 eb_t + \beta_5 m2m_t + v_{4t} \quad \ldots \quad \ldots (4.10)$$

Where v_{4t} is the white noise error term. Here cbb_t, sbb_t and nss_t are considered as endogenous while eb_t and $m2m_t$[16] are exogenously treated.

[15]As according to Agha and Khan (2006) and Ishrat Hussain (2007) non-bank borrowing is mostly comprised of NSS. Therefore it is assumed that NBB-Privatisation proceeds=NSS.

[16]M2 that part which is endogenously increased for fiscal deficit is removed from total m2. Therefore, only exogenous part is left.

Since CBB and SBB data is available for 22 years only.[17] In such a small sample, to find the long run relationship, we are left with the choice of ARDL.[18] Narayan and Narayan (2005) used ARDL with 27 observations, and compared the computed bound test statistic with 30 observations critical bound given by Narayan (2005); while Pattichis (1999) used only 19 observations for ARDL and compared the bound test statistic with critical bound given by Pesaran, *et al.* (1996). These studies give some reliability to run ARDL with 22 observations, using the critical values used by Narayan (2005).

Results of Bound Test of Cointegration

The results of the bound test of cointegration are given in Table 4.9.

Table 4.9

Results of Bound Test of Cointegration

Test Statistic	Value	K
F-statistic	11.355	3
	Critical Value Bounds	
Significance	I_0 Bound	I_1 Bound
10%	2.676	3.586
5%	3.272	4.306
1%	4.614	5.966

Note: Critical values are taken from Narayan (2005) for 30 observations.

According to Table 4.9 there is a long run relationship among the said variables in the below equation, as the F-statistic lies outside the upper bound of the critical values.

$$\widehat{cpi}_t = \underset{}{-5.215} + \underset{(0.364)}{0.144cbb_t} + \underset{(0.041)}{0.007sbb_t} + \underset{(0.009)}{0.083nss_t} + \underset{(0.010)}{0.007eb_t} + \underset{(0.004)}{0.472m2m_t} \underset{(0.013)}{}$$

This equation says that central bank borrowing (cbb_t), national saving schemes (nss_t) and exogenous money supply ($m2m_t$) contribute towards inflation, as they are statistically significant at 5 percent level of significance. In comparison, if significance is ignored, central bank borrowing is more inflationary than scheduled bank borrowing, as CBB has larger coefficient magnitude than SBB and NSS. Similarly NSS is more inflationary than SBB. So CBB is the most inflationary source of financing fiscal deficit in Pakistan.

The Error Correction Mechanism

After confirmation of the long run relationship, the convergence to the long run mean is tested through ECM. The Results of the ECM is given in Table 4.9.

[17]Thanks to Dr Mansoor Saleemi, SBP, who provided access to the data. Published data is only for 2001-14.

[18]In small sample ADF is biased while ARDL does not require pre-testing of unit root.

Table 4.10

Results of ECM

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECM_{t-1}	–0.522	0.088	–5.958	0.0001
Δcbb_t	0.041	0.018	2.256	0.0435
Δsbb_t	0.004	0.005	0.799	0.4399
Δnss_t	0.016	0.007	2.372	0.0353
Δeb_t	0.004	0.002	1.694	0.1161
$\Delta m2m_t$	0.247	0.043	5.780	0.0001
R-Square	0.9991	$F_{ARCH}(1)$		0.8248
Std. Error of Regression	0.1919	$F_{ARCH}(2)$		0.8371
$F_{auto}(1)$	0.9048	$\chi^2{}_{Norm}(2)$		0.4574
$F_{auto}(2)$	0.6583	$F_{RESET}(1,27)$		0.6072

There is negative and statistically significant ECM_{t-1} value which shows that long run convergence may take place if short run deviation occurs due to some unexpected shocks. Hence we may conclude that there is long run relationship respectively between borrowing from scheduled banks, central bank and National Saving Schemes with inflation.

CONCLUSION AND POLICY RECOMMENDATIONS

The basic aim of this study has been to find the least inflationary source of financing fiscal deficit and to analyse the long run relationship between sources to finance fiscal deficit and inflation. For this purpose fiscal deficit was divided into different sources, which are in practice in Pakistan for financing. Estimations were done in four stages depending upon the categorisation of the sources of financing fiscal deficit. On the basis of unit root results, two techniques were used, Johansen Cointegration Technique and Autoregressive Distributed Lag model. The results of the first stage show that there is a long run relationship between fiscal deficit and inflation along with money supply, which is the standard result in most of the studies. While the second stage results indicate that there is a long run relationship between domestic borrowing, external borrowing and inflation, but domestic borrowing is more inflationary than external borrowing, again a standard result. In the third stage of estimation, it is shown that bank borrowing and non-bank borrowing (parts of domestic borrowing) have long run relationship with inflation. In this case bank borrowing significantly contributes to inflation as compared to non-bank borrowing. So bank borrowing is more inflationary in nature than non-bank borrowing. In the fourth and last stage of estimation it is found that central bank borrowing, scheduled banks borrowings (part of bank borrowings), National Saving Scheme (part of non-bank borrowing) have inflationary effects in the long run, on inflation. Central bank borrowing is the most expensive source of financing as compared to scheduled banks and National Saving Schemes.

(1) The study recommends financing of the deficit through external borrowing and non-bank borrowing as these sources are found to be least inflationary. Further studies need to be conducted to explicitly focus on the supply side factors as

well as on low and high inflation regimes which may have different implications for the source of deficit financing.

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CONCLUDING REMARKS

The intricate interplay among inflation, monetary policy, and exchange rates forms the bedrock of Pakistan's economic narrative. This extensive collection of scholarly works has dissected these pillars, shedding light on their profound influence and implications for the nation's financial landscape.

Inflation, more than a mere statistic, is the heartbeat of economic realities in Pakistan. Its pervasive impact on purchasing power, investment decisions, and policy formulation necessitates a comprehensive understanding. The collection's analysis, ranging from empirical studies to theoretical frameworks, provides invaluable insights into the multifaceted nature of inflation within Pakistan's economic context.

Monetary policy decisions, resonating in markets and homes, wield immense influence on interest rates, money supply, and economic growth. Understanding the intricacies of policy formulation and implementation is critical. This collection offers deep insights into the challenges, strategies, and implications of Pakistan's monetary policy within its complex socio-economic fabric.

Moreover, the exchange rate regime holds a vital position in Pakistan's economic standing on the global stage. Beyond numerical indices, it signifies trade dynamics, market sentiments, and the nation's competitive edge. Articles exploring exchange rate mechanisms unravel the impacts of fluctuations, policy interventions, and external forces on Pakistan's trade balance, investment climate, and overall economic resilience.

For Pakistan, economic stability isn't a distant abstraction; it intricately intertwines with the daily lives, aspirations, and future of its populace. Monetary policy decisions, inflationary pressures, and exchange rate dynamics directly shape individual experiences, business trajectories, and national development.

The book sets the stage by highlighting the State Bank of Pakistan's evolution and the necessary legal changes to prioritise price stability and bolster decision-making capabilities. However, the road to economic resilience requires multifaceted strategies. In the *Exchange Rate* section, maintaining an undervalued target rate emerges as crucial for stimulating growth and averting crises. Understanding its impact on monetary policy transmission is pivotal, requiring improvements in fiscal and monetary institutions to navigate challenges.

Inflation delves into the complexities of managing inflation, emphasising structural reforms and enhancing readiness for inflation targeting. Improvements in prioritisation, consistency, and accountability mechanisms are recommended for a successful transition. *Interest Rate* underscores the need for an integrated approach to managing inflation through monetary aggregates and interest rates. This nuanced perspective becomes essential for navigating the intricate economic landscape.

The collection, a reservoir of knowledge, serves as a compass guiding policymakers, economists, and stakeholders. Beyond information dissemination, it aims to spur dialogue, innovation, and collaboration. Policymakers must heed the insights offered, focusing on legislative reforms, institutional enhancements, and education to empower decision-makers within the State Bank of Pakistan.

Robust policy frameworks, rooted in informed decision-making and collaborative engagement, are imperative. Strengthening fiscal and monetary institutions, prioritising price stability, and fostering expertise within the central bank are essential steps toward economic resilience. Ultimately, this collection seeks not just to inform but to inspire action, innovation, and collaboration. It beckons policymakers, economists, and stakeholders to collectively steer Pakistan toward a prosperous future grounded in economic stability, resilience, and inclusive growth.

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