INFLATION ANALYTICS

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PIDE

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EXECUTIVE SUMMARY

Inflation[1] is projected to fall between 10.0 to 10.5 per cent in FY2022 and 11.0 to 11.5 per cent in the first half of FY2023. Inflation (YoY) is expected to remain in the range of 11.5 to 12.0 per cent by end-June 2022 and 8.5 to 9.0 per cent by December 2022.

Pakistan Institute of Development Economics (PIDE)'s inflation forecasting models predict inflation to remain between 10.0 to 10.5 per cent in FY2022 and 11.0 to 11.5 per cent in the first half of FY2023. Compared to forecasts made by the State Bank of Pakistan (7 to 9 per cent), the International Monetary Fund (8.5 per cent) and the Asian Development Bank (7.5 per cent), PIDE forecasts inflation to remain substantially higher. PIDE also expects inflation to persist in double digits till December 2022 with an upward momentum through the remaining part of FY2022 and the first half of FY2023. PIDE strongly believes that there will be a significant upward revision in the State Bank of Pakistan's forecasts (expected range of 9.0 to 11.0 per cent from the previous forecast of 7.0 to 9.0 per cent).

Despite being significantly higher than forecasts by other institutions, PIDE's forecast is perfectly in line with the results of the Survey of Industry experts.[2] More than 80 per cent of the respondents expected inflation in FY2022 to remain between 9.5 to 11.0 per cent. The respondents also believed that inflation will remain in double digits in the next two fiscal years and will only be back to a single digit in FY2024. Survey participants also expected GDP growth to remain between 4.0 to 4.7 per cent in the next several years.

PIDE analysis also indicates that inflation persistence has risen and will further rise in the next five quarters. Out of 94 composite commodities, around 70 commodities are projected to continue with double-digit growth in their prices. Out of these 70, more than 25 commodities are projected to grow at more than 14 per cent. PIDE also anticipates inflation to remain broad-based with both food and non-food items contributing to high inflation. The measures of uncertainty and fan charts also indicate that inflation is expected to remain within the range predicted by PIDE's models.

The increasing trend of inflation with high persistence and a broader base supports PIDE's suggestion for an immediate adjustment in the policy rate by at least 75 basis points. PIDE's inflation forecasting models anticipate a one per cent increase in electricity prices, translating into an 8 per cent increase in fuel prices and an upward policy adjustment of 75 basis points in policy rate within the next two months given the prior information that Pakistan requires at least a 14 per cent increase in electricity prices to overcome the crushing burden of ever-increasing circular debt. We introduced an additional shock of 13 per cent in the next five months and found that with the full adjustment of electricity shock, inflation could go up 0.43 per cent in FY2022 and 0.66 per cent in the first half of FY2023. Similarly, the additional shock of 10 per cent in fuel prices could further push the inflation by 0.32 per cent in FY2022 and 0.46 per cent in the first half of FY2023. The inflation forecast anticipates 8 per cent policy rate and expects inflation to come down by 0.26 per cent by December 2022 with every 100 basis points increase in the policy rate.

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1. Inflation means average CPI (Consumer price Index) Inflation.
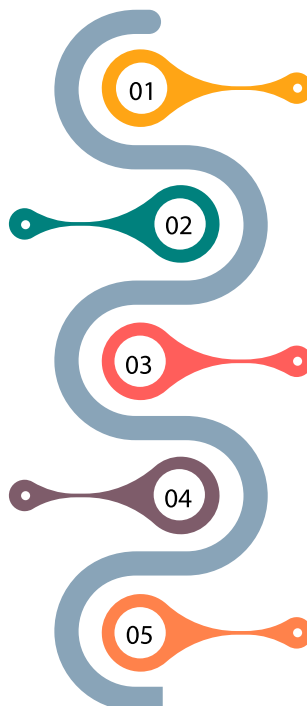2, PIDE conducted the survey and recorded responses of 61 respondents.

INTRODUCTION

Nowadays, inflation is the talk of the town. Almost everyone is talking about the purchasing power of the people against the backdrop of rising inflation. Therefore, it is important to analyse the kind of future path it will take so that an appropriate policy option can be taken well in advance because once inflation starts to pick up or enters the double-digit zone then reversing the trend takes time. Therefore, knowing the forward-looking path is very important. In addition to this, there is a serious lack of any publication/report on inflation forecasting from an independent think tank. And even if some policy-making institute forecasts inflation on a regular basis, the results are not available for the public/stakeholders to use, comment on, and discuss; rather these forecasts are utilised for internal decision-making. Thus, these forecasts are considered biased. Therefore, given this in view, the present study provides an independent and unbiased forward-looking assessment of inflation. Specifically, this study provides a forward-looking forecast of inflation by using state-of-the-art econometric models along with the inflation survey based on professional expectations. Along with the forecast, the study provides an analysis of the sources of inflation, the sources of future inflationary pressures, uncertainty analysis, and sensitivity analysis.

Keeping this backdrop in view, the present study is built upon the question of how can we help the government to identify the dynamics of recent inflation and what kind of path it would take in the future. Given this research question, we conducted a detailed analysis of inflation and its dynamics.

The objectives of the study are as follows:

01 — This study provides a forward-looking assessment of "inflation."

02 — The assessment includes an inflation forecast, based on theoretical and empirical models, and an analytical piece on potential determinants of inflation.

03 — The study also includes assessments of the response of inflation to shocks, such as monetary, fiscal, external, oil price, seasonality, and other shocks.

04 — The study also includes a scenario to make inflation forecasts more comprehensive and suggestive.

05 — An additional objective of the inflation forecast is to start a survey-based inflation expectation product that is based on international best practices and presents the market view. This will give us the viewpoint of other professional forecasters on inflation.

As mentioned earlier, investigating the source of inflation is important to shape the policy. Similarly, forecasting also plays a vital role in the making of economic policy. It is well known that the economic consequences of a policy decision made today unfold over time. Similarly, a new policy is typically intended to remain in place for some period. The present project has several policy linkages in the current scenario of the country. First, the exchange rate policy is strongly linked to inflation. Second, the speed and the direction of inflation are linked to the monetary policy of the State Bank of Pakistan (SBP). Third, fiscal policy is also strongly linked to inflation, keeping in view the increase in administrative prices of different commodities, for example, wheat, sugar and energy. A huge inflationary pressure may trigger the wage-price spiral as well. Fourth, since the government is going to elections after the next one and a half years, huge government expenditures are expected. Increased government expenditures will give an additional jump in inflation. In this way, the current study is very relevant and strongly connected with the current policymaking.

The rest of the study is organized as follows. A literature review is presented in Section 2 to justify inflation forecasting. Section 3 presents the econometric specifications of the models. Section 4 presents the findings of the study. Section 5 concludes the study and also provides thematic advice.

LITERATURE REVIEW

Macroeconomic forecasts are an essential component of policy decisions taken at the highest level. These forecasts contribute to the balance of risks and uncertainties regarding the overall economic outlook and policy responses. While there is a considerable amount of effort in developing such forecasts depending upon the tools utilized in the process, the judgement of a forecaster also has a role in the forecasting process. These forecasts are an integral part of the policy-making process as they motivate to ask questions regarding the present state of the economy such as what drives a particular state in short and medium terms, and what would be the future path of the economy. Hence, in the process, the forecaster gets answers about the appropriateness or inappropriateness of the policies and corrections.

The lags in the response of macroeconomic activity to the policy decisions indicate the significance of forecasting and forward-looking policy considerations. Therefore, the forecast must have a sufficient lag length to analyse the impact of policy decisions on macroeconomic activity. However, the significance of macroeconomic forecasts should not be misunderstood as requiring detailed numerical analysis. While the point forecasts provide an overall indication of the economic variable, the prime focus should be on the broader outlook of the economic environment. That is why the judgements about the risks and uncertainties surrounding the economic outlook get centre stage and the policy decisions are not taken solely based on forecasts (Lawrence, *et al.*, 2006).

Over the last twenty years or so, macroeconomic forecasting has witnessed many pathbreaking developments, particularly in the areas of model selection and real-time forecasting using large cross-section data sets (Elliot & Timmemann 2016). However, there exists no forecasting method or model that applies to every economic variable. Therefore, a variety of forecasting methods are available that advocate for combining different areas. Similarly, Elliot & Timmermann (2007) conclude that purely statistical approaches based on complicated 'black box' approaches have, with a few exceptions, so far failed to generate much attention among economists and are not used to the extent one might have expected.

Correspondingly there are many ways to forecast inflation ranging from sophisticated statistical models to methods based on instincts based on past experiences, and survey-based predictions. Economic agents are more concerned about inflation forecasts than any other economic variable as everybody is concerned about current and future prices. For example, businesses and households require such forecasts to make well-informed decisions. Central banks and/or governments, on the other hand, are interested in inflation forecasts to monitor developments and make corrections where necessary as it is their job to contain the prices.

Inflation tends to be a relatively persistent process, which means that future inflation can be predicted from the current and past values of inflation. From the information embedded in past values, two basic models have been constructed to forecast inflation. One is based on regression analysis and the other is based on naïve specification developed by Atkeson and Ohanian (2001).

These basic models can be improved further by incorporating three other types of information. Firstly, the models can be improved with the inclusion of economic activity variables into the regression equation. This is a common approach and is often referred to as Phillips Curve. Secondly, the models can be improved by including the investigation of the measures that reduce the volatility in headline inflation, such as core inflation, to get precise information on the underlying phenomenon. Thirdly, the survey-based forecasts might have some useful information to predict inflation (Meyer and Pasaogullari, 2010).

Theoretically, the measures of economic activity are thought to be effective in predicting inflation, and the indicators such as real GDP, unemployment, manufacturing, etc. are considered to improve inflation forecasts. For example, when the output is rising at a faster pace, i.e., rapid economic growth, the unemployment rate will be lower which leads to increased prices resulting in a higher inflation rate. On the contrary, when growth is slower, the unemployment rate is high, consequently, prices tend to be disinflationary. Hence, it is really important to comprehend what helps in forecasting inflation for the modern economy. For effective policymaking, accurate and appropriate data is required to assess the current state of an economy, which is generally available in the case of developed countries. However, developing as well as emerging countries face the perpetual issue of scarce macroeconomic data, which is released with a considerable delay and at a low frequency (Qin, *et al.*, 2006). Furthermore, developing economies, as compared to developed and emerging economies, also face a plethora of issues as the central banks have to deal with a broader set of objectives simultaneously, (J. Ha 2019). Besides, low-income countries have to cope with frequent domestic supply shocks, especially in agriculture production due to, for instance, bad weather, which often leads to an increase in food prices (Frankel, 2011).

Inflation forecasting for emerging economies is not only limited but has shown inconsistencies when compared to advanced economies (Pincheira and Medel, 2015; Mandalinci, 2017). These inconsistencies might be due to a shift in monetary policy regimes in emerging economies, and many of these countries have adopted the inflation-targeting regime in the last decade as well as due to increased globalisation (Duncan and Martinez-Garcia, 2018). These changes have put forecasters and policymakers in a formidable challenge to forecast inflation for emerging economies.

Many of the studies, for instance, Liu and Gupta (2007), Aron and Muellbauer (2012), and Medel *et al.* (2016), predicting inflation for emerging countries have a drawback of limited cross-section and time-series dimensions with very few countries in the sample. Mandalcini (2017) included nine emerging economies in his study. Furthermore, the studies on emerging economies also completely ignore the forecasting random walk model developed by Atkeson and Ohanian (2001). This model is also not included on the list of forecasting tools of the central banks of emerging economies (Hammond, 2012). Duncan and Martinez-Garcia (2018) have argued that it is easier to forecast inflation for emerging countries using the random-walk Atkeson and Ohnain approach which gives robust results. However, it is harder to explain the results because of lacking economic intuition behind the model. This model has outperformed many economics-backed models for inflation

forecasting including Phillips curve settings, which has performed considerably well in the case of developed economies (Duncan and Martinez-Garcia, 2015; Kabukcuoglu and Martinez-Garcia, 2018). The obstacles in modelling all the pertinent aspects of an economy as well as tracking the developments and structural breaks over time give rise to random-walk Atkeson and Ohanian-based models.

As discussed, Atkeson and Ohanian (2001) have shown that the closed economy forecasts developed by the Phillips curve-based models are inaccurate compared to those obtained from naïve specifications. Similarly, Stock and Watson (2007) also argued that the Phillips curve-based models produce precise results only rarely. As a result, Kabukcuoglu and Martinez-Garcia (2018) developed a Phillips curve model based on the theoretical foundations of the open economy, which is theoretically sound but produces mixed results empirically. The studies that support the open economy Phillips curve model settings include Eickmeier and Pijnenburg (2013) and Kabukçuoglu and Martínez-García (2016) and the ones that find weaker support include Ball (2006) and Milani (2010).

So far, we have discussed models for predicting inflation that are either based on time series properties or some economic relationships. However, in the literature, another way of predicting inflation is through surveys of expected inflation. In the surveys, questions are asked of professional economists or consumers regarding their views on expected movements of inflation and other economic variables in future. The market-based surveys, therefore, can be seen as a complementary source of information on expected inflation. Central banks across the globe use these surveys for continuous analysis of the economic environment and the risks attached to the developments for policymaking purposes.

The effectiveness of surveys in forecasting inflation has been discussed in detail by Ang, Bekaert and Wei (2007), and they consider survey-based measures of expected inflation to produce better results than alternatives. In contrast, Bharat (2015) argues that the quality of the surveys in predicting inflation has declined over time since consumers weigh recent inflation data more while forming expectations, whereas professionals show lesser interest in headline inflation and rely on core measures of inflation. However, little evidence is available on the forecasting performance of survey-based measures. The gap, to some extent, is filled by Grothe and Meyler (2015) who observed that these surveys contain predictive information for future inflation in the short-term in the Euro area and the United States.

In the case of Pakistan, several studies have been conducted on inflation and finding its determinants employing either vector auto-regressive or cointegration techniques. For example, Shamsuddin and Holmes (1997) could not find a long-run relationship between inflation, M2, and GDP, and found that the ARMA model is considered to produce the best forecasts for inflation. Ahmed and Ali (1999, 1999a) found import prices and money supply as the main determinants of inflation. In contrast, Choudhri and Khan (2002) found no evidence. Similarly, Hyder and Shah (2004) found little evidence of the exchange rate pass-through to inflation. However, none of these

studies extrapolated the results to forecast inflation. Bokil and Shimmelpfennig (2006) employed three different empirical approaches for forecasting inflation in Pakistan. The leading indicator model was found to be more suitable followed by ARIMA which produced less accurate forecasting than the leading indicator model. Similarly, ARIMA was found to have sufficient predictive information for forecasting inflation in Pakistan (Muhammad, Salam and Feridun, 2006).

The most important determinant in the case of Pakistan was found to be international commodity prices as Pakistan imports one-quarter of raw material as an input for manufacturing concerns (Choudhary, *et al.*, 2012). Hanif and Jahanzeb (2015) evaluated the performance of different forecasting models at different forecast horizons and found the ARDL approach to perform better keeping in view every forecast horizon considered in the study.

In a nutshell, we can conclude that the researchers utilise different forecasting models keeping different scenarios in view. But none of the studies, according to the best of our knowledge, utilised forecasting models and surveys of industry experts. The present study is an attempt to fill this gap as well.

METHODOLOGY AND ECONOMETRIC SPECIFICATIONS

As mentioned earlier, the assessment includes an inflation forecast, based on theoretical and empirical models, and an analytical piece on potential determinants of inflation. The study also includes assessments of the response of inflation to shocks such as monetary, fiscal, external, oil prices, seasonality, and other shocks of interest. In this regard, several vector autoregressive models were utilised in this study. The first model is the external sector-based VAR model for inflation; the second is the monetary sector-based VAR model for inflation; the third model is the credit sector-based VAR model for Inflation; and the fourth is the extended external sector-based VAR model for inflation.

External Sector-based VAR Model for Inflation

$$WR_t = E_{t-1}WR_t + \epsilon_t^{WR} \tag{1}$$

$$ER_t = E_{t-1}ER_t + \lambda_{21}\varepsilon_t^{WR} + \epsilon_t^{ER} \tag{2}$$

$$GLSM_t = E_{t-1}GLSM_t + \lambda_{31}\varepsilon_t^{WR} + \lambda_{32}\varepsilon_t^{ER} + \epsilon_t^{GLSM} \tag{3}$$

$$INF_t^C = E_{t-1}INF_t^C + \lambda_{41}\lambda4\varepsilon_t^{WR} + \lambda_{42}\varepsilon_t^{ER} + \lambda_{43}\varepsilon_t^{GLSM} + \epsilon_t^{INF^C} \tag{4}$$

Recursive shocks feed into inflation and lead to the following recursive structural VAR system:

$$Y_t = A_1 Y_{t-1} + B_{EXT}\varepsilon_t \tag{5}$$

Where Y = (WR, ER, GLSM, INF^C) and $\varepsilon = (\varepsilon^{WR}, \varepsilon^{ER}, \varepsilon^{GLSM}, \varepsilon^{INF^C})$ and

$$B_{EXT} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ \lambda_{21} & 1 & 0 & 0 \\ \lambda_{31} & \lambda_{32} & 1 & 0 \\ \lambda_{41} & \lambda_{42} & \lambda_{43} & 1 \end{bmatrix}$$

Monetary Sector-based VAR Model for Inflation

The SVAR model is specified in the following way:

$$DR_t = E_{t-1}DR_t + \epsilon_t^{DR} \tag{6}$$

$$LR_t = E_{t-1}LR_t + \lambda_{21}\varepsilon_t^{DR} + \epsilon_t^{LR} \tag{7}$$

$$GNM_t = E_{t-1}GNM_t + \lambda_{31}\varepsilon_t^{DR} + \lambda_{32}\varepsilon_t^{LR} + \epsilon_t^{GNM} \tag{8}$$

$$GBM_t = E_{t-1}GBM_t + \lambda_{41}\varepsilon_t^{DR} + \lambda_{42}\varepsilon_t^{LR} + \lambda_{43}\varepsilon_t^{GNM} + \epsilon_t^{GBM} \tag{9}$$

$$INF_t^C = E_{t-1}INF_t^C + \lambda_{51}\varepsilon_t^{DR} + \lambda_{52}\varepsilon_t^{LR} + \lambda_{53}\varepsilon_t^{GNM} + \lambda_{54}\varepsilon_t^{GBM} + \epsilon_t^{INF^C} \tag{10}$$

Where DR is the discount rate, LR is the lending rate, GNM is the growth in narrow money, and GBM is the growth in the broad money.

Recursive shocks feed into inflation and lead to the following recursive structural VAR system:

$$Y_t = A_2 Y_{t-1} + B_{MON}\varepsilon_t \qquad\qquad 11$$

Where Y = (DR, LR, GNM, GBM, INF^C) and $\varepsilon = (\varepsilon^{DR}, \varepsilon^{LR}, \varepsilon^{GNM}, \varepsilon^{GBM}, \varepsilon^{INF^C})$ and

$$B_{MON} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ \lambda_{21} & 1 & 0 & 0 & 0 \\ \lambda_{31} & \lambda_{32} & 1 & 0 & 0 \\ \lambda_{41} & \lambda_{42} & \lambda_{43} & 1 & 0 \\ \lambda_{51} & \lambda_{52} & \lambda_{53} & \lambda_{54} & 1 \end{bmatrix}$$

Credit Sector-based VAR Model for Inflation

The SVAR model is specified in the following way:

$$DR_t = E_{t-1}DR_t + \epsilon_t^{DR} \qquad\qquad 12$$

$$TB_t = E_{t-1}TB_t + \lambda_{21}\varepsilon_t^{DR} + \epsilon_t^{TB} \qquad\qquad 13$$

$$PB_t = E_{t-1}PB_t + \lambda_{31}\varepsilon_t^{DR} + \lambda_{32}\varepsilon_t^{TB} + \epsilon_t^{PB} \qquad\qquad 14$$

$$LR_t = E_{t-1}LR_t + \lambda_{41}\varepsilon_t^{DR} + \lambda_{42}\varepsilon_t^{TB} + \lambda_{43}\varepsilon_t^{PB} + \epsilon_t^{LR} \qquad\qquad 15$$

$$CPS_t = E_{t-1}CPS_t + \lambda_{51}\varepsilon_t^{DR} + \lambda_{52}\varepsilon_t^{TB} + \lambda_{53}\varepsilon_t^{PB} + \lambda_{54}\varepsilon_t^{LR} + \epsilon_t^{CPS} \qquad\qquad 16$$

$$INF_t^{~C} = E_{t-1}INF_t^{~C} + \lambda_{61}\varepsilon_t^{DR} + \lambda_{62}\varepsilon_t^{TB} + \lambda_{63}\varepsilon_t^{PB} + \lambda_{64}\varepsilon_t^{LR} + \lambda_{65}\varepsilon_t^{CPSC} + \epsilon_t^{INF^C} \qquad 17$$

Where TB is T-bill rates, PB is the government borrowing and CPS is the credit to the private sector.

Recursive shocks feed into inflation and lead to the following recursive structural VAR system:

$$Y_t = A Y_{t-1} + B_{CRE}\varepsilon_t \qquad\qquad 18$$

Where Y = (DR, TB, PB, LR, CPS, INF^C) and $\varepsilon = (\varepsilon^{DR}, \varepsilon^{TB}, \varepsilon^{PB}, \varepsilon^{LR}, \varepsilon^{CPS}, \varepsilon^{INF^c})$ and

$$B_{CRE} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ \lambda_{21} & 1 & 0 & 0 & 0 & 0 \\ \lambda_{31} & \lambda_{32} & 1 & 0 & 0 & 0 \\ \lambda_{41} & \lambda_{42} & \lambda_{43} & 1 & 0 & 0 \\ \lambda_{51} & \lambda_{52} & \lambda_{53} & \lambda_{54} & 1 & 0 \\ \lambda_{61} & \lambda_{62} & \lambda_{63} & \lambda_{64} & \lambda_{65} & 1 \end{bmatrix}$$

Extended External Sector-based VAR Model for Inflation

The SVAR model is specified in the following way:

$$INF_t^F = E_{t-1}INF_t^F + \epsilon_t^{INF^F} \tag{19}$$

$$GLSM_t = E_{t-1}GLSM_t + \lambda_{21}\varepsilon_t^{INF^F} + \epsilon_t^{GLSM} \tag{20}$$

$$BM_t = E_{t-1}BM_t + \lambda_{31}\varepsilon_t^{INF^F} + \lambda_{32}\varepsilon_t^{GLSM} + \epsilon_t^{BM} \tag{21}$$

$$NER_t = E_{t-1}NER_t + \lambda_{41}\varepsilon_t^{INF^F} + \lambda_{42}\varepsilon_t^{GLSM} + \lambda_{43}\varepsilon_t^{BM} + \lambda_{45}\varepsilon_t^{INF^C} + \epsilon_t^{NER} \tag{22}$$

$$INF_t^C = E_{t-1}INF_t^C + \lambda_{51}\varepsilon_t^{INF^F} + \lambda_{52}\varepsilon_t^{GLSM} + \lambda_{53}\varepsilon_t^{BM} + \lambda_{54}\varepsilon_t^{NER} + \epsilon_t^{INF^C} \tag{23}$$

Where INF^F is foreign inflation, BM is money supply, NER is the nominal exchange rate, and INF^C is domestic inflation.

Recursive shocks feed into inflation and lead to the following recursive structural VAR system:

$$Y_t = A\,Y_{t-1} + B_{EXT2}\varepsilon_t \tag{24}$$

Where Y = (INF^F, GLSM, BM, NER, INF^C) and $\varepsilon = (\varepsilon^{INF^F}, \varepsilon^{GLSM}, \varepsilon^{BM}, \varepsilon^{NER}, \varepsilon^{INF^C})$ and

$$B_{EXT2} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ \lambda_{21} & 1 & 0 & 0 & 0 \\ \lambda_{31} & \lambda_{32} & 1 & 0 & 0 \\ \lambda_{41} & \lambda_{42} & \lambda_{43} & 1 & \lambda_{45} \\ \lambda_{51} & \lambda_{52} & \lambda_{53} & \lambda_{54} & 1 \end{bmatrix}$$

EMPIRICAL FINDINGS

Baseline Forecast

As per the forecasts obtained from the Pakistan Institute of Development Economics (PIDE)'s inflation forecasting models, the CPI inflation in FY2022 is expected to fall between 10.0 and 10.5 per cent, with year-on-year inflation in June 2022 falling in the range of 11.5 to 12.0 per cent. Designated as the baseline scenario, forecast from a wide range of econometric models,[3] inflation and year-on-year inflation for FY2022 are expected to remain at 10.2 and 11.8 per cent, respectively. PIDE's inflation forecast indicates that inflation will not only persist in double digits for the remaining part of FY2022 but will also persist in the first half of FY2023. Inflation forecasting models also expect inflation to further increase during the first half of FY2023 from the levels expected in FY2022.

PIDE forecasts inflation to peak in October 2022 and then gradually decline in November and December 2022 (see Figure 1). From November 2021 to October 2022, inflation is expected to follow an increasing trend. YoY inflation is forecasted to peak in August 2022 and then decline significantly from September 2022 to December 2022. YoY inflation for December 2022 is expected to remain between 8.5 to 9.0 per cent. However, it is important to mention that the decline will predominantly be a reflection of high base impact, as month-on-month growth in CPI is still expected to be positive for the period, while YoY is expected to fall significantly.

Comparison with Other Institutions

As compared to forecasts made by the State Bank of Pakistan, the International Monetary Fund, and the Asian Development Bank, PIDE's inflation forecasts are on the higher side. None of these

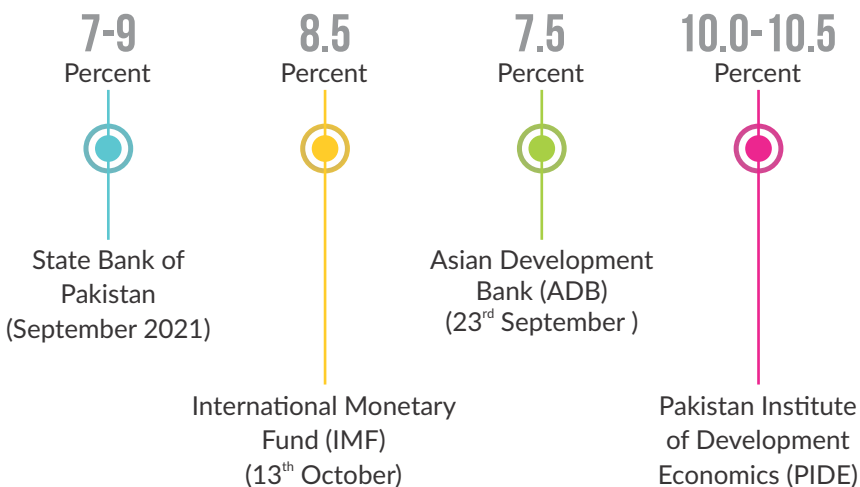*Figure 1: Average CPI Inflation Forecast - Base Line (Percent)*

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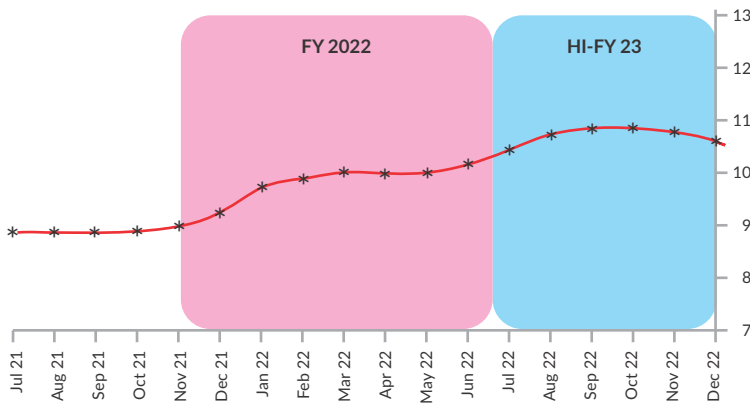
3. Models ranging from univariate models with uncertainty to Structural Vector Autoregressive, Vector Error Correction, and disaggregated models.

institutions expects inflation to remain above 9 per cent with the highest forecast coming from the State Bank of Pakistan with an expected range of 7-9 per cent. However, it is important to note that the upside risks mentioned by these institutions and the State Bank of Pakistan have already materialised, hence these forecasts are bound to be revised upward. For instance, the State Bank of Pakistan during its monetary policy decision of September 2021 mentioned that it expected inflation to remain between 7-9 per cent but highlighted potential risks of high global commodity prices, high domestic fuel prices, and a pass-through of exchange rate depreciation.

Relative Comparison of Inflation Forecasts

7-9	8.5	7.5	10.0-10.5
Percent	Percent	Percent	Percent

State Bank of Pakistan (September 2021)

International Monetary Fund (IMF) (13th October)

Asian Development Bank (ADB) (23rd September)

Pakistan Institute of Development Economics (PIDE)

Given the facts that global commodity prices are already up, domestic fuel prices have seen a substantial increase in the last couple of months, and the exchange rate has depreciated happened recently, PIDE expects all these institutions to revise their forecasts significantly upward. While the IMF and the ADB forecast revision will take some time, the State Bank of Pakistan is scheduled to announce its monetary policy on November 26, 2021. Keeping our analysis in view, we are expecting a big revision in the inflation forecast by the State Bank of Pakistan.

Comparison with Professional Forecasters

PIDE conducted a Survey of Industry Experts (SIE) to ascertain the collective view of experts, representing different sectors of the economy, on future inflation and growth trends. In total, 160 industry experts, representing the business community, academia, central bank, think tanks, banking industry, and brokerage houses, were requested to provide their opinion. However, only 61 respondents - 38 per cent of the total - provided their feedback. Importantly, these 61 respondents represent every sector included in the total sample and, hence, provide reasonably well and robust opinions.

The results of the Survey of Industry Experts further validate the PIDE's forecast of 10.0 to 10.5 per cent inflation for FY2022. Even for the first half of FY2023, PIDE's inflation forecast range remained well in line with the results of the survey. Out of 61 respondents, more than 80 per cent believe that inflation for FY2022 and the first half of FY2023 will remain between 10.0 to 10.5 per cent and 10.75 to 11.25 per cent, respectively. Respondents also support PIDE's finding that inflation will further increase in the first half of FY2023. In comparison to 10.2 per cent inflation in FY2022, industry experts expect inflation to further increase to 10.9 per cent during the first half of Fy2023.

Figure 2: Industry Expert's Forecast for Average Inflation (in percent)
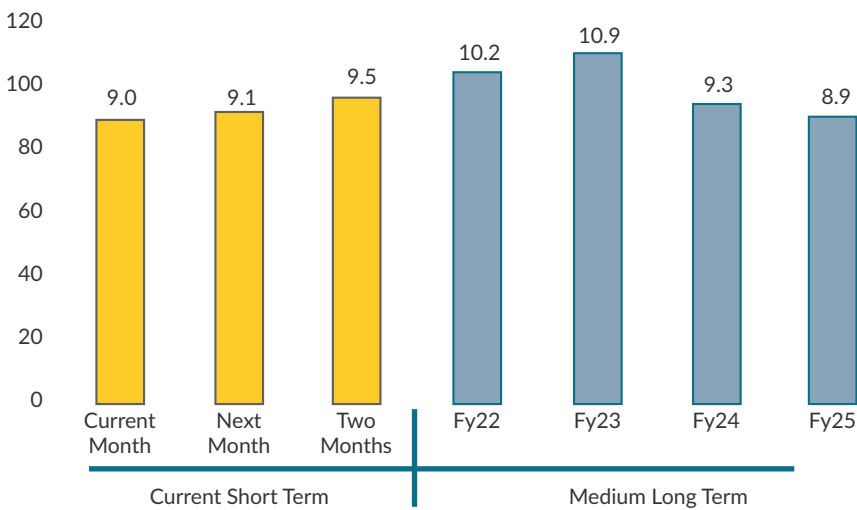

Persistently High Inflation Expected

A disaggregated analysis of inflation indicates that inflation is not only expected to remain high but is also expected to persist in double digits at least for the next couple of years. Theoretically, CPI is an aggregation of 94 composite commodities and the distribution of these commodities with respect to inflation provides useful information about the persistence of inflation. Intuitively, more commodities with double-digit price growth are a reflection that overall inflation is more persistent and will take significant policy intervention to come back. Figure 3 indicates that out of 94 composite commodities, currently, around 70 commodities are projected to continue with double-digit price growth. Out of 70, more than 25 commodities' prices are projected to grow at more than 14 per cent inflation. Commodities with below 9 per cent price growth are expected to decline from 53 to 28 from November 2021 to December 2022. Contrary to that, commodities with price growth between 9 and 14 per cent are projected to increase from 26 to 40. Additionally, commodities with price growth of above 14 per cent are also expected to increase from 15 to 26. These trends indicate that inflation during November 2021-December 2022 will remain stubborn in double digits.

Figure 3: Distribution of 94 Composite Commodities (Based on Average Inflation)
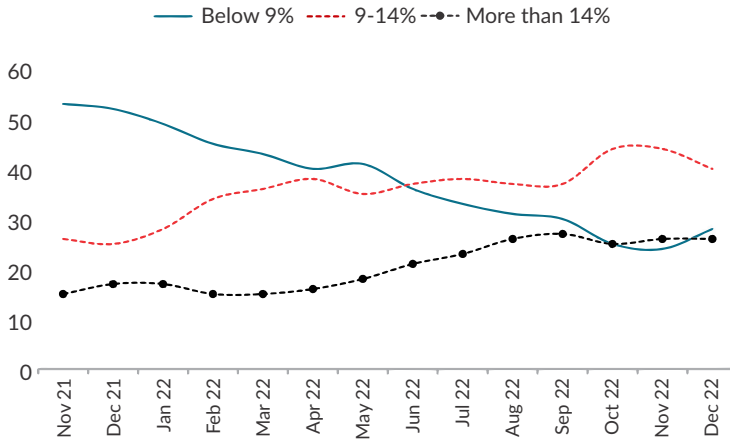
Results of the Survey of Industry Experts further validate the PIDE's view that inflation will persist in double digits for the next couple of years. As a part of the survey, industry experts were requested to assign different probability values to different ranges of inflation. Figure 4 generated from the industry experts' responses, indicates that the respondents associated more than 80 per cent probability for inflation to remain between 10.0 to 10.5 per cent for the next three consecutive years. The figure also indicates that industry experts believe that inflation will only come down to a single digit in FY2025. There is an almost negligible difference between the probabilities assigned to FY2022, FY2023, and FY2024. For all these years, more than 80 per cent of probabilities were assigned to the inflation range of 10.0 to 10.5 per cent. A more

Figure 4: Inflation Probabilities (FY 2022 to FY 2025)

than 80 per cent probability of inflation remaining in double-digits in three consecutive years is a pure reflection of the fact that high inflation will persist for the next several years. The figure validates PIDE's argument that inflation has become stubborn recently and is expected to persist at elevated levels for the next few years.
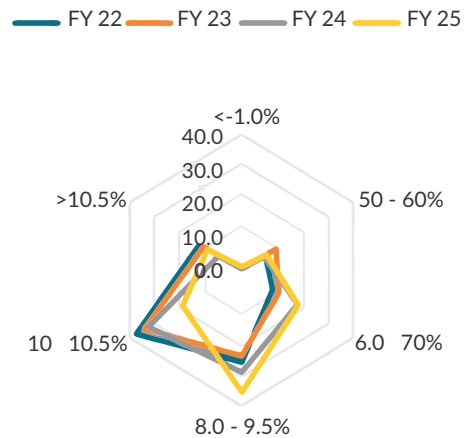
Box 1: Inflation Persistence – Resident Thief in Your Wallet

Inflation persistence is defined as the tendency for price shocks to push the inflation rate away from its long-run trend for long periods. In addition to that, inflation persistence means how much the current inflation is dependent on the past values of inflation. Often, economies with high persistent inflation have less policy space, which presses policymakers to view the policy intervention in terms of structural changes in the long run.

Inflation Persistence
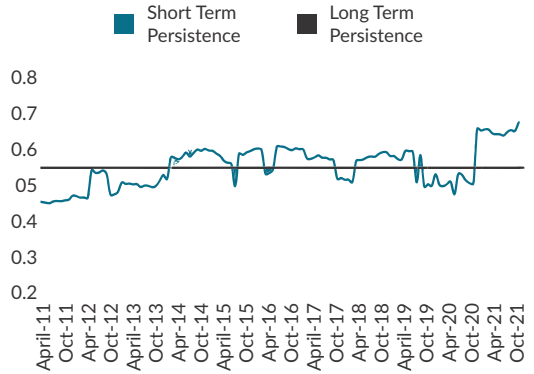
Although there are several approaches to calculating inflation persistence, we focus on the univariate analysis. For this purpose, we need a univariate time series that represent inflation. Under the univariate approach, persistence is investigated by looking at the univariate time series representation of inflation.

Further, we assume that inflation follows a stationary autoregressive process of order P(AR(P)):

$$y\mathrm{t} = \propto + \sum_{j-1}^{p} \beta j \, y_{t-j} + \varepsilon t$$

To estimate the degree of inflation persistence, we run the first-order autoregressive AR (1) model. In the second step, we check for the statistical significance of positive coefficients of the AR terms, which implies a positive serial correlation and, thus, inertia in the inflation series.

It is evident from the figure that the short-run persistence is away from its steady-state path. More importantly, it is much higher than long-term persistence and short-term persistence is much higher and more rigid. This shows that in the coming months the inflationary pressure will keep building, which will continue to steal your resources away.

Inflation to Remain Broad-Based

Inflation pickup in the last few quarters was broad-based, and the trends are projected to continue. Broad-based inflation is a clear indication that higher inflation is here to stay and will require serious policy interventions. Figure 5 explains the relevant contributions of food, energy, house rent and other products in total forecasted inflation. Unlike the general perception that current inflation is primarily coming from higher food prices (resulting from higher global commodity prices), Figure 5 indicates that inflation has been and will remain broad-based. Food inflation contributes to high inflation but is not the sole source of current inflation. Interestingly, the government's recent decision to increase the house rent ceiling for its employees has put upward pressure on the market

house rent. This has led house rent alone to cause 1.7 per cent inflation to the June 2022 number and 1.9 per cent inflation to the December 2022 number. Similarly, energy prices' direct contribution to inflation is not the major contributor to inflation. The broad nature of current inflation further validates PIDE's argument that inflation is persistent and will require policy intervention for price stability in the coming months.

*Figure 5: Contributions in Inflation*
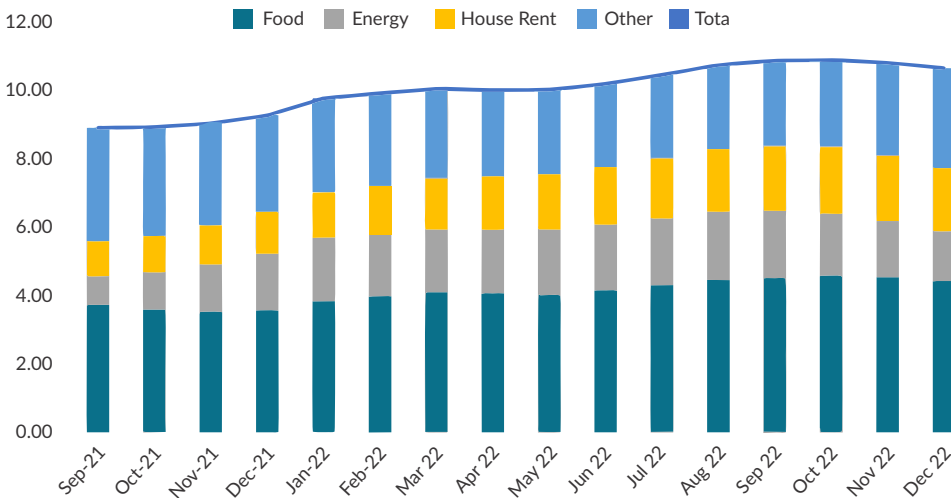
Box 2: Supply-Side Challenges

The disruptions to the economy during the pandemic have disrupted the supply chains across countries and created shortages of goods and services. The worrisome factor is that these disruptions are not getting better probably due to a shortage of vessels that increased the freight charges to extraordinary highs (see the figure).

The demand for containers increased on the back of changing consumption patterns during the pandemic and lockdowns. During the pandemic, people were more inclined towards buying consumer goods and other electronic items due to restrictions on social activities. When the lockdowns were lifted, the countries had already consumed items imported in the pre-covid era because trade was restricted during lockdowns. Hence, increased demand for e-commerce and consumer goods is unable to match the supply due to constrained shipping capacity.

Freight Charges US$
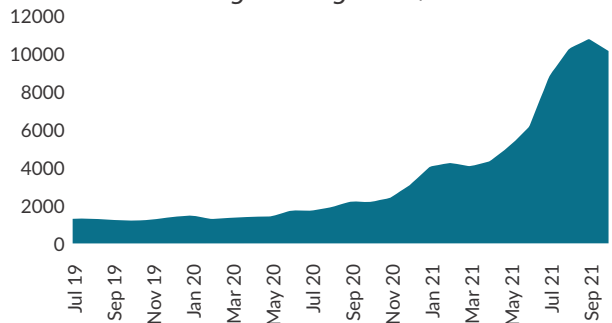
Analysts across the world term these supply-side shortages and increased freight charges as major inflation determinants and are still uncertain when these supply chain issues would return to normal. To tackle the rising inflation on the back of supply-side factors, the central bank is in a very difficult situation and must be very cautious in formulating monetary policy so that these demand-supply mismatches might not get permanent.

At present, the debate is also going on about the transient nature of inflation in Pakistan. However, keeping in view the exchange rate depreciation and other macroeconomic factors, we are of the view that inflation will remain persistent even if the freight charges get back to normal.

Electricity Prices and Inflation

On top of econometric models for aggregate CPI inflation, PIDE's Inflation Analytics also includes forecasts at a disaggregated level. Relying on univariate models, Inflation Analytics forecasted 94 composite commodities to calculate the direct impact of shocks on different commodities. One of the 94 commodities is electricity, which is the most important one. Disaggregated forecasting model captured one per cent inertia in electricity prices. However, as a part of the IMF Extended Fund Facility, Pakistan and Fund are discussing at least a 14 per cent increase in electricity prices to overcome the crushing burden of ever-increasing circular debt. Against this backdrop, we introduced an additional shock of 13 per cent for the next five months and found that with a full adjustment of electricity shock, inflation could go up by 0.43 per cent in FY2022 and 0.66 per cent in the first half of FY2023. To calculate the second-round impact of electricity prices on the rest of the CPI basket, we developed a model using the electricity price index and the CPI excluding electricity. The impulse response of the newly constructed CPI to a 10 per cent shock in electricity reveals that there could be an additional 0.16 per cent inflation in the first four months of the electricity price increase.

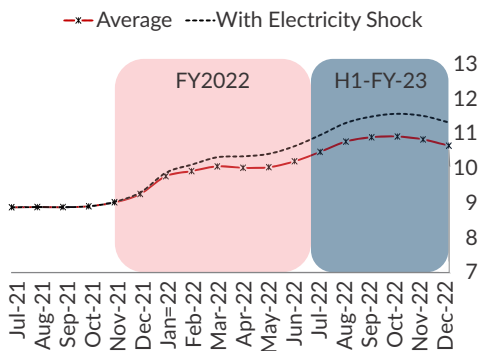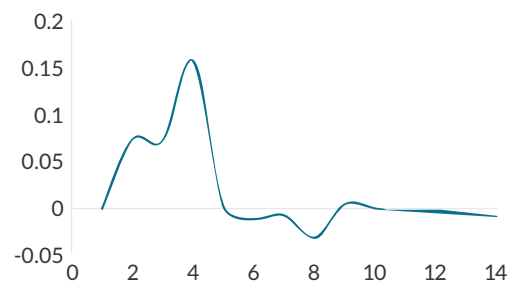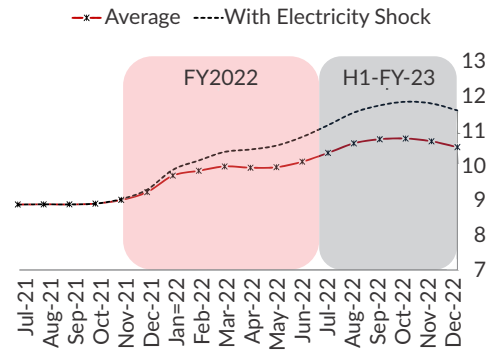*Figure 6: Average CPI Inflation Forecast (Percent)*

Figure 7: Impulse Response of CPI to Electricity Prices

Fuel Prices and Inflation

Pakistan is an oil-importing country and is exposed to external shocks through global oil prices. In recent months, Pakistan has substantially increased domestic oil prices mainly due to high global oil prices and exchange rate depreciation. Disaggregated forecasting model captured 8 per cent inertia in fuel prices. However, the recent depreciation and trends of global oil prices suggest that there would be at least another 10 per cent increase in fuel prices in the coming two months. Against this backdrop, we introduced an additional shock of 10 per cent in the next two months and found that with the full adjustment of fuel price shock, inflation could go up by 0.32 per cent in FY2022 and 0.46 per cent

Figure 8: Average CPI Inflation Forecast (Percent)

in the first half of FY2023. To calculate the second-round impact of electricity prices on the rest of the CPI basket, we developed a model using the fuel price index and CPI excluding fuel. The impulse response of the newly constructed CPI to a 10 per cent shock in electricity reveals that there could be an additional 0.20 per cent inflation in the first six months of the fuel price increase.

Box 3: Petroleum Prices – Perception vs Reality

There is no doubt that petroleum prices have soared to unprecedented levels and every country is facing the consequences of these rising prices globally. A comparison of prices only provides a half-truth in the sense that it does not accommodate the purchasing power of the consumers.

Considering the per capita income as well as per capita petroleum consumption for several countries, we calculated the consumption expenditure on petroleum for an average person across countries. The per capita petroleum consumption is assumed to be the same for an

Petroleum Per Capita Consumption Expenditure (in percent)

average person across the globe. The idea behind this exercise is to examine how much this increase in petroleum prices impacts an average household.
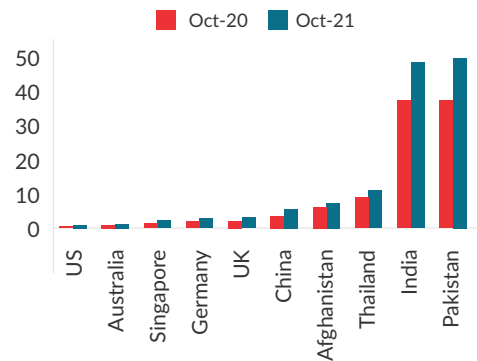
We found that an average Pakistani consumer spent almost half of his income (49.7%) on petroleum in October due to lower per capita income as compared to the other countries in October 2021 (see

the figure). The increased petroleum prices have also increased consumption expenditure by more than 12 per cent for an average Pakistani consumer compared with the last year. In other words, an average Pakistani has now 12 per cent fewer resources to manage expenditures on items other than petroleum.

Uncertainty Analysis

The fan chart represents the forecasting distribution of a variable based on the information available at present. In comparison with the traditional forecast path and its corresponding symmetrical bands, the fan chart has two important advantages. First, it depicts the whole marginal forecast distribution. Second, this marginal distribution, in each period of the forecasting horizon, may be non-symmetric. When this distribution is not symmetric, the probability that the variable takes on values above the central path differs from the probability that it takes on values below it, which makes it a desirable tool to show the risks of not fulfilling pre-established targets for future values of the variable[4].

The presentation of inflation forecasts with fan charts is useful for several reasons. First, fan charts show inflation forecast is inherently uncertain. Uncertainty is both about the potential shocks that can affect the economy in the coming period as well as uncertainty about the qualitative and quantitative nature of the transmission mechanism. Second, fan charts allow the central bank to communicate the risks regarding inflation forecast with less ambiguity, i.e., whether the central bank is expecting upper-side risk or lower-side risk. If the fan chart is dispersed equally around the central point, actual inflation in the future will most probably be equal to the mode of fan chart distribution. If the fan chart is tilted upwards, then actual inflation will most probably be higher than the mode of fan chart distribution and vice versa.

Figure 9 is a fan chart utilising credit structural VAR. The fan chart is constructed by utilising the forecast from 'credit SVAR' and incorporation of exogenous errors based on bootstrapping with several simulations (100,000). The shape of the fan chart from credit SVAR indicates that the likelihood of the inflation forecast to remain between 10.0 to 10.5 is the highest and, hence, we can claim that the forecast range will hold, even if there are a few exogenous shocks.

Figure 9: Fan Chart Utilizing Credit VAR

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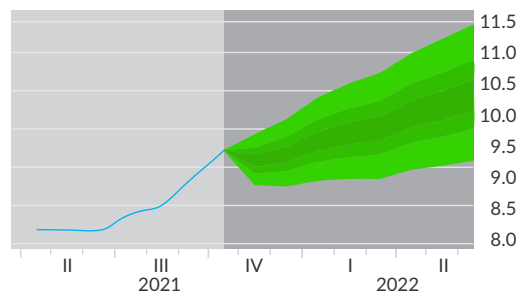
4. (Julio, 2006)

Figure 10 is a fan chart utilising monetary structural VAR. The fan chart is constructed by utilising the forecast from monetary SVAR and the incorporation of exogenous errors based on bootstrapping with several simulations (100,000). The shape of the fan chart from 'monetary SVAR' indicates that the likelihood of the inflation forecast to remain between 9.5 to 10.5 is the highest. Therefore, we can claim that the forecast range will hold, even if few exogenous shocks materialise.

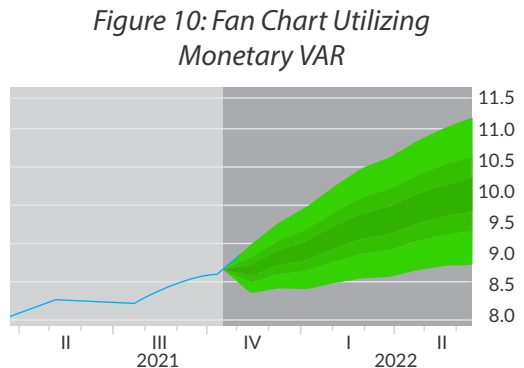*Figure 10: Fan Chart Utilizing Monetary VAR*

Figure 11 is a fan chart utilising external structural VAR. The fan chart is constructed by utilising the forecast from external SVAR and the incorporation of exogenous errors based on bootstrapping with several simulations (100,000). The shape of the fan chart from 'external SVAR' clearly indicates that the likelihood of the inflation forecast to remain between 10.0 to 11.5 is the highest and, thus, we can claim that the forecast range will hold, even if few exogenous shocks materialise.

Figure 11: Fan Chart Utilizing External VAR
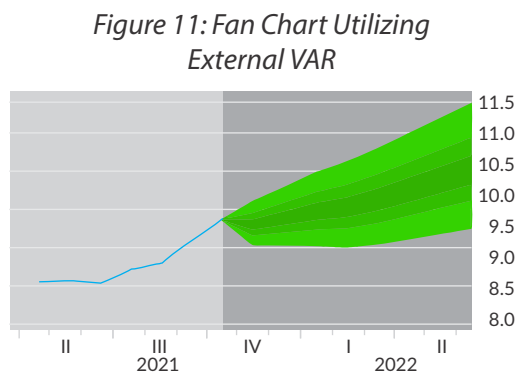
Box 4: Monetary Overhang May Increase the Inflationary Pressure

Monetary overhang means the economy is having more money than the real money demand. In simple words, all the individuals (on aggregate) in the economy have more money than they can spend. It arises when there is an excess supply of money relative to the money supply. Therefore, the monetary overhang may create inflationary pressures.

Following Moinuddin (2010), we calculate the monetary overhang by using the difference between the actual growth of money and the optimal growth of money.[5] The optimal monetary growth, using the data from 1976 to 2021, is 11.3 per cent of Pakistan's economy, and any growth of money above that will be the monetary overhang, which will affect inflation and monetary policy.[6] It implies that the increasing money overhang would lead to an increase in inflation and vice versa. Historically, over the last four decades, 73 per cent of the time – 29 out of 40 episodes – (see table) the money overhang and inflation moved in the same direction.

It is also interesting to note that the monetary overhang impacts inflation after some lags. It is evident from the figure that the MOH may impact inflation after three lags. The monetary overhang

5. This is also known as the reference monetary growth or the trend monetary growth.
6. Moinuddin (2010) estimated 13.1 percent

Money Overhang (No of Episodes)


Money Overhang and Inflation
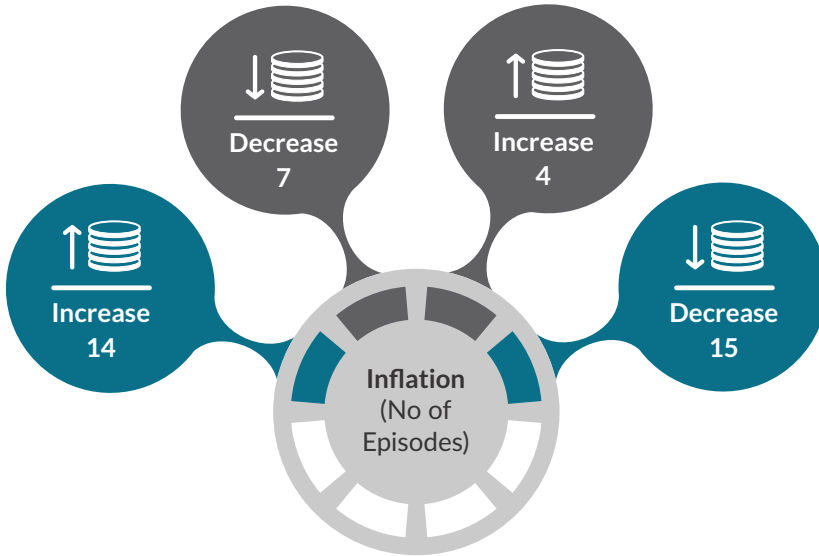
in FY2020 and FY2021 was around 6 and 5 per cent, respectively. This implies that this will create further pressure on inflation in the coming months. This finding is in line with ground realities. The people had fewer opportunities to spend given the COVID situation in the last two years. The recovery period will lead to inflationary pressures.

Box 5: Policy Choices Against the Backdrop of Rising Prices: Between the Devil and the Deep Blue Sea

Indeed, Pakistan's economy is grappling with multiple challenges at present, which include soaring international prices of crude oil and essentials, massive import bill (65% increase in Jul-Oct FY22), plunging exchange rate, unprecedented freight charges, the lack of fiscal space and, last but not the least, uncertainty on the western border.
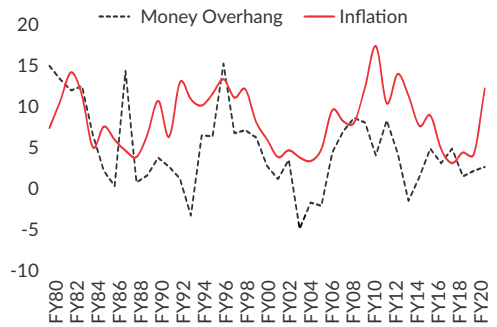
Risk in Prices from June 20-Sep 21
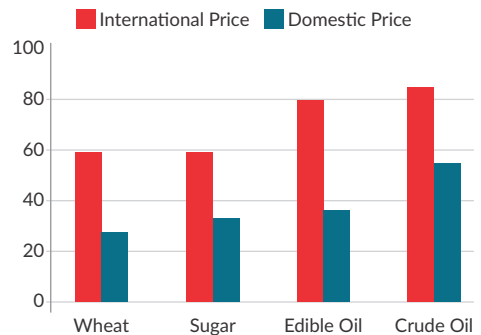
The impact of increased international prices, with a compounding effect of freight charges, hit hard the economy, which resulted in a relentless increase in domestic prices raising concerns that inflation remains transitory in post-pandemic recovery (see the **figure**). Exchange rate depreciation has made imports even more expensive.

This raises concerns that in such circumstances what policy options government and central bank together must come up with to contain inflation without jeopardising the post-pandemic economic recovery. Unfortunately, there is no band-aid solution available to the government in these unprecedented times. For example,

SBP may attempt to contain prices through contractionary monetary policy. However, without recognising the determinants of domestic inflation, an undesirable tightening of monetary stance will result in delayed economic recovery. As monetary policy is purely a demand management strategy, the central bank must be cautious in its approach to addressing supply-driven inflation. Furthermore, the slowdown in the economy will lead to decreased revenues exacerbating the aforestated fiscal problems.

Another approach to make imports cheaper is through strengthening the PKR, and for that, the supply of foreign exchange must be greater than the demand for it in the market. For this option, we must have infinite foreign exchange reserves. Currently, the market forces are moving in an undesirable direction, and with fewer forex reserves. Therefore, artificially supporting the exchange rate option is almost impossible to exercise.
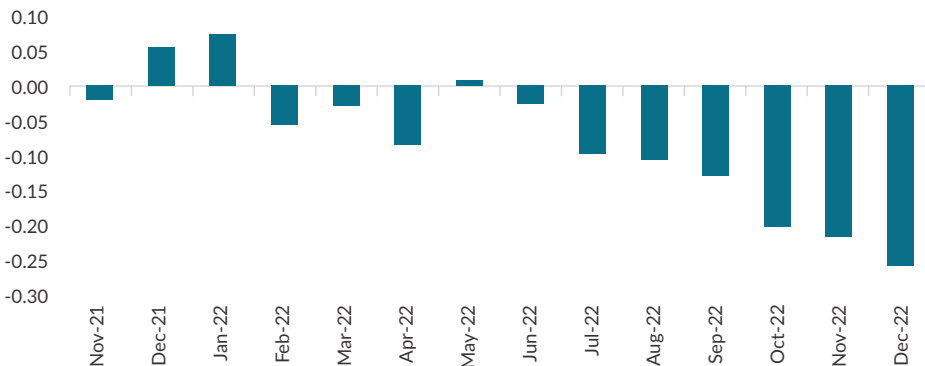
One way is to reduce the import duties and taxes on essential imports, so that the pressure may ease on the domestic prices. To abolish these duties/taxes, the government will have to compromise on fiscal targets.

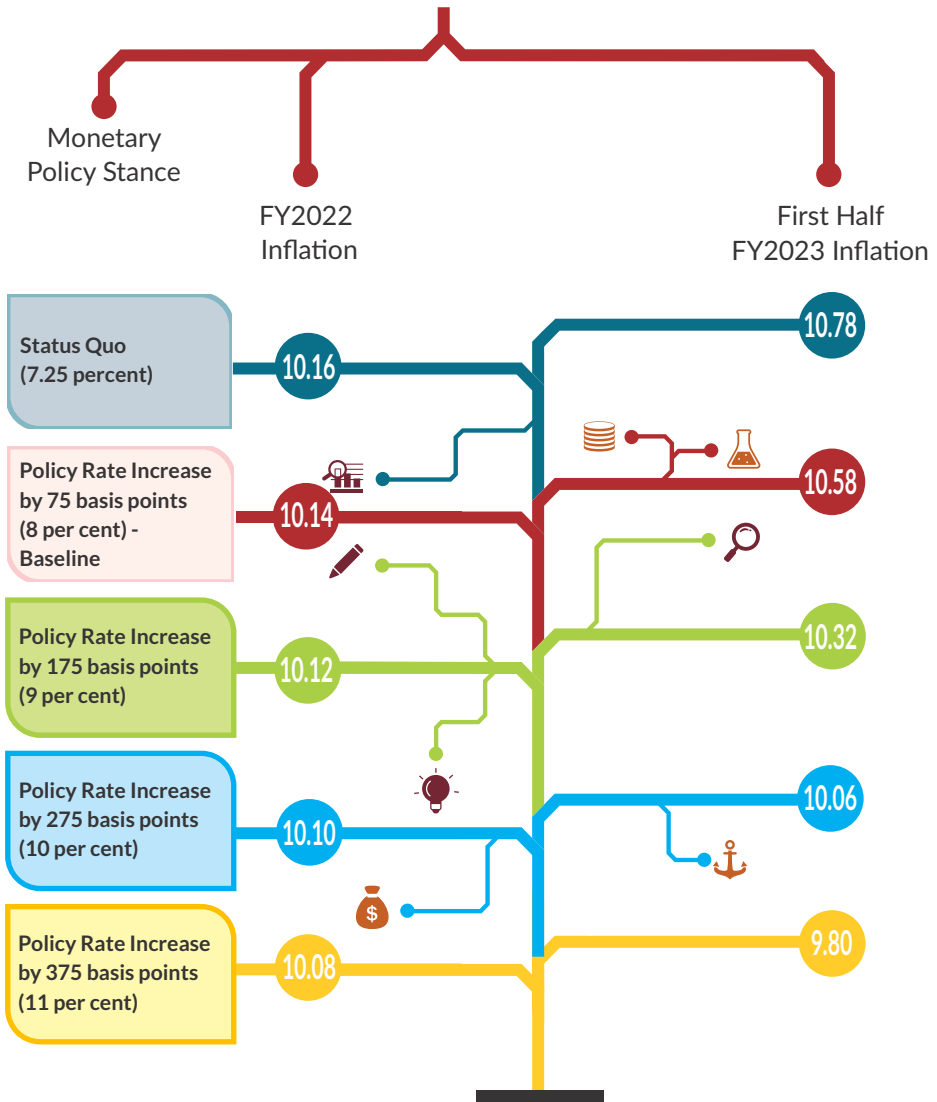## CONCLUSION AND THEMATIC ADVICE: MONETARY POLICY AND INFLATION

As mentioned earlier, PIDE's inflation forecasting models expect inflation to remain between 10 per cent and 10.5 per cent. However, it is important to mention that this baseline forecast is subject to certain assumptions. The most important assumption is about the monetary policy. It is assumed in the models that there would be an upward policy adjustment of 75 basis points in the discount rate; the baseline forecast assumes the policy rate to be 8 per cent as compared with the current 7.25 per cent rate. Nevertheless, the baseline forecast is exposed to several upside risks. The most important to note is the recent level of exchange rate depreciation. By utilising 'external sector SVAR' we found that depreciation of 10 per cent can bring incremental inflation of 1.23 per cent for 14 months. We strongly believe, given the nature of exchange rate pass-through and the lags it involves, that the actual impact of the recent depreciation is yet to be witnessed. Against this backdrop, there is an immediate need for the relevant policy adjustment to ensure that inflation in FY2022 does not go beyond 10.5 per cent.

Very recently, on the 13th of November 2021, the SBP tightened the money supply by increasing banks' cash reserve requirement (CRR) by 1 per cent. According to an estimate, this move will suck around Rs 150-170 billion out of the banking system. In addition to the recent use of macroprudential, increasing CRR, SBP also needs to use conventional monetary policy to ensure that there is a check on inflation to achieve the goal of price stability. However, before making any policy adjustment the SBP needs to know how much impact it can have on inflation through policy adjustment, for example, in form of an increase in the policy rate. By utilising 'monetary SVAR', we calculated the impulse response of inflation to a 100 basis point shock in interest rates. We found that an increase of a 100 basis point in interest rate can bring inflation down by 0.26 per cent for a period of 12 to 14 months. Given this relationship, PIDE's inflation forecasting models suggest that with the status quo monetary policy, inflation in FY2022 can easily surpass the baseline scenario with additional inflationary pressures building through Fy2023.

Figure 12: Accumulated Response of Inflation to Monetary Policy

Monetary Policy Simulations

Monetary Policy Stance

FY2022 Inflation

First Half FY2023 Inflation

Stance	FY2022 Inflation	First Half FY2023 Inflation
Status Quo (7.25 percent)	10.16	10.78
Policy Rate Increase by 75 basis points (8 per cent) - Baseline	10.14	10.58
Policy Rate Increase by 175 basis points (9 per cent)	10.12	10.32
Policy Rate Increase by 275 basis points (10 per cent)	10.10	10.06
Policy Rate Increase by 375 basis points (11 per cent)	10.08	9.80

The above table summarises different policy options related to the policy (discount) rate and their impact on inflation in FY2022 and the first half of FY2023. If the State Bank of Pakistan decides to keep the policy rate at the status quo, i.e., at 7.25 per cent, inflation in FY2022 will be 0.02 per cent higher than the baseline scenario, whereas inflation in the first half of FY2023 will be 0.20 per cent higher. These policy simulations indicate that inflation will persist in double digits and a significant policy adjustment would be required to bring it back to a single digit in the next 14 months.

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