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SAY NO TO INFLATION TARGETING: A CALL FOR THE ADAPTATION OF A ZERO-INTEREST REGIME

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ABSTRACT

In its early history, monetary policy focused on numerous objectives, including stable growth, full employment, stable exchange rates, and price stability. In the 1990s, many countries shifted their monetary policy framework from monetary aggregate/interest rate targeting to inflation targeting, in which inflation was regarded as the primary target of monetary policy and interest rate is the primary tool for achieving target inflation. Inflation targeting has diverted the focus of central banks from growth and employment to price stability. Unfortunately, there is considerable evidence which shows that inflation targeting frameworks are unable to control inflation in the way central banks aiming at, and in fact lead to a greater departure from optimal growth and employment, the two key targets of sustainable development goals (SDGs). There is also evidence suggesting a strong association between inflation targeting and the move away from several other SDGs. Employing a systematic review of the related literature and Granger causality tests applied to data from various countries, this paper shows that inflation targeting fails to control inflation and has several undesirable impacts on a wide range of socioeconomic indicators. It is argued that the zero-interest regime is the optimal regime with respect to the impact on socioeconomic indicators and also supports the interest-free economy advocated by Islam.

Keywords: Central bank, Inflation targeting, Sustainable development goals, Zero interest.
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I. INTRODUCTION

During its history, monetary policy has focused on several goals, including stable and sustained economic growth, full employment or a minimum unemployment rate, and financial system and exchange rate stability. However, the relative importance of these goals has changed. In the 1960s, the emphasis of monetary policy was on sustained and stable economic growth, along with an acceptable level of employment. This was the era in which economists were influenced by the findings of Keynes (1883-1946) and Phillips (1914-1975), believing that monetary policy could be used to bring about desirable economic results. However, since the early 1990s, many central banks have adopted an inflation-targeting framework, in which inflation is the primary target of monetary policy and interest rates are a primary policy variable through which the desired level of inflation can be achieved.

While growth and employment are also considered to be targets of monetary policy, they attract relatively little attention from monetary authorities in countries with the inflation-targeting framework. This change of priorities has a serious implication for monetary practices, namely, the targeting of low inflation and the potential compromise of the other two goals. Considering the adverse effects on employment and growth, many central banks who claim to follow inflation targeting have adopted policies which do not fit into the inflation-targeting framework, in particular the unconventional monetary policy. This policy includes monetary stimulus based on very low or zero inflation to bring economies out of recession. Although the adoption of the unconventional monetary policy can be taken as a call to abandon the targeting of inflation, many countries are still tied to their inflation-targeting framework.

This paper argues that the use of an inflation-targeting framework is theoretically and empirically unjustified. In theoretical terms, adopting inflation targeting is equivalent to a compromise on sustainable development goals, while empirically, it is unjustified because inflation targeting is often counterproductive. This paper argues that the implementation of inflation targeting frameworks has undermined the focus on economic growth and employment, which are essential aspects of sustainable development goals; the frameworks are therefore equivalent to a move away from sustainable development goals. The paper further argues that the primary assumption on which inflation targeting frameworks are based, that is, the interest rate is inversely related to inflation, is not supported by historical data. The analysis based on data from many countries provides evidence against the foundations of inflation-targeting frameworks. Furthermore, there is numerous theoretical and empirical evidence showing that the high-interest rate, the primary tool of such frameworks, is negatively associated with the progress toward numerous indicators of sustainable development goals. Finally, this paper argues that in order to progress toward the sustainable development goals, the suitable regime adapted should be a zero-interest one, which is the central focus of Islamic economic system.

The rest of this paper is organized as follows. Section 2 discusses why inflation targeting frameworks have undermined the traditional goals of monetary policy, apart from price stability. Section 3 provides evidence for why such frameworks often fail to achieve their desired goals, as indicated by the positive association

between interest rate and inflation. In the literature, such evidence is often referred to as a paradox or puzzle. Section 4 argues that since the earliest history of monetary policy, theories have been developed which support the positive association between interest rates and prices. Section 5 shows that the inflation-targeting frameworks damage the progress towards several sustainable development goals, while Section 6 concludes the discussion and makes policy recommendations.

II. INFLATION TARGETING HAS UNDERMINED THE TRADITIONAL GOALS OF MONETARY POLICY

As explained above, monetary policy has traditionally focused on several goals. However, during the last three decades, the central banks have opted for the inflation-targeting framework for their operations, but this has undermined the traditional objectives of central banking, apart from inflation.

In the 1960s, the Federal Reserve and many other central banks focused on full employment and growth as their ultimate objectives (Christian, 1968). Economists with a Keynesian macroeconomic background are of the view that it is possible to fine-tune the economy to achieve full employment with low inflation. Samuelson and Solow (1960) and Phillips (1958) advocated the famous Phillips curve argument, which posits a trade-off between unemployment and inflation, and that this tradeoff can be exploited. Therefore, employment was the primary target of monetary policy during this period.

During the 1970s and 80s, monetary targeting was the most popular monetary policy framework. In this approach, the central banks announced an explicit target of monetary aggregates. These were assumed to affect price levels, unemployment, and growth. Experts were of the view that an increase in the monetary aggregates could reduce unemployment through the channel of prices. Therefore, the intermediate targets were the monetary aggregates, while the final objectives included unemployment and growth.

In the 1990s, inflation targeting was introduced in New Zealand and subsequently in the United Kingdom, Canada and many other countries. In this approach, the central banks announce an explicit target inflation rate and use the short-term interest rate to achieve the target inflation. The framework gives primary importance to inflation, while other objectives are given secondary status.

It should be noted that among the popular targets of monetary policy, unemployment and economic growth are included in the SDGs; the goals which have been approved by the nations across the globe as common agenda for the wellbeing and future of humanity. On the other hand, the price levels are not directly associated with any of the goals. The traditional economic theories such as the Phillips Curve theory propose that there is a tradeoff between inflation and employment. Therefore, commitment to price stability indicates a compromise on employment and growth. The central banks have opted for a framework which gives secondary status to the SDG indicators.

The sustainable development goals were approved much later than the introduction of the inflation targeting regime; however, they are decided with consideration of the broader wellbeing of humanity, and it can now be seen that inflation targeting leads to a departure from the progress towards these goals. As

stated above, a number of popular economic theories posit that there is a tradeoff between inflation and unemployment. Therefore, a commitment to low inflation may imply a compromise on unemployment. Consequently, by adopting the current monetary regime, the focus of monetary policy shifted from the direct indicators of SDGs to an indicator that reflects a compromise on these indicators.

Keeping in mind the broader welfare-related objectives, some countries have witnessed frequent unannounced departures from the inflation-targeting framework. For example, quantitative easing introduced in the wake of the Global Financial Crisis was a huge departure from inflation targeting and it was adopted by many countries in 2007-08 (Fawley & Neely, 2013). The quantitative easing was actually a call to abandon the inflation-targeting framework; however, despite its success in bringing the world out of recession, many central banks are still tied to their inflation-targeting framework in the conduct of their monetary policy.

An example of one such country stuck in Pakistan. The legislation which provides legal cover to the functioning of its central bank, the State Bank of Pakistan (SBP), mentions employment and growth as its core objectives. On the other hand, in monetary policy statements released by the State Bank of Pakistan during the past three years, only inflation is presented as a justification for monetary policy action. These statements usually discuss the overall economy, but use only inflation for the justification of forthcoming monetary policy. Some samples of these monetary policy statements are discussed below.

On June 25, 2020, the Monetary Policy Committee of the State Bank of Pakistan held a meeting on reducing the policy rate from 8% to 7% in the wake of Covid-19. The decision was in fact a strategy to mitigate the effects of the pandemic and was aligned with the strategies adopted by many countries around the world. However, in these unusual times, when growth and employment were facing extreme difficulties, the SBP did not forget to mention inflation as the main reason for their decision. The monetary policy statement began as follows:

> At its meeting on 25th June 2020, the Monetary Policy Committee (MPC) decided to reduce the policy rate by 100 basis points to 7 percent. This decision reflected the MPC's view that the inflation outlook has improved further, while the domestic economic slowdown continues and downside risks to growth have increased. Against this backdrop of receding demand-side inflation risks, the priority of monetary policy has appropriately shifted toward supporting growth and employment during these challenging times[1].

The statement shows that the SBP considered growth and employment after ensuring that there is no issue with inflation. The pandemic has created serious problems for the global economies, and growth and employment witnessed major setbacks. In such a situation, it was perfectly justified for the SBP to mention growth and employment as the core reasons for the change in the policy rate. However, the State Bank was very careful in the departure from inflation targeting, feeling it necessary to justify the move by citing inflation. All the monetary statements released during the 2018-2019 period mention inflation as the core reason for choosing the policy rate. For example, the following is an excerpt from the monetary policy statement released on 16 July 2019:

1. http://www.sbp.org.pk/m_policy/2020/MPS-Jun-2020-Eng.pdf

> At its meeting on 16th July 2019, the Monetary Policy Committee decided to raise the policy rate by 100 bps to 13.25 percent with effect from 17th July 2019. The decision takes into account upside inflationary pressures from exchange rate depreciation since the last MPC meeting on 20th May 2019 and the likely increase in near-term inflation from the one-off impact of recent adjustments in utility prices and other measures in the FY20 budget[2].

This monetary policy statement was released in July 2019, a month after the release of the Pakistan Economic Survey, which reported a 3.4% decline in the GDP growth rate. For the fiscal year 2017-18, this rate was reported in the survey to be 5.5% which fell to 1.9% in the fiscal year 2018-19[3]. If there is even a secondary weightage for economic growth in monetary policymaking, the policy should respond to such a huge fall in the growth rate, and the policy adopted at the time must be expansionary. But the entire focus of monetary policy has been on inflation, and the monetary policy committee approved a 100 basis point rise in the policy rate.

Apart from Pakistan, central banks in many other countries regard inflation as their most important goal and sometimes as their only one. Therefore, Langdana (2004) notes in his book *Macroeconomic Policy: Demystifying Monetary and Fiscal Policy*:

> ECB has unambiguously and adamantly announced that a target of less than (or equal to) 2 % inflation is the only macroeconomic goal that it will attempt to attain.[4]

Similarly, Mishkin (2007) notes that

> Indeed, price stability, which central bankers define as low and stable inflation, is increasingly viewed as the most important goal of monetary policy.

The IMF recognizes the explicit focus on inflation, mentioning it in several documents and stating that "the primary role of monetary policy is to maintain price stability" (IMF, 2005, chapter 4).

This increased focus on inflation has undermined the other objectives of central banking, and some economists have started to realize this serious deficiency of contemporary monetary policy. For example, Epstein (2007) argues that despite alarming levels of unemployment in many parts of the world, some central banks do not even include it in their mandate. Following inflation targeting, the policies of central banks are focused on achieving low inflation, and international financial institutions such as the IMF support such targeting by providing technical assistance. Epstein (2007) argues that inflation-centered monetary policy has created a culture of inflation obsession. Millions of dollars are spent on studying every aspect of inflation, but with little emphasis on unemployment. Despite this extensive research, central bankers are totally unaware of how to deal with unemployment, and if someone asks them to facilitate job creation, their only reply is to say that 'it's not our job'.

2. http://www.sbp.org.pk/m_policy/2019/MPS-Jul-2019-Eng.pdf
3. http://www.finance.gov.pk/survey_1819.html
4. European Central Bank

III. INFLATION TARGETING DOES NOT WORK

Inflation targeting uses interest rates as the single most important policy tool, in the assumption that higher rates will reduce inflation. However, the empirical evidence found in every era of the history of central banking negates the existence of the inverse association between inflation and interest rates. It was Gibson who first noted a positive association between interest rates and prices in the historical UK data over a period of more than 200 years. This observation was termed by Keynes (1935) as the Gibson Paradox and endorsed it by stating that it was 'one of most established facts in the whole field of quantitative economics'. Shiller and Siegel (1977) found a positive correlation in data from the United States and the United Kingdom over the period 1729 to 1970, while Milne and Torous (1984) also find a positive correlation in firm-level Canadian data over a long time period.

Many other papers focusing on different countries have reached findings similar to those of Gibson (1923); see Rehman (2015) for more details. The most notable of these studies is that of Sims (1992), who finds that contrary to the popular theory, the response of prices to changes in interest rate is positive. Subsequently, this finding has been termed the price puzzle and has attracted much attention from economists.

Rehman (2015) and Rehman (2017) use data on interest rates, prices and a number of other covariates from a large number of countries and explore the relationship between interest rate and inflation. Rehman employs different sample periods, sample sizes and different sets of control variables in the regression of inflation on the interest rate. The author reports that the findings from most countries support the so-called price puzzle, indicating that an increase in interest rate leads to an increase in inflation. Rehman (2017) also reports that the empirical evidence supporting the price puzzle is robust to sample size, sample period, the existence or absence of control variables, and the definition of interest rate.

3.1. Recent Evidence on the Price Puzzle

In 1992, New Zealand adopted the so-called inflation targeting framework and soon many other countries follow suit. By the year 2000, many industrial and developing countries had chosen inflation targeting as their monetary policy framework. However, this trend was interrupted by the Global Financial Crisis of 2007, when many countries have to adopt Quantitative Easing to deal with the situation. Although Quantitative Easing is in stark contrast with inflation targeting, the central banks have been reluctant to explicitly declare a departure from the inflation-targeting framework. Nevertheless, regardless of the current monetary policy framework adopted by various nations, it is possible to test the primary assumption underlying inflation targeting. The basic assumption behind the inflation-targeting framework is that a reduction in interest rate would lead to higher inflation, and vice versa. However, the empirical data on the interest rate and inflation opposes the existence of such a relationship.

The literature presents substantial evidence showing that there is a positive association between interest rates and inflation. While the previous section has noted several studies documenting a positive interest rate-inflation relationship, there is also evidence in the most recent data showing that interest rate and inflation have a positive association.

We divide this evidence into two parts: first, a general overview based on global data; and second, a detailed analysis based on certain sample countries, including the United States and Pakistan.

3.1.1. Evidence from data of countries around the globe

The global overview is based on data from the period 2000 to 2020. The objective here is to empirically analyze the relationship between interest rates and inflation in countries where relevant data are available. We collected both monthly and quarterly data from January 2000 to August 2020 and divided them into various subsamples. The variables and subsamples are shown in Table 1.

Table 1.
Description of Sample Variables and Subsamples

Dependent Variable	Independent Variable
YoY Inflation, Consumer Price Index	DR: Discount Rate GBY: Government Bond Yield PR: Policy Rate
Subsamples for monthly data	Subsamples for quarterly data
Sample 1: 2000M1 to 2006M12 (before the global financial crisis)	Sample 1: 2000Q1 to 2006Q4 (before the global financial crisis)
Sample 2: 2007M1 to 2008M12 (during the global financial crisis)	Sample 2: 2007Q1 to 2008Q4 (during the global financial crisis)
Sample 3: 2009M1 to 2019M12 (after the global financial crisis)	Sample 3: 2009Q1 to 2019Q4 (after the global financial crisis)
Sample 4: 2000M1 to 2019M12 (entire sample)	Sample 4: 2000Q1 to 2019Q4 (entire sample)

The data were collected from the International Financial Statistics (IFS) online database[5]. To examine the relationship between inflation and interest rate, we estimate the following regression model:

$$\pi_t = \sum_{i=1}^{2} \alpha_i \pi_{t-i} + \sum_{j=0}^{2} \beta_j \, int_{t*-j} + \varepsilon_t \tag{1}$$

where π_t is the inflation rate, and *int* is the interest rate, as represented alternatively by the three interest rates as noted above. From the above model, the long-run impact of interest rate on inflation can be computed as:

$$\beta = \frac{\sum_{i=0}^{2} \beta_i}{1 - \sum_{j=1}^{2} \alpha_i}$$

5. https://data.imf.org/?sk=4c514d48-b6ba-49ed-8ab9-52b0c1a0179b

The sign and significance of the coefficient β were recorded, and the results are summarised in Tables 2 and 3.

The above regression equation is used to test Granger causality; i.e., whether or not the interest rate Granger causes inflation. The Granger causality test is equivalent to the test for joint restrictions on the lags of the interest rate in Eq (1).

Three regressions are calculated for each data set, first taking inflation and the interest rate only on levels, with the second regression having the level variables and the first lags, and the third lags having level variables along with lags 1 and 2.

Columns 2 to 4 of Table 2 indicate that for the sample period 2000M1 to 2006M12, 25 countries are employed to run regressions of inflation on the discount rate[6]. Out of these 25, the coefficient of the interest rate is negative in only ten, and only in five out of these ten is it significant. Therefore, evidence providing support for the negative association between inflation and the interest rate is found in only five out of the 25 countries. The insignificant and positive coefficients both indicate a failure of the inflation-targeting framework. For the same sample period, the data on government bond yields are available only for 20 countries. Out of these 20 regressions, seven produced negative signs and only three carry significant coefficients.

Table 2.
Summary of the Signs and Significance of the Interest Rate Coefficients in the Regression of Consumer Price Inflation on Interest Rates (Monthly Data)

Period	Coefficient	With Lag 0			With Lag 1			With Lag 2		
		DR	GBY	PR	DR	GBY	PR	DR	GBY	PR
2000M1 to 2006 M12	Negative	10	7	6	10	7	6	11	8	6
	Negative and Significant	5	3	4	4	3	4	4	3	5
	Positive	15	13	16	15	13	16	14	12	16
	Positive and Significant	7	9	13	6	7	12	4	6	12
	Total	25	20	22	25	20	22	25	20	22
2007M1 to 2008 M12	Negative	7	7	6	7	7	5	7	8	4
	Negative and Significant	3	5	3	3	5	2	3	6	3
	Positive	22	16	23	22	16	24	22	15	25
	Positive and Significant	19	11	19	18	10	20	17	12	19
	Total	29	23	29	29	23	29	29	23	29

6. The dataset used contained all the data available from International Financial Statistics for the period 2000-2020. However, the sample countries for each regression kept changing. For example, taking the sample period 2000-2006, some countries did not have data on the Discount Rate variable, therefore these were not included in the sample. For the same period, another set of countries did not have data on the Policy Rate; therefore, the regressions could not include these countries. Similarly, the sample countries also changed with the sample period. Some countries did not have data for the period 2000-2006, whereas others did not have data for the period 2010-2020. Therefore, instead of identifying particular countries, the number of countries with available data is given.

Table 2.
Summary of the Signs and Significance of the Interest Rate Coefficients in the Regression of Consumer Price Inflation on Interest Rates (Monthly Data) ***Continued***

Period	Coefficient	With Lag 0			With Lag 1			With Lag 2		
		DR	GBY	PR	DR	GBY	PR	DR	GBY	PR
2009M1 to 2019 M12	Negative	13	9	7	16	8	7	16	8	7
	Negative and Significant	7	4	4	7	4	3	7	4	3
	Positive	38	25	35	35	26	35	35	26	35
	Positive and Significant	21	15	27	19	15	25	19	15	25
	Total	51	34	42	51	34	42	51	34	42
2000M1 to 2019 M12	Negative	14	8	6	15	8	6	17	9	7
	Negative and Significant	5	3	4	5	3	4	5	1	4
	Positive	40	26	36	39	26	36	36	25	35
	Positive and Significant	21	17	27	21	18	27	21	17	25
	Total	54	34	42	54	34	42	54	34	42

Note: DR: Discount Rate; GBY: Government Bond Yield; PR: Policy Rate

Regressions of inflation on the interest rate are also implemented using lags so that if the monetary policy works with a lag period, its effect can be captured. With multiple lags, it is necessary to report the coefficient of the Static Long-Run Solution instead of signs of any specific lag. The results are summarised in columns 5 to 7 of Table 2. The results indicate that for the sample period 2000M1 to 2006M12, 25 regressions of inflation on the discount rate are estimated, and out of these, the coefficient of the interest rate is negative only in ten countries, with four producing negative signs with significant coefficients. Contrary to this, 15 countries produce positive coefficients, with six of these being significant. This means that evidence providing support for the negative association between inflation and the interest rate is even weaker in the regression with one lag.

Column 8:10 indicates results using two lags, with the results being very similar to the first two cases. For the sample periods 2007-08, 2009-19 and 2000-19, the results are also similar in nature. The similarity of the results in the different samples indicates that the nature of the relationship between inflation and interest rates does not change before and after the Global Financial Crisis.

Table 2 summarizes the results of the 1215 regressions, of which 310 (26%) produce negative coefficients and 905 (74%) produce positive ones. Significant coefficients with negative signs stood at only 12%, and about half (49%) of the regressions produced results with positive and significant coefficients. The results that can be considered as evidence for the validity of the inflation-targeting framework are only a total 12%, a figure which is likely to reduce further when the control variables are added to the regression.

It should be noted that inflation targeting is justified only when the interest rate is able to reduce inflation. If the effect of rates is insignificant, higher inflation will only lead to a reduction in growth and employment, which cannot be justified. Therefore, all the insignificant results can be taken to run counter to the inflation-targeting framework. The positive and significant coefficients indicate that the inflation-targeting framework is counterproductive; that is, it leads to results opposite to those anticipated, which tallies with the Gibson paradox.

A similar analysis with the same variables and sample periods is performed using quarterly data, with the results summarised in Table 3.

Table 3.
Summary of the Signs and Significance of the Interest Rate Coefficients in the Regression of Consumer Price Inflation on Interest Rates (Quarterly Data)

Period	Coefficient	With Lag 0			With Lag 1			With Lag 2		
		DR	GBY	PR	DR	GBY	PR	DR	GBY	PR
2000Q1 to 2006Q4	Negative	13	9	10	14	12	12	17	8	12
	Negative and Significant	6	5	6	8	6	9	10	5	9
	Positive	20	36	36	18	33	34	16	37	33
	Positive and Significant	14	27	30	11	20	27	11	22	27
	Total	33	45	46	32	45	46	33	45	45
2007Q1 to 2008Q4	Negative	12	13	20						
	Negative and Significant	8	8	12						
	Positive	19	34	35						
	Positive and Significant	16	23	28						
	Total	31	47	55						
2009Q1 to 2019Q4	Negative	12	17	13	17	15	16	20	16	30
	Negative and Significant	2	7	7	2	7	8	3	10	10
	Positive	43	52	73	38	54	70	33	53	56
	Positive and Significant	30	32	53	24	31	47	21	29	41
	Total	55	69	86	55	69	86	53	69	86
2000Q1 to 2019Q4	Negative	15	12	11	19	12	12	18	17	19
	Negative and Significant	3	5	4	2	4	5	2	6	6
	Positive	53	58	77	49	58	77	49	53	70
	Positive and Significant	34	41	60	31	39	58	29	36	52
	Total	68	70	88	68	70	89	67	70	89

Note: DR: Discount Rate; GBY: Government Bond Yield; PR: Policy Rate

Columns 2 to 4 in Table 3 indicate that for the sample period 2000Q1 to 2006Q4, there are 33 countries for which we can run the regressions of inflation on the discount rate. Out of these, the coefficient of the interest rate is negative in 13, all of which have negative signs, with six countries producing significant results. Therefore, evidence providing support for the negative association between inflation and interest rate is found in only six out of the 33 countries. Regressions of inflation on the interest rate with lags are not made for the sample 2007Q1 to 2009Q4 because of the degree of freedom problem.

Table 3 summarizes the results of 1810 regressions, of which 443 (24%) produce negative coefficients and 1367 (76%) positive ones. Significant coefficients with negative signs only represent 10% of the total, and more than half (52%) of the regressions produce positive and significant results. The results that can be considered as supporting the inflation-targeting framework total 10% in the quarterly data, whereas in the monthly data such results are observed for 12% of the regressions.

3.1.2. Evidence from Sample Countries

As stated in section 3.1.1., to analyze the relationship between inflation and interest rate, we give an overview of many countries and a detailed analysis of two, the United States and Pakistan. The US data on interest rates and inflation provide very clear evidence of the failure of the inflation-targeting framework.

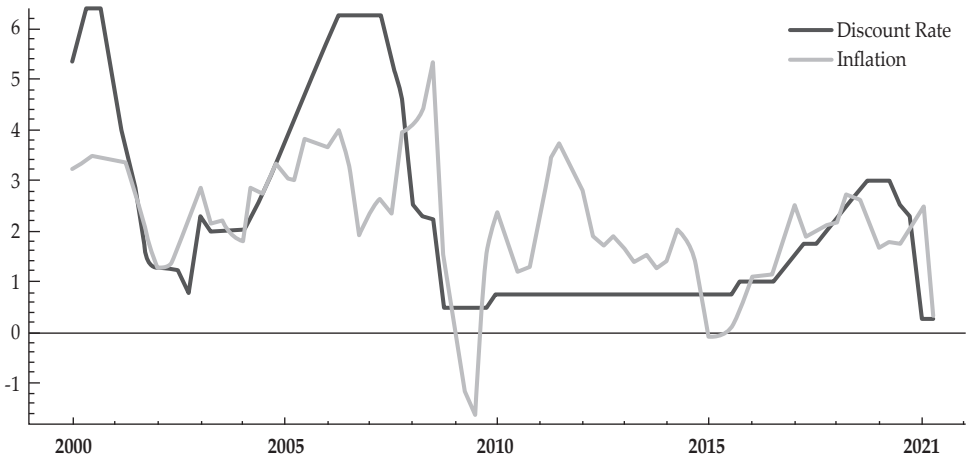

Figure 1.
Interest Rate and Inflation in the United States for the period 2000M1 to 2020M8

In the United States, during the five years before the Global Financial Crisis (2002-2006), the average discount rate was approximately 3.18%, the average policy rate was 2.53%, and the average level of inflation was 2.6%. In 2007, the global financial crisis hit many major economies, including the United States, and the discount rate was reduced gradually to 0.125% in order to boost the economy.

During the five years after the end of the crisis (2009-13), the average discount rate was 0.7%, and the average policy rate was 0.125%. This marked a huge reduction in the policy rate, and if the logic behind inflation targeting was functional, then inflation after the crisis should have been higher. However, the data show that the average inflation during the five years after the crisis was 1.6%, far below the level recorded in the period before it.

It can be argued that the Global Financial Crisis was an extremely unusual event and might have changed the structure of the economy; therefore, data before and after it should not be used to draw conclusions on the validity of inflation targeting. However, it is possible to observe the correlation between interest rate and inflation in the periods before and after the crisis separately. Table 4 gives a summary of the correlations between interest rate and inflation in the period before the Global Financial Crisis (2000Q1-2006Q4).

Table 4.
Correlation between Inflation and Different Interest Rate Levels in the United States (2001-2006)

	Government Bond Yield	Policy Rate	Discount Rate
Lag 0	0.248	0.669	0.759
Lag 1	0.110	0.571	0.684
Lag 2	0.120	0.421	0.572

The correlation matrix shows that the correlations between all three interest rates and inflation are positive, even before the crisis. The correlation between inflation and lagged interest rates is also summarised as capturing potential lag in the transmission mechanism. If inflation targeting was a functional mechanism, the interest rate should negatively affect inflation. However, the results show that the correlation between lagged interest rates and inflation also has a positive sign. The correlation is also significant for the policy and discount rates. For a more detailed analysis, we apply Granger causality between the interest rate and inflation using four lags of quarterly data. The results are summarised in Table 5.

Table 5.
Results of Granger Causality tests for United States Data

Hypothesis	Sample Period 2000 Q1 to 2006Q4			Sample Period 2009 Q1 to 2020Q2			Sample Period 2000 Q1 to 2020Q2		
	Test Stat	P-value	Coeff. of Int. Rate	Test Stat	P-value	Coeff. of Int. Rate	Test Stat	P-value	Coeff. of Int. Rate
Government Bond Yield Causes Inflation	2.179	0.122	0.355	0.919	0.44	0.621	4.347	0.007	0.55
Policy Rate Granger Causes Inflation	1.517	0.24	0.211	1.793	0.164	0.243	5.15	0.002	0.414
Discount Rate Granger Causes Inflation	1.58	0.224	0.293	2.33	0.089	0.264	5.123	0.002	0.419

The table shows that the interest rate does not Granger cause inflation in all three interest rates if the sample period is in the pre-crisis era and that Granger causality is also absent in the post-crisis data. This means that the functionality of the inflation-targeting framework is not validated. There exists evidence of Granger causality when we employ the full sample. The absence of Granger causality goes against the validity of the logic of the inflation-targeting framework, as the framework rests on the assumption that inflation can be reduced by increasing the interest rate. Therefore, the pre- and post-crisis data are contrary to the validity of the inflation-targeting framework.

When we take the whole sample, we see the presence of Granger causality. The Granger causality test indicates that the interest rate has an effect on inflation, but it does not give the direction of the relationship. Conventional wisdom, which is also the basis of the inflation-targeting framework, assumes that inflation falls if interest rates rise. However, contrary to this, Gibson (1923) observes that an increase in the interest rate would increase inflation. Both cases indicate Granger causality; however, the direction of the effect on inflation is opposite in the two cases. Therefore, it is necessary to find the sign of the interest rate so that it can be determined whether the causality is supporting the Gibson paradox or the inflation-targeting framework. For this purpose, we calculate the Static Long-Run Solution from the estimated equation. The results are summarised in Table 2 under the column heading 'Coefficient of interest rate'. We find that in all nine cases, the sign of the coefficient is positive. This means that wherever it is shown in Table 2 that there is Granger causality, this supports the Gibson paradox and invalidates the inflation-targeting framework.

The second example employed focuses on data from Pakistan. A graph of the T-bill rate and inflation for the country is given in Figure 2.

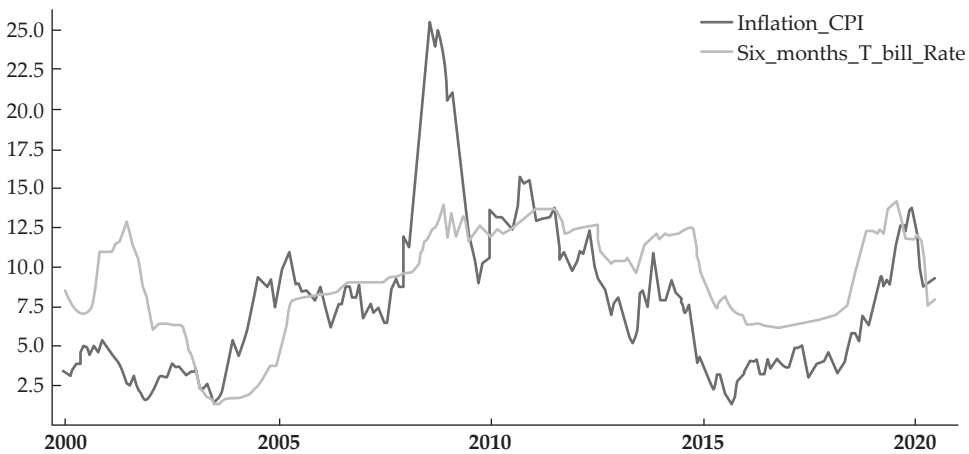

Figure 2.
Graph of Treasury Bill Rate and Inflation for Pakistan, 2000-2019

The graph indicates that higher inflation is associated with a higher interest rate, and vice versa. For more detailed analysis, the Granger causality test is conducted, with the results are summarised in Table 5. In Pakistan, the Global Financial Crisis did not damage the economy significantly; therefore, the period is not separated. The results are shown in Table 6.

Table 6.
Results of Granger Causality for Pakistani Data, 2000 to 2019

	2000M1 to 2008M12			2009M1 to 2019M12		
	F-Stat	P-value	Coefficient of Interest Rate	F-Stat	P-value	Coefficient of Interest Rate
Discount Rate Granger Causes Inflation	0.78	0.59	-1.72	0.77	0.57	0.27
Six Month T-bill Rate Granger Causes Inflation	1.12	0.35	-1.25	1.97	0.08	0.17

The results indicate that Granger causality does not exist in any of the four cases summarized in Table 6, which means there is no support for the validity of the inflation-targeting framework in the Pakistani data.

IV. NO PARADOX - NO PUZZLE

The popular economic theory proposes that a higher interest rate should lead to lower inflation. It posits that a higher interest rate compels the public to consume less, especially in the case of durables, leading to a reduction in aggregate demand and, therefore, a fall in inflation. On the contrary, empirical data throughout history have supported the positive association between interest rate and prices. As there is an absence of a theory to explain this positive association, it is termed as a paradox and/or puzzle.

In fact, it is neither a puzzle nor a paradox. One of the oldest theories on the relationship between interest rate and prices, known as Tooke's *Banking School Theory*, predicts a positive relationship between the two variables. Tooke (1793-1858), the founder of Banking School theory, was the first to write on the dynamics of prices in *A History of Prices and of the State of the Circulation, from 1793 to 1837*. He is often referred to as the father of monetary economics. His Banking School theory argues that interest rate is a part of the cost of production. If the interest rate is increased, the cost of production will also increase, leading to a higher equilibrium price level. If the policy rate is higher, the lending rate will also be higher, which will discourage investors from investing. This will cause a reduction in aggregate supply, leading to a higher equilibrium price level. The theory was reformulated as the Cost Channel of Monetary Transmission when researchers started looking for explanations of the so-called Gibson paradox. To date, a large number of papers have been written supporting the cost channel (see, for example,

Barth & Ramey, 2001; Chowdhury et al., 2006; Ravenna and Walsh, 2006; Tillmann, 2008; and Rehman, 2015).

Another explanation of the positive association between inflation and interest rate lies in the fact that the policy rate determines the markup payments on public domestic debt. The higher the policy rate, the higher these payments. The government will need to increase taxes to finance debt obligations, and these surplus taxes will increase inflation.

Many nations across the globe have a high level of debt borrowed from the domestic market. For example, in the United States, the debt to GDP ratio is above 100%, and in Pakistan, it is around 86%. Public debt usually includes a high proportion of domestic debt borrowed from domestic banks and financial institutions by selling short-term and/or long-term government securities, such as treasury bills. The markup on these debts is very closely associated with the policy rate. If a country has a domestic debt equal to 50% of GDP, a 2% markup on this debt would be equal to 1% of the GDP of the entire country. This markup is paid to lenders every year. For many governments, the markup payment comprises a very high proportion of the annual budget. For example, in Pakistan, out of a total federal budget of PKR 6345 billion, 2631 billion is reserved for markup payments on domestic debt. A rise in the policy rate increases the markup payments on short-term debts and early maturity long-term debts. To finance these payment obligations, the government needs to increase taxes and reduce subsidies, actions which cause an increase in price levels instead of reducing them.

Pakistan has a domestic debt of around PKR 23 trillion[7], of which about 25% is short-term debt. If the policy rate is reduced by 2%, this will create a relief of PKR 120 billion in the markup payments on short-term debt. Long-term debt can have different maturity dates; debt maturing in the near future will have a lower markup rate, resulting in a lower markup payment burden. This relaxation in the fiscal space will provide space for tax relaxations and subsidies, which in turn can reduce inflation.

V. INFLATION TARGETING DAMAGES SUSTAINABLE DEVELOPMENT GOALS

It should be noted that the welfare costs of inflation, which are a very important concern for many social policymakers, are not among the reasons for adopting inflation targeting. Inequality is a very important social concern and has a close theoretical link with inflation. The sustainable development goals include a reduction in income inequality. In addition, monetary economists believe that monetary policy can be employed to control inflation. This automatically implies that monetary policy is indirectly linked to inequality. Many researchers, including Nordhaus (1973), Rothbard (1994), Romer and Romer (1999), Fowler (2005) and Easterly and Fischer (2001), have demonstrated strong direct and indirect theoretical linkages between monetary policy and income inequality. Therefore, it is highly likely that monetary policy will affect progress towards SDGs. Owing to the significance of income inequality in these goals, and the links between monetary policy and inequality, the monetary policy modeling should never ignore the

7. https://www.sbp.org.pk/ecodata/cengovdebt.pdf

effects of such policy on inequality. However, it seems that the costs of inflation and the progress towards SDGs are subjects with which monetary authorities have little familiarity. For monetary economists, inflation targeting seems to be quite neutral with regard to socioeconomic implications; therefore, despite having sufficient resources, the central banks never pay attention to exploring the link between monetary policy and socioeconomic indicators. This is why Yves Mersch, a member of the executive board of the European Central Bank, when addressing a corporate credit conference in Zurich, admitted that:

> As I noted at the start, the ECB has a clear mandate to deliver price stability – and that mandate does not involve policies aimed at the distribution of wealth, income or consumption. Nevertheless, we need to be aware that there are distributional consequences of our actions (Mersch, 2014).

Below are some examples of how monetary policy can affect socioeconomic indicators in general, and SDGs in particular.

1) Economists assume that there is a trade-off between unemployment and inflation. They believe that if inflation rises, unemployment will fall, and vice versa. Therefore, targeting inflation may imply a compromise on unemployment, which is one of the indicators of SDGs. This means that monetary policy is related to Goal 8, decent work and employment;
2) A rise in the policy rate to control inflation would lead to an increase in the costs of doing business, and increased pressure on employment. Business and employment are also SDG indicators. The cost of doing business is associated with Goal 8, decent work and employment and Goal 9, industry, innovation and infrastructure; and
3) A rise in the policy rate will increase the government's debt servicing and lead to rises in the budget deficit. In turn, the government will find it difficult to maintain allocations for education and health. Therefore, Goal 3, good health and wellbeing and Goal 4, quality education, will be compromised.

In a similar way, dozens of theoretical linkages can be found between SDG indicators and monetary policy. It would be too lengthy a process to discuss all links, so a summary is given of the nature of the observed relationship between the policy rate and some of the important socioeconomic indicators, which will provide an idea of how the inflation-targeting framework affects progress towards the sustainable development goals.

Table 7 indicates the relationship between the policy rate and several business-related indicators. The table shows that we could find data from 204 countries on two variables: (i) the cost of business and (ii) the policy rate, in order to run a regression. Out of these 204 countries, in 152 the relationship between the cost of business and the policy rate was positive, indicating that a rate leads to a higher cost of business and lower business opportunities. The data on domestic credit to the private sector was found for 221 countries, of which 141 exhibit negative a relationship between the policy rate and credit. This indicates that bank lending to the private sector falls in line with an increase in the policy rate. This indicates a negative association between the policy rate and SD Goals 8 and 9.

Table 7.
Nature of the Relationship between the Policy Rate and Indicators of Business for Countries across the Globe

Indicator	Percent of Coefficients with Negative signs	Number of Coefficients with Negative Signs	Number of Coefficients with Positive Signs
Cost of business start-up procedures (% of GNI per capita)	26%	52	152
Domestic credit to private sector (% of GDP)	64%	141	80
Domestic credit to private sector by banks (% of GDP)	67%	147	74
Ease of doing business score (0 = lowest to 100 = best performance)	57%	95	71
Employment in services (% of total employment)	82%	177	38
Export volume index (2000 = 100)	71%	156	65
Exports as a capacity to import (constant LCU)	81%	160	37
GNI growth (annual %)	54%	101	86
Informal employment (% of total non-agricultural employment)	57%	31	23

Table 7 shows the relationship between the policy rate and several business-related indicators. It was possible to find data from 204 countries on two variables to run the regression of the cost of business on the policy rate. Out of these countries, in 152 the relationship between the cost of business and policy rate was positive, indicating that a higher policy rate leads to higher business costs and fewer business opportunities. Data on domestic credit to the private sector was found for 221 countries, of which 141 exhibited a negative relationship between the policy rate and such credit. This automatically indicates that higher policy rates reduce the ease of business. Similarly, negative effects of the interest rate on ease of doing business, employment, exports, GNI growth and informal employment can be seen in the table.

Table 8 summarizes the findings on the relationship between education-related indicators and the policy rate. It indicates that in the majority of countries, educational indicators such as educational expenditure are negatively associated with the policy rate. This is because a higher rate will increase the government's current obligations, exerting downward pressure on the allocation for education.

Table 8.
Nature of the Relationship between the Policy Rate and Indicators Related to Education for Countries across the Globe

Indicator	Percentage of Coefficients with Negative Signs	Number of Coefficients with Negative Signs	Number of Coefficients with Positive Signs
Current education expenditure, primary (% of total expenditure)	56%	81	64
Current education expenditure, secondary (% of total expenditure)	56%	82	65
Government expenditure on education, total (% of GDP)	55%	106	86

As with education, allocations for health are also affected by higher policy rates through the same mechanism. This is evident from Table 9, where the relationship between the policy rate and health-related indicators is summarised.

Table 9.
Nature of the Relationship between the Policy Rate and Health Indicators for Countries across the Globe

Indicator	Percentage of Coefficients with Negative Signs	Number of Coefficients with Negative Signs	Number of Coefficients with Positive Signs
Current health expenditure (% of GDP)	68%	148	71
Domestic general government health expenditure (% of GDP)	68%	150	70
Domestic general government health expenditure (% of general government expenditure)	66%	145	75

As shown in Table 9, an increase in the policy rate increases interest payments and reduces fiscal space, which in turn reduces the allocation of health expenditure. Out of the 229 countries for which data were available, in 148 a higher policy rate was associated with a reduction in health expenditure, leading to a departure from SD Goal 3.

Finally, Table 10 summarizes the relationship between the interest rate and indicators of the general welfare, including poverty and inequality. The table indicates that out of 165 countries, in 102 an increase in policy rate is associated positively with GINI, an index of inequality. This shows that a higher policy rate is associated with a higher level of inequality, distancing nations from SD Goal 10.

Table 10.
Nature of the Relationship between the Policy Rate and Indicators of General Welfare for Countries across the Globe

Indicator	Percent of Coefficients with Negative Signs	Number of Coefficients with Negative Signs	Number of Coefficients with Positive Signs
GINI index (World Bank estimate)	38%	63	102
Income share held by fourth 20%	60%	97	66
Income share held by highest 20%	37%	60	105
Increase in poverty gap at $1.90 ($ 2011 PPP) poverty line due to out-of-pocket healthcare expenditure (% of poverty line)	35%	33	61
Increase in poverty gap at $3.20 ($ 2011 PPP) poverty line due to out-of-pocket healthcare expenditure (% of poverty line)	42%	43	58
Physicians (per 1,000 people)	71%	149	61
Poverty headcount ratio at $1.90 a day (2011 PPP) (% of population)	34%	55	109
Poverty headcount ratio at $3.20 a day (2011 PPP) (% of population)	33%	54	110
Poverty headcount ratio at $5.50 a day (2011 PPP) (% of population)	27%	44	121

Similarly, the association between the indicators of poverty and policy rate is positive for most of the countries. The share of income of the poorest 20% has a negative association with the policy rate, showing that an increase in the rate will reduce the income share of the poorest people, indicating a rise in inequality and a departure from the sustainable development goals.

The results summarized in the paper are the regression-based ones, most of which are just bivariate regression, taking the policy rate as independent variables. In real life, such models are not very reliable. For reliable results, it is necessary to include all the relevant variables in the models. Therefore, in this case, the results are only indicators of the nature of the relationship. However, large numbers of indicators of the same nature provide strong evidence. In all the indicators that we have seen, we find an association between the policy rate and the distancing from the sustainable development goals. Since logic exists for each of the clues found, collectively all the evidence makes a strong case against the validity of the inflation-targeting framework; and a negative association between the policy rate and the indicators of sustainable development goals.

VI. CONCLUSION AND POLICY RECOMMENDATIONS

6.1. Conclusion

Various evidence has been presented which shows that the inflation-targeting framework has undermined the other objectives of monetary policy, which are consistent with the sustainable development goals. Many prominent central bankers, such as Mersch (2014) and Mishkin (2007), have admitted this fact. The choice of inflation as a primary target means a compromise on employment and growth.

Evidence is presented showing that the inflation targeting framework fails to achieve its objective; i.e., a desired level of inflation. Many of the results indicate that inflation targeting is actually counterproductive and in fact increases it.

It is also shown that the positive association between interest rate and inflation is neither a puzzle nor a paradox. Theory in place since the time of Tooke (1838) has shown that higher interest rates may cause higher inflation. Besides the theoretical explanations for this found in the literature, this paper argues that another reason for the positive association between inflation and interest rate is the markup payment on domestic debt, which leads to numerous problems and leads to a distancing from the sustainable development goals.

6.2. Recommendations

In light of the above, this paper argues that the inflation-targeting framework is not a suitable policy framework and that higher policy rates lead to several undesirable consequences. Therefore, inflation targeting must be abandoned, with quantitative easing being one alternative.

The success of QE and the failure of inflation targeting indicate that the closer we are to a zero-interest regime, the better placed we are to run the economy. However, there is another harmful effect associated with the QE, in that depositors receive no rewards, even if borrowers make a huge profit on their money. This harms pensioners and old people, who depend on their savings in later life, and has become a big problem in western society. A profit-loss sharing arrangement would be better for both borrowers and lenders, as they will share the benefit if any. Muslim societies need to explore the profit-loss sharing option for a monetary policy so that both borrowers and lenders can share the advantages.

This paper provides sufficient evidence to show the obvious failure of the interest rate-based inflation targeting framework. Islamic economists need to develop monetary policy tools which have their roots in Islamic principles.

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