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State-Level Inflation Forecasts for India: Based on Data from Inflation Expectations Survey of Households

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Purnima Shaw and R. K. Sinha[1]

Abstract

The Inflation Expectations Survey of Households (IESH) of the Reserve Bank of India (RBI) completed its 90th round in March 2024. Using the historical series from this survey, we provide state-level inflation forecasts, which can help in better understanding of inflation dynamics. Deviating from the conventional regression-based forecasting, this paper proposes a new approach to modelling inflation expectations, which not only uses centre-wise survey data and state-wise inflation data but also redistributes the inflation expectation of respondents suitably to gain further precision. For most of the states, the analysis suggests a noticeable reduction in the quantum of nowcast/ forecast errors in state-level nowcasts/ forecasts obtained using the proposed methodology when compared with the errors of the survey forecasts, bias-adjusted survey forecasts and linear regression-based forecasts.

JEL Classification: D84, E31

Keywords: Inflation, inflation expectations, percentile, probability distribution function

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Introduction

The information on inflation expectations is widely used by central banks for monetary policy making. Several central banks conduct high-frequency surveys to collect information on short to medium-term inflation perceptions. The Reserve Bank of India (RBI) conducts Survey of Professional Forecasters (SPF), Industrial Outlook Survey (IOS), Services and Infrastructure Outlook Survey (SIOS), Consumer Confidence Survey (CCS) and Inflation Expectations Survey of Households (IESH).

In this paper, we focus on inflation expectations of households collected through IESH. IESH is conducted across approximately 6,000 respondents in 19 urban centres/ cities. The survey captures both qualitative and quantitative inflation perceptions of households. However, we restrict our analysis only to quantitative information in the paper, which is sought in the survey over three time-horizons: (i) current inflation perception, (ii) three-month ahead inflation expectations and (iii) one-year ahead inflation expectations. The frequency of IESH is six times per annum, aligning with the frequency[2] of the bi-monthly Monetary Policy Committee meetings of the RBI.

Econometric methods are commonly used for nowcasting and forecasting actual inflation based on inflation expectations data. Recently, Sinha (2023) demonstrated the potential use of statistical distributions to explain inflation and inflation expectations and linking them using suitable functions. The paper applied the method to all-India inflation and inflation expectations of all the survey centres together.

Given India's geographical diversity, each state differs in consumption patterns, which can result in variations in inflation and inflation expectations. Other factors like inter-state transportation costs, differences in state tax regimes, varying freight costs, geographical distances, and state-level food supply management can also contribute to inflation variability. Hence, forecasting all-India level inflation may overlook the important state-specific information.

In this paper, we extend Sinha's (2023) work by applying it to centre-wise data of inflation and inflation expectations and provide state-level inflation nowcasts and forecasts. Additionally, to better analyse the round number preferences of the

[2] The IESH was conducted 4 times a calendar year till December 2015. As the frequency of the monetary policy of RBI changed to bimonthly, the survey's frequency was changed to 6 times a calendar year.

respondents in IESH, we propose a novel approach of decomposing inflation expectations into discrete and continuous data.

The paper is divided into five sections. The second section reviews the relevant literature. The third section provides the methodology to split the datasets into discrete and continuous components distinctly and map these data with the inflation data to obtain state-level inflation nowcasts and forecasts. The numerical demonstration, illustrated in the fourth section, based on the proposed methodology evaluates the performance of the estimates in comparison with the actual inflation numbers. The last section concludes and provides a direction for future studies on the subject.

II. Literature Review

Inflation expectations generally tend to be higher than the realised inflation, a trend observed globally, including in advanced economies. Abildgren and Kuchler (2021) refer to this overestimation as the “inflation perception conundrum”. The upward bias in households’ reporting of inflation perceptions and expectations may not be a major concern if it is consistent, and econometric models can filter this out when forecasting actual inflation. However, the concern becomes more serious when the bias is inconsistent and fluctuates unpredictably over time, without being explained by business cycles or economic outlooks.

Recently, Singh *et al.* (2024) conducted a study on the nature of bias in inflation expectations in India and in other economies and found that the characteristics of the data in India were similar to those in other economies. They also explored another potential use of the survey - its relation with households’ future savings - and established a link.

Inflation expectations can vary across households based on their socio-economic and demographic characteristics [Jonung (1981), Souleles (2004), Malmendier and Nagel (2016), Goyal and Parab (2019), Goldfayn-Frank and Wohlfart (2020) and Shaw (2024)]. The observed probability distributions of inflation perceptions and expectations tend to reveal peaks at specific points, usually in multiples of five, indicating the round number preference of respondents when expressing their opinions. Some recent studies, such as Krifka (2009), Binder (2017) and Reiche and Meyler (2022), have considered this behaviour an indicator of uncertainty regarding inflation. Krifka (2009) described this through a principle, namely, Round Numbers Round Interpretation Principle. According to this principle, short and simple numbers are related to low accuracy, whereas long and complex numbers correspond to higher accuracy. Binder (2017) developed an uncertainty index based on the frequency of round numbers, suggesting that a number is

considered uncertain if it is divisible by five. Reiche and Meyler (2022) found that this uncertainty increases during the periods of economic instability.

The probability distribution of a stochastic process is given by the probability that a realised value of the variable falls in a specified range. An empirical probability distribution of the stochastic series is obtained by finding the observed frequency distribution. Researchers have also explored the fitting of probability distributions to time series data. For instance, Osborne (1959) analysed the probability distribution of share price changes using the New York Stock Exchange data.[3] Later, Praetz (1972) extended Osborne's (1959) theory by incorporating the dynamic nature of volatility. More recently, Qiao *et al.* (2022) proposed a distribution coupling the distribution of extreme values of time series data with a distribution for frequently occurring values.

Departing from conventional regression-based nowcasting and forecasting techniques, Sinha (2023) fitted statistical probability distributions to inflation and inflation expectations data for India, providing inflation forecasts by relating the two distributions. In the current paper, the approach of Sinha (2023) is utilised and generalised to map the datasets of inflation and inflation expectations after fitting them separately with suitable probability distributions in each of the centres.

To manage centre-wise data, which tend to be uneven due to respondents' preference for round numbers, a novel method is deployed. This method reduces additional frequency observed at peaks associated with round numbers by removing the interpolated frequencies based on the frequencies of the neighbouring points. In doing so, the probability density function is adjusted for better fitting, and the removed values are reassembled into a new discrete dataset representing a probability mass function. The detailed methodology is described in the following section.

III. Methodology

While upward bias (definition provided in Table A3) in the inflation expectations data when compared with the realised Consumer Price Index (CPI) – Urban inflation (CPI-U) figures is well-accepted, it may be of interest to look at the centre-wise biases (Tables 1 to 3). This analysis is performed with the assumption that the centre-wise inflation expectations represent the corresponding state's urban inflation forecasts. These data indicate that the biases not only vary widely across the states, but they also fluctuate considerably across time. Thus, the biases in the centre-wise inflation expectations data appear to be dynamic. Hence, for deriving the inflation nowcasts and forecasts using the survey data, a centre-wise analysis seems more relevant.

[3] Moore (1964), Fama (1965) and Praetz (1969) conducted similar studies.

Table 1: Inflation Perceptions as Nowcasts and Realised CPI-U Inflation

State	Maximum Bias	Minimum Bias	State	Maximum Bias	Minimum Bias
Gujarat	12.0	0.7	West Bengal	10.0	-0.8
Karnataka	5.3	-1.9	Uttar Pradesh	8.8	-1.5
Madhya Pradesh	6.8	-0.1	Maharashtra (using Mumbai)	7.6	1.2
Odisha	10.1	-1.6	Maharashtra (using Nagpur)	10.7	-0.2
Tamil Nadu	9.2	0.2	Bihar	7.8	-3.2
Delhi	8.9	-0.1	Kerala	8.4	-0.7
Assam	11.4	-2.8	Chandigarh	8.5	-1.3
Telangana	7.3	-0.7	Jharkhand	6.3	-1.9
Rajasthan	7.9	-1.6	Chhattisgarh	8.4	-1.5

Note: The survey centre Jammu is added to the list of IESH centres from March 2021 round onwards. Hence, due to insufficient data, the centre is omitted from this analysis.
Source: Authors' calculations.

Table 2: Three-month ahead Inflation Expectations as Forecasts and Realised CPI-U Inflation

State	Maximum Bias	Minimum Bias	State	Maximum Bias	Minimum Bias
Gujarat	12.7	1.8	West Bengal	9.6	-0.7
Karnataka	7.5	-1.5	Uttar Pradesh	11.1	0.5
Madhya Pradesh	8.5	0.9	Maharashtra (using Mumbai)	8.8	1.4
Odisha	11.9	-1.5	Maharashtra (using Nagpur)	10.8	0.9
Tamil Nadu	9.0	2.1	Bihar	10.4	-2.6
Delhi	9.4	-0.6	Kerala	6.9	-0.4
Assam	12.3	-4.0	Chandigarh	9.3	-0.7
Telangana	8.7	-1.3	Jharkhand	6.7	-1.1
Rajasthan	8.5	-0.7	Chhattisgarh	10.8	-1.6

Note: The survey centre Jammu is added to the list of IESH centres from March 2021 round onwards. Hence, due to insufficient data, the centre is omitted from this analysis.
Source: Authors' calculations.

Table 3: One-Year Ahead Inflation Expectations as Forecasts and Realised CPI-U Inflation

State	Maximum Bias	Minimum Bias	State	Maximum Bias	Minimum Bias
Gujarat	15.4	2.0	West Bengal	11.2	-1.2
Karnataka	8.3	-1.1	Uttar Pradesh	12.3	0.6
Madhya Pradesh	10.9	0.3	Maharashtra (using Mumbai)	8.7	-0.6
Odisha	12.7	-1.3	Maharashtra (using Nagpur)	12.9	-1.3
Tamil Nadu	13.3	2.4	Bihar	13.7	-4.5
Delhi	9.9	0.8	Kerala	11.8	-0.1
Assam	13.1	-5.3	Chandigarh	14.0	0.2

Telangana	9.6	0.1	Jharkhand	8.7	-3.0
Rajasthan	10.2	-2.5	Chhattisgarh	8.3	-1.6

Note: The survey centre Jammu is added to the list of IESH centres from March 2021 round onwards. Hence, due to insufficient data, the centre is omitted from this analysis.
Source: Authors' calculations.

We then study the state-wise official inflation data and centre-wise survey data by fitting appropriate probability distributions to them separately, and then linking the two through fitted distributions. Fitting probability distributions to the inflation and survey data facilitate a complete study of the data characteristics, including moments, skewness, kurtosis, *etc.*

Let x be a real variable denoting the official inflation series of a state for a finite number of time periods T. While the aggregate inflation data may follow standard probability distribution or a mixture of two standard probability distributions (Sinha, 2023), the state-wise data are expected to display greater variability. As a result, to fit a probability distribution to the state-wise official inflation series, several continuous probability distributions are fitted to the data and it may be better to consider that x is fitted with a mixture of say, n probability distributions.

The practice of using mixture probability distributions is popular in the literature. Johnson *et al.* (1994) described a theory on deriving a two-piece Normal distribution in which half of the pieces of two different Normal distributions with the same mode, but different standard deviations were joined together. Blix and Sellin (1998) used a two-piece Normal distribution to incorporate asymmetric risks to forecasts. Banerjee and Das (2011) also followed the same to apply in the Indian case. Sinha (2023) refers to literature like Cooray and Ananda (2005), Scollnik (2007), Ciumara (2006), Scollnik and Sun (2012), Nadarajah and Bakar (2014) and Frigessi *et al.* (2002) to fit a set of two probability distributions to the inflation data in India. The probability distribution function of x may, thus, be denoted as,

$$f(x) = C \begin{cases} f_1(z_1)\ if\ z_1 \in Z_1 \\ f_2(z_2)\ if\ z_2 \in Z_2 \\ \vdots \\ \vdots \\ f_n(z_n)\ if\ z_n \in Z_n \end{cases} \quad (1)$$

where, $(z_1 \cup z_2 \cup \ldots \cup z_n) = x$, $x \in \mathbb{R}$, the line of real numbers, $Z_1, Z_2, \ldots Z_n$ denote the supports of $z_1, z_2, \ldots z_n$, respectively and $(Z_1 \cup Z_2 \cup \ldots \cup Z_n) \in \mathbb{R}$. Here, C is a constant such that,

$$\int_{-\infty}^{\infty} f(x)\, dx = 1 \quad (2)$$

We estimate the probabilities for each of the inflation brackets using twelve probability distributions and choose the best fit for each bracket. In such a case, calculating the goodness of fit measure may not be of much relevance.

The distribution function of x for any real number "a" is defined as,

$$F(a) = \frac{1}{T}\sum_{i=1}^{T} w_i$$
$$w_i = \begin{cases} 1 \; if \; x_i \leq a \\ 0 \; otherwise \end{cases} \quad (3)$$

Here, $F(a)$ denotes the proportion of x-values in the finite time frame not exceeding a real number "a".

An important characteristic of the inflation sentiment data in India is the respondents' preference for round numbers in polling their expectations (Sinha, 2023). This characteristic is expected to be even more prominent in the centre-wise data. This makes the centre-wise survey data uneven which makes the task of fitting suitable probability distribution extremely difficult. Hence, in fitting a suitable probability distribution to the state-wise inflation expectations survey dataset, an approach similar to that in fitting probability distribution to the official inflation dataset may not be appropriate. For the ease of handling the data, it is intended to classify the survey data into two portions in which the first portion would only display the dataset due to digit preference and the second portion would consist of the remaining dataset displaying a much smoother distribution. Although the survey data is continuous, the first portion, due to digit preference, is discrete, and the remaining portion remains continuous.

To perform this data segregation, we consider the survey data for a finite time period. As per the survey questionnaire, the quantitative inflation sentiments of consumers are collected in the range of $(< 1\%, 1 - < 2\%, \dots, 15 - < 16\%, \geq 16\%)$. Respondents who answer "≥ 16 per cent" are advised to provide the exact inflation perception/ expectation number. Let y be a real variable, taking values y_k representing the inflation sentiment of the consumers. The variable y_k takes value labels in the set $V = (< 1\%, 1 - < 2\%, \dots, j, \dots 15 - < 16\%, 16\%, 17\%, 18\%, \dots.)$ in the survey data. As observed from the IESH data, y_k is allowed to take decimal values. Further, this is a variable indicating the sentiments on inflation, which itself is a continuous variable. Hence, it can be safely concluded that y_k is a continuous variable. Let the frequency distribution of this variable be represented as (y_k, f_k), where f_k is the frequency of y_k observed from the data of a survey centre. Now, to segregate the frequency distribution of the original continuous data into discrete and continuous data at first, g_k is computed as-

$$g_k = \begin{cases} \frac{f_{k-1} + f_{k+1}}{2} & if \quad y_k \in (5-<6\%, 10-<11\%, 15-<16\%) \\ & or \\ & y_k \; is \; any \; response \geq 16\% \; and \\ & f_{k-1} < 10 < f_k < f_{k+1} \\ f_k & otherwise \end{cases} \quad (4)^4$$

Then h_k is computed as,

$$h_k = \begin{cases} f_k - g_k & if \quad y_k \in (5-<6\%, 10-<11\%, 15-<16\%) \\ & or \\ & y_k \; is \; any \; response \geq 16\% \; and \\ & f_{k-1} < 10 < f_k < f_{k+1} \\ 0 & otherwise \end{cases} \quad (5)$$

Here, the frequency distribution (y_k, g_k) denotes the new frequency distribution of continuous data on y_k. The frequency values g_k are calculated with the logic that at every y_k, wherever there is a peak in frequency due to consumers' preference for certain digits, the frequency for the continuous data is estimated by interpolation method. This segregation from continuous raw survey data to discrete and continuous survey data results in a much smoother distribution for the continuous data, thus making it much easier to fit appropriate probability distributions.

From the frequency distribution of the centre-wise IESH data, it is observed that there are several sharp peaks in the frequencies corresponding to certain whole and rounded numbers; peaks are observed at multiples of 5 for responses below 16 per cent and at multiples of 5 as well as of other numbers for responses equal to 16 per cent and above. The preference for digits varies across the survey rounds. In other words, peaks in frequencies of y_k are identified at $5-<6$ per cent, $10-<11$ per cent and $15-<16$ per cent if y_k lies below 16 per cent. If y_k value is 16 per cent and above, peaks in frequencies are observed at y_k values being multiples of 5 as well as of other numbers. Hence, for y_k values 16 per cent and above, the frequencies f_k are considered as peaks if f_k is greater than 10 and f_k is greater than its neighbours, *i.e.*, f_{k-1} and f_{k+1}. This ensures that f_k is always positive for the IESH data. Let these values at which peaks in frequencies f_k are observed, be represented by the set y'_k.

The frequency distribution (y'_k, h_k) represents the frequency distribution of the discrete data segregated from the original data. The frequency values h_k are calculated with the logic that at every y_k, wherever a peak in frequency has been identified due to respondents' preference for certain digits, the frequency for the discrete data due to digit preference is estimated by deriving the left-out frequency

[4] Here, the threshold $f_k > 10$ is chosen based on the IESH data such that g_k is always positive for the given data.

after removing the frequencies at those points for the continuous data (g_k) from the original frequencies (f_k). The observations in the derived discrete data are specific numbers, *e.g.*, $5-<6\%, 10-<11\%$, $15-<16\%$, 20%, 22%, 25%, 30%, 33%, …., 99%. For the ease of handling data in fitting discrete probability distributions, for which usually the observations are 0,1, 2, …., the frequency distribution (y'_k, h_k) is redesigned into a fixed tabular frequency distribution format, say (Y_p, l_p) as given below in Table 4.

Table 4: Redesigned Discrete Frequency Distribution

Discrete Brackets from y'_k	**Midpoints of Brackets (A_p)**	**New Frequency Distribution of Discrete Data**	
		Converted Midpoint (Y_p)	**Frequency (l_p)**
$[y'_1, y'_a]$	$\frac{y'_1 + y'_a}{2} = A_0$	$\frac{A_0 - A_0}{A_1 - A_0} = 0$	l_0
$[y'_b, y'_c]$	$\frac{y'_b + y'_c}{2} = A_1$	$\frac{A_1 - A_0}{A_1 - A_0} = 1$	l_1
$[y'_d, y'_e]$	$\frac{y'_d + y'_e}{2} = A_2$	$\frac{A_2 - A_0}{A_1 - A_0} = 2$	l_2
⋮	⋮	⋮	⋮
⋮	⋮	⋮	⋮
$[y'_{\frac{m}{2}-1}, y'_m]$	$\frac{y'_{\frac{m}{2}-1} + y'_m}{2} = A_{\frac{m}{2}-1}$	$\frac{A_{\frac{m}{2}-1} - A_0}{A_1 - A_{0_1}} = \frac{m}{2} - 1$	$l_{\frac{m}{2}-1}$

Source: Authors' calculations.

A discrete frequency distribution (Y_p, l_p) and a continuous frequency distribution (y_k, g_k) are now available. Several discrete probability distributions are fitted into the discrete data and suppose $h(Y_p)$ for $p = 0,1,2, \ldots, \frac{m}{2} - 1$, is the probability distribution suitably fitted to the discrete data. For fitting an appropriate probability distribution to the continuous data, an approach similar to that followed in fitting probability distribution to the official inflation data is taken:

$$f(y_k) = D \begin{cases} f_1(y_{1k}) \; if \; y_{1k} \in Y_{1k} \\ f_2(y_{2k}) \; if \; y_{2k} \in Y_{2k} \\ \vdots \\ \vdots \\ f_r(y_{rk}) \; if \; y_{rk} \in Y_{rk} \end{cases} \tag{6}$$

where, $(y_{1k} \cup y_{2k} \cup \ldots \cup y_{rk}) = y_k$, $y_k \in \mathbb{R}$, $Y_{1k}, Y_{2k}, \ldots Y_{rk}$ denote the supports of $y_{1k}, y_{2k}, \ldots y_{rk}$, respectively and $(Y_{1k} \cup Y_{2k} \cup \ldots \cup Y_{rk}) \in \mathbb{R}$. Here, D is a constant such that,

$$\int_{-\infty}^{\infty} f(y_k)\, dy_k = 1 \tag{7}$$

Now, once $f(x)$, its related distribution function $F(a)$ at a, $h(Y_p)$ and $f(y_k)$ and the estimates of the related parameters of the fitted distributions are available, the idea now is to revert the estimated probabilities of the survey figures to the corresponding percentiles of the distribution function of the official inflation data. The statistical moments of the two distributions are very different and mapping the two distributions facilitates a correspondence between the two. Various Copula functions can be applied for this mapping. Sinha (2023) explains direct and indirect mapping procedures and executes the direct mapping method. In this paper, we explore finding the quantile of the inflation distribution for a given probability in the distribution for inflation expectations as follows:

$$P_p = F^{-1}\{h(Y_p)\}, p = 0,1,2,\dots,\frac{m}{2} - 1 \quad (8)$$

and

$$Q_k = F^{-1}\{f(y_k)\}, y_k \in V \quad (9)$$

The survey-based expectations are biased towards larger numbers as compared to the official inflation figures. Hence, it may be assumed that the distribution of the inflation expectations is shifted towards the right of the distribution of the official inflation. In the survey distribution, if the probability of expecting a higher inflation number increases, then the corresponding percentile of the inflation data will be towards a number higher than the previously realised inflation figure. As distributions of the official inflation data and the survey data are widely different (apparent from the bias in the survey data), a mapping of the distributions is expected to remove the bias in the survey data and present refined inflation forecasts, namely, P_p from the discrete[5] survey data, Q_k from the continuous survey data and $P_p + Q_k$ as a forecast obtained from the combined survey data.

We observe that the discrete survey data on inflation perceptions, three-month ahead and one-year ahead inflation expectations contain more information on the realised official inflation figures than the continuous survey data on the inflation sentiments. Taking this into account, the proposed inflation estimates are restricted to P_p. We also consider the estimates obtained from the sum $P_p + Q_k$ as alternative inflation estimates.

Usually, time-varying coefficients are estimated in econometric models for nowcasting and forecasting inflation. This is important for updating the nowcasts and forecasts with the recent changes in the economy. Accordingly, with the addition of new datasets on inflation expectations (from survey rounds) and realised CPI-U

[5] Here, the reversion from probabilities of discrete distribution from survey to percentiles of continuous distribution of CPI-U inflation are being done. The motive is to derive the percentiles of official inflation using the probabilities obtained from the survey data.

inflation, we update the probability distributions of both datasets by following the same method of finding the best-fit distribution out of 12 distributions for each of the data brackets. Thus, crucial information on the time-varying nature of both datasets is retained in the derived nowcasts and forecasts. The distributions to be studied are kept fixed throughout the paper (one may add other distributions to the set and explore for better fit), thus eliminating the possibility of subjectivity in distribution fitting, if any.

IV. Nowcasting/ Forecasting State-level Urban Inflation

To examine the applicability of the above methodology, at first, the state-wise CPI-U[6] general[7] inflation data[8], pertaining to states[9] in which the IESH is conducted, is considered from January 2014 to December 2023. The state-wise IESH unit-level data[10], are used from December 2013 to September 2023. The information on exact inflation perceptions and expectations (for responses labelled '≥ 16 per cent') are available in a consistent manner from the December 2013 onwards.

Our objectives are to use the inflation perceptions' survey data to nowcast the CPI-U inflation of the survey period and also to use the three-month ahead and one-year ahead inflation expectations' survey data to forecast the CPI-U inflation of the months which are three-month ahead and one-year ahead of the survey month, respectively. To perform this exercise, available information on the CPI-U inflation of the months just prior to the survey month is used to compute the out-of-sample inflation forecasts. The out-of-sample nowcast estimates and two types of forecast estimates are obtained for 20 months each. To obtain out-of-sample nowcasts and forecasts of CPI-U inflation using the survey data, mapping of the survey months and nowcast and forecast months is performed as shown in Table 5.

[6] The CPI urban inflation figures are considered here instead of the CPI combined inflation because the survey IESH is being conducted in urban areas.

[7] For comparability reasons, the general CPI-U inflation data are considered; the survey IESH captures quantitative inflation sentiments of consumers for combined items. The survey does not capture inflation sentiments for sub-groups and hence the proposed methodology is inapplicable for forecasting sub-group-wise inflation figures.

[8] Data are available from the Ministry of Statistics and Programme Implementation (MOSPI).

[9] The states in which IESH is conducted are Gujarat, Karnataka, Madhya Pradesh, Odisha, Tamil Nadu, Delhi, Assam, Telangana, Rajasthan, Jammu and Kashmir, West Bengal, Uttar Pradesh, Maharashtra, Bihar, Kerala, Chandigarh, Jharkhand and Chhattisgarh. The survey centre Kolhapur is not considered as IESH was discontinued in this centre since June 2016. The corresponding survey centres are Ahmedabad, Bangalore, Bhopal, Bhubaneswar, Chennai, Delhi, Guwahati, Hyderabad, Jaipur, Jammu, Kolkata, Lucknow, Mumbai and Nagpur, Patna, Thiruvananthapuram, Chandigarh, Ranchi and Raipur.

[10] The dataset is available on Centralised Information Management System of RBI; https://cimsdbie.rbi.org.in/DBIE/#/dbie/home

Table 5: Mapping of Survey Periods CPI-U Nowcasting/ Forecasting Months

Current		Three-months ahead		One-year ahead	
Survey Month	**CPI-U Nowcast Month**	**Survey Month**	**CPI-U Forecast Month**	**Survey Month**	**CPI-U Forecast Month**
July 2020	July 2020	July 2020	Oct. 2020	Nov. 2019	Nov. 2020
Sept. 2020	Sept. 2020	Sept. 2020	Dec. 2020	Jan. 2020	Jan. 2021
Nov. 2020	Nov. 2020	Nov. 2020	Feb. 2021	Mar. 2020	Mar. 2021
Jan. 2021	Jan. 2021	Jan. 2021	April 2021	May 2020	May 2021
Mar. 2021	Mar. 2021	Mar. 2021	June 2021	July 2020	July 2021
May 2021	May 2021	May 2021	Aug. 2021	Sept. 2020	Sept. 2021
July 2021	July 2021	July 2021	Oct. 2021	Nov. 2020	Nov. 2021
Sept. 2021	Sept. 2021	Sept. 2021	Dec. 2021	Jan. 2021	Jan. 2022
Nov. 2021	Nov. 2021	Nov. 2021	Feb. 2022	Mar. 2021	Mar. 2022
Jan. 2022	Jan. 2022	Jan. 2022	April 2022	May 2021	May 2022
Mar. 2022	Mar. 2022	Mar. 2022	June 2022	July 2021	July 2022
May 2022	May 2022	May 2022	Aug. 2022	Sep 2021	Sep 2022
July 2022	July 2022	July 2022	Oct. 2022	Nov. 2021	Nov. 2022
Sept. 2022	Sept. 2022	Sept. 2022	Dec. 2022	Jan. 2022	Jan. 2023
Nov. 2022	Nov. 2022	Nov. 2022	Feb. 2023	Mar. 2022	Mar. 2023
Jan. 2023	Jan. 2023	Jan. 2023	April 2023	May 2022	May 2023
Mar. 2023	Mar. 2023	Mar. 2023	June 2023	July 2022	July 2023
May 2023	May 2023	May 2023	Aug. 2023	Sept. 2022	Sept. 2023
July 2023	July 2023	July 2023	Oct. 2023	Nov. 2022	Nov. 2023
Sept. 2023	Sept. 2023	Sept. 2023	Dec. 2023	Jan. 2023	Jan. 2024

Sources: RBI, MOPSI and Authors' calculations.

We then examine the probability distribution of the CPI-U inflation series of each of the 18 states separately. On an experimental basis, the distribution-fitting exercise is initially conducted for a period of twelve months, *i.e*., from September 2022 to August 2023. Chart A1 displays these distributions of the CPI-U inflation data. These show that the distributions are somewhat smooth only for the states of Delhi, Assam, Bihar and Kerala. For the rest of the states, no single standard distribution can fit well into the observed probability distributions. The modal inflation lies in the range of 4 per cent to 7 per cent in most of the states. 17 per cent and 25 per cent of the inflation values in the case of Delhi and Chhattisgarh, respectively are less than or equal to 2 per cent; for the rest of the states under study for the mentioned period, there is no observation equal to or less than 2 per cent. However, more than half of the inflation values lie beyond 6 per cent in the case of Gujarat, Madhya Pradesh, Tamil Nadu, Telangana, Uttar Pradesh and Maharashtra.

To fit distribution(s) to the CPI-U inflation data of each of the states under study, following Sinha (2023), 12 distributions, namely, Johnson S_B, Cauchy, Burr, Laplace, Lognormal, Exponential, Gamma, Logistic, Weibull, Inverse Gamma, Loglogistic and Inverse Weibull are experimented. For each inflation bracket, the best-fit distribution (the distribution for which the fitted probability is nearest to the observed probability) is taken (Table A1).

It is observed that for each of the 18 states under study, a mixture of probability distributions fit the data well. Now, following equations (1) and (2), for each state, the estimated probability distribution functions are proportioned into their respective weights and stitched together so that the final probability distribution function consisting of a mixture of probability distribution functions adds up to unity (Chart A1).

Now, it is intended to fit distributions to the centre-wise inflation perceptions' and expectations' data of the IESH. First, a distribution is fitted to state-wise inflation expectations' data of the September 2023 survey round. Due to the digit preferences of respondents in polling their inflation sentiments (observed as long spikes in observed frequencies for certain numbers in Chart A2) and using equations (4) and (5) and Table 4, the observed frequency distribution is broken into discrete and continuous frequency distributions. Table 6 provides the share of estimated discrete frequencies out of the total frequencies in each of the survey centres. The shares are comparatively higher in the perceptions about the current inflation than in the expectations about the future inflation over three months and one year. The shares are less than 50 per cent.

Table 6: Percentage of Discrete Responses in IESH September 2023 Survey Round

Survey Centre	Inflation Perceptions	Three-month ahead Inflation Expectations	One-year ahead Inflation Expectations
Ahmedabad	47.2	37.2	36.7
Bangalore	34.9	26.0	26.3
Bhopal	38.8	30.9	32.4
Bhubaneswar	36.8	21.5	27.7
Chennai	49.9	35.8	39.9
Delhi	36.4	28.8	28.0
Guwahati	42.0	37.5	34.4
Hyderabad	32.1	24.3	30.0
Jaipur	36.5	27.2	27.4
Jammu	50.0	42.5	40.0
Kolkata	42.7	36.5	34.0
Lucknow	37.3	27.6	27.7
Mumbai	31.8	25.7	25.6
Nagpur	31.8	21.3	22.2
Patna	23.6	14.0	18.7
Thiruvananthapuram	47.4	32.4	24.7
Chandigarh	28.6	18.5	18.4
Ranchi	17.7	12.9	15.4
Raipur	23.8	15.7	16.7

Sources: RBI and Authors' calculations.

In the case of the discrete frequency distribution segregated from the survey frequency distribution, Poisson distribution and Negative Binomial distributions are

fitted. For the September 2023 survey round, the Poisson distribution fits the data well. The estimated values of the parameter λ for the fitted Poisson(λ) distribution are provided in Table A2. The continuous data is also fitted with appropriate probability distributions using equations (6) and (7). Frequency peaks are also observed at $< 1 \text{ per cent}$ response option for the one-year ahead inflation expectations but not in the three-month ahead inflation expectations.

This reflects consistency in the responses because for respondents who expect prices to remain the same/ decline (responses to qualitative questions) in the next year as compared to the current period (about 12 per cent in the study period), the quantitative inflation expectations must (by definition) be $< 1 \text{ per cent}$ (about 8 per cent in the study period) as no price change (price decrease) over a year implies zero inflation (deflation). So, this phenomenon in the responses is a required criterion as per the structure of the questionnaire, rather than being noise in the data, as is the case with digit preference.

With this logic, the frequency peaks at $< 1 \text{ per cent}$ in the one-year ahead inflation expectations are retained. The state-wise observed frequency distributions and fitted probability distributions for both the discrete and continuous data portions of the one-year-ahead inflation expectations in the September 2023 survey round are displayed in Chart A3. From Charts A2 and A3, it is clear that frequent high spikes in the observed frequency distributions of the inflation expectations are now separated into discrete data, and the remaining data are comparatively smoother, thus making the task of fitting distributions easier.

Now, following the above procedure shown on a sample basis for fitting distributions to 12 months of CPI-U inflation data and one survey round of IESH data, the distribution fitting exercises are performed for each survey round starting from July 2020 to September 2023. For each of these survey rounds, the corresponding 12 months of CPI-U inflation data are fitted with appropriate probability distribution functions. To nowcast the CPI-U of each CPI state under study for the survey month by using the IESH survey data of a single round and the CPI-U inflation data available for the past 12 months (based on the logic that individuals usually poll inflation sentiments based on past experiences), equations (3), (8) and (9) are used. These estimates are named here as '1 IESH 12 CPI-U'. Using the same data, forecasting the CPI-U inflation of each CPI state under study for the next three months and for the next year is also done. Chart A4 displays the three-months ahead forecast of CPI-U inflation from October 2020 to December 2023 for each state.

To check the robustness of the proposed methodology, the nowcasting and forecasting exercises are then repeated by utilising the following data combinations:

i. IESH data pertaining to a single survey round and previous six months' CPI-U inflation data '1 IESH 6 CPI-U': The logic for such a selection is that individuals usually poll inflation sentiments based on the experiences in the past few months.

ii. All IESH data from December 2013[11] round onwards and CPI-U inflation data of all months from the beginning, *i.e*., from January 2014 onwards 'All IESH All CPI-U': The logic for such a selection is to prevent any loss of information in the survey and the inflation datasets.

iii. All IESH data and previous twelve months' CPI-U inflation data 'All IESH 12 CPI-U': This utilises the entire survey data but considers the inflation data from the last year using the logic that individuals usually poll inflation sentiments based on past experiences.

iv. All IESH data and previous six months' CPI-U inflation data 'All IESH 6 CPI-U': This utilises the entire survey data but considers the recent inflation data using the logic that individuals usually poll inflation sentiments based on the recent experiences.

The CPI-U inflation nowcasts and forecasts are separately derived using the discrete survey data (D) and by adding the estimates of discrete and continuous survey data (D+C). These are then compared with the realised CPI-U[12] inflation figures, and the performances of the estimates are gauged by using the error measure Theil's U given below in equation (10):

$$Theil's\ U = \frac{\sqrt{\frac{1}{T}\sum_{t=1}^{T}(F_t - A_t)^2}}{\sqrt{\frac{1}{T}\sum_{t=1}^{T}F_t^2} + \sqrt{\frac{1}{T}\sum_{t=1}^{T}A_t^2}} \tag{10}$$

where, F_t is the forecast for time period t, A_t is the actual at time period t and T is the number of time periods. Lower the value of Theil's U, the closer is the nowcast/ forecast to the realised figure. The performances of the inflation perceptions (considered as one of the benchmark nowcasts) and expectations (considered as one of the benchmark forecasts) from the IESH data are also measured based on above methodology. Apart from this, another type of nowcasts and forecasts are considered here by removing the bias from the survey estimates as shown in equation (11).

$$E_{Ts} = e_{Ts} - \frac{1}{T-1}\sum_{i=1}^{T-1}(e_{is} - A_{is}) \tag{11}$$

[11] The information on exact inflation perceptions and expectations (for responses labelled ≥16 per cent) are available in a consistent manner from the December 2013 onwards.

[12] For the months April 2020, May 2020, April 2021 and May 2021 for which CPI-U inflation figures are unavailable due to the COVID-19 pandemic restrictions, so the nearest available month's figures are considered.

where, E_{Ts} is the revised forecast of the T^{th} month for the s^{th} state derived from the survey estimate, e_{Ts} is the inflation perception/ expectation estimate of the T^{th} month for the s^{th} state from the survey and A_{is} is the realised official inflation figure of the i^{th}, $i = 1,2, \ldots, T$, month for the s^{th} state. Furthermore, out-of-sample nowcasts and forecasts based on simple linear regression (named as 'Reg-based') of the centre-wise survey-based mean estimates on the corresponding state-wise CPI-U general inflation figures are also taken as benchmark estimates for the comparison purposes based on the performances of nowcasts and forecasts. These estimates are named here as 'IESH-BA'[13]. Tables 7(I), 7(II) and 7(III) display the performances of the nowcasts and forecasts[14] based on Theil's U values.

Table 7(I): Performances of Nowcasts: Values of Theil's U for Nowcasts *vis-à-vis* Realised Inflation Values

Data		GJ	KT	MP	OD	TN	DL	AS
IESH		0.275	0.242	0.151	0.241	0.238	0.418	0.266
IESH-BA		0.339	0.170	0.171	0.194	0.175	0.240	0.267
Reg-based		0.197	0.088	0.156	0.182	0.152	0.176	0.208
1 IESH 12 CPI-U	D	0.125	0.111	0.115	0.163	0.111	0.198	0.199
	D+C	0.236	0.238	0.273	0.261	0.263	0.288	0.325
1 IESH 6 CPI-U	D	0.125	0.113	0.099	0.165	0.105	0.181	0.169
	D+C	0.241	0.204	0.247	0.234	0.208	0.254	0.322
All IESH All CPI-U	D	0.149	0.102	0.164	0.203	0.162	0.159	0.299
	D+C	0.161	0.187	0.212	0.188	0.189	0.272	0.233
All IESH 12 CPI-U	D	0.143	0.111	0.120	0.152	0.107	0.196	0.165
	D+C	0.199	0.247	0.253	0.211	0.244	0.291	0.299
All IESH 6 CPI-U	D	0.138	0.110	0.110	0.165	0.105	0.182	0.158
	D+C	0.196	0.202	0.235	0.215	0.195	0.260	0.294
Data		**TL**	**RJ**	**JK**	**WB**	**UP**	**MHM**	**MHN**
IESH		0.192	0.296	0.314	0.261	0.273	0.238	0.206
IESH-BA		0.125	0.199		0.223	0.111	0.141	0.130
Reg-based		0.149	0.177		0.204	0.114	0.155	0.164
1 IESH 12 CPI-U	D	0.115	0.145	0.108	0.152	0.116	0.129	0.116
	D+C	0.278	0.242	0.288	0.259	0.249	0.235	0.248
1 IESH 6 CPI-U	D	0.192	0.144	0.087	0.132	0.114	0.117	0.106
	D+C	0.284	0.241	0.257	0.263	0.237	0.258	0.268
All IESH All CPI-U	D	0.223	0.150	0.136	0.304	0.145	0.161	0.161
	D+C	0.222	0.204	0.222	0.225	0.180	0.218	0.220
All IESH 12 CPI-U	D	0.165	0.148	0.101	0.156	0.110	0.170	0.169
	D+C	0.288	0.165	0.282	0.238	0.220	0.234	0.235

[13] The survey centre Jammu is added to the list of IESH centres from March 2021 round onwards. Due to insufficient survey data, the 'IESH-BA' and 'Reg-based' figures for Jammu could not be compiled.

[14] The states are denoted as 'GJ' for Gujarat, 'KT' for Karnataka, 'MP' for Madhya Pradesh, 'OD' for Odisha, 'TN' for Tamil Nadu, 'DL' for Delhi, 'AS' for Assam, 'TL' for Telangana, 'RJ' for Rajasthan, 'JK' for Jammu and Kashmir, 'WB' for West Bengal, 'UP' for Uttar Pradesh, 'MHM' for Maharashtra using Mumbai's survey data, 'MHN' for Maharashtra using Nagpur's survey data, 'BR' for Bihar, 'KL' for Kerala, 'CH' for Chandigarh, 'JH' for Jharkhand, 'CHH' for Chhattisgarh and 'AC' for combined[14] estimate for all centres. The survey centre Jammu is added to the list of IESH centres from March 2021 round onwards. Due to insufficient survey data, the 'IESH-BA' and 'Reg-based' figures for Jammu could not be compiled.

All IESH 6 CPI-U	D	0.177	0.154	0.091	0.149	0.132	0.121	0.122
	D+C	0.266	0.203	0.250	0.262	0.224	0.249	0.249
Data		**BR**	**KL**	**CH**	**JH**	**CHH**	**AC**	
IESH		0.160	0.105	0.358	0.175	0.293	0.234	
IESH-BA		0.225	0.385	0.144	0.172	0.220	0.100	
Reg-based		0.201	0.106	0.132	0.163	0.190	0.113	
1 IESH 12 CPI-U	D	0.151	0.095	0.110	0.139	0.169	0.083	
	D+C	0.271	0.289	0.259	0.310	0.300	0.215	
1 IESH 6 CPI-U	D	0.128	0.094	0.112	0.147	0.166	0.083	
	D+C	0.269	0.258	0.243	0.298	0.282	0.194	
All IESH All CPI-U	D	0.133	0.103	0.088	0.129	0.151	0.133	
	D+C	0.207	0.202	0.221	0.261	0.237	0.140	
All IESH 12 CPI-U	D	0.145	0.079	0.089	0.148	0.153	0.087	
	D+C	0.295	0.240	0.253	0.332	0.277	0.181	
All IESH 6 CPI-U	D	0.124	0.141	0.084	0.135	0.154	0.094	
	D+C	0.277	0.225	0.223	0.305	0.266	0.162	

Sources: RBI, MOSPI and Authors' calculations.

Table 7(II): Performances of Three-month ahead Forecasts: Values of Theil's U for Forecasts *vis-à-vis* Realised Inflation Values

Data		**GJ**	**KT**	**MP**	**OD**	**TN**	**DL**	**AS**
IESH		0.322	0.298	0.207	0.297	0.308	0.462	0.322
IESH-BA		0.288	0.209	0.167	0.188	0.113	0.264	0.209
Reg-based		0.172	0.101	0.156	0.186	0.122	0.189	0.171
1 IESH 12 CPI-U	D	0.145	0.127	0.122	0.164	0.115	0.244	0.225
	D+C	0.220	0.205	0.253	0.241	0.259	0.307	0.363
1 IESH 6 CPI-U	D	0.147	0.151	0.141	0.189	0.123	0.233	0.222
	D+C	0.227	0.202	0.255	0.218	0.200	0.281	0.374
All IESH All CPI-U	D	0.218	0.137	0.194	0.258	0.199	0.188	0.326
	D+C	0.181	0.173	0.219	0.212	0.184	0.264	0.266
All IESH 12 CPI-U	D	0.181	0.127	0.120	0.177	0.128	0.245	0.229
	D+C	0.185	0.227	0.229	0.199	0.245	0.317	0.364
All IESH 6 CPI-U	D	0.195	0.157	0.134	0.209	0.141	0.230	0.249
	D+C	0.212	0.222	0.232	0.208	0.189	0.280	0.372
Data		**TL**	**RJ**	**JK**	**WB**	**UP**	**MHM**	**MHN**
IESH		0.247	0.308	0.337	0.327	0.311	0.284	0.273
IESH-BA		0.109	0.182		0.149	0.101	0.106	0.077
Reg-based		0.132	0.156		0.156	0.097	0.133	0.134
1 IESH 12 CPI-U	D	0.133	0.169	0.165	0.171	0.142	0.163	0.151
	D+C	0.262	0.235	0.318	0.279	0.238	0.238	0.250
1 IESH 6 CPI-U	D	0.262	0.226	0.154	0.169	0.138	0.152	0.145
	D+C	0.301	0.291	0.289	0.288	0.235	0.261	0.268
All IESH All CPI-U	D	0.355	0.171	0.193	0.293	0.156	0.192	0.197
	D+C	0.312	0.232	0.262	0.199	0.185	0.222	0.222
All IESH 12 CPI-U	D	0.170	0.151	0.151	0.175	0.125	0.201	0.198
	D+C	0.269	0.160	0.306	0.268	0.206	0.243	0.237
All IESH 6 CPI-U	D	0.285	0.185	0.149	0.179	0.154	0.156	0.163
	D+C	0.306	0.245	0.283	0.284	0.227	0.247	0.249

Data		BR	KL	CH	JH	CHH	AC	
IESH		0.191	0.200	0.377	0.199	0.323	0.291	
IESH-BA		0.214	0.189	0.174	0.146	0.200	0.072	
Reg-based		0.196	0.074	0.172	0.137	0.187	0.090	
1 IESH 12 CPI-U	D	0.152	0.097	0.127	0.123	0.192	0.084	
	D+C	0.285	0.286	0.241	0.316	0.318	0.193	
1 IESH 6 CPI-U	D	0.141	0.091	0.137	0.123	0.194	0.098	
	D+C	0.281	0.249	0.239	0.305	0.292	0.175	
All IESH All CPI-U	D	0.147	0.105	0.120	0.116	0.176	0.159	
	D+C	0.202	0.231	0.222	0.266	0.233	0.129	
All IESH 12 CPI-U	D	0.151	0.090	0.097	0.131	0.179	0.101	
	D+C	0.281	0.256	0.231	0.325	0.290	0.163	
All IESH 6 CPI-U	D	0.134	0.151	0.122	0.121	0.171	0.116	
	D+C	0.274	0.247	0.225	0.306	0.266	0.146	

Sources: RBI, MOSPI and Authors' calculations.

Table 7(III): Performances of One-year ahead Forecasts: Values of Theil's U for Forecasts *vis-à-vis* Realised Inflation Values

Data		GJ	KT	MP	OD	TN	DL	AS
IESH		0.323	0.296	0.207	0.273	0.319	0.441	0.344
IESH-BA		0.460	0.165	0.283	0.407	0.211	0.274	0.627
Reg-based		0.156	0.095	0.156	0.174	0.131	0.196	0.143
1 IESH 12 CPI-U	D	0.163	0.142	0.134	0.136	0.150	0.282	0.286
	D+C	0.213	0.206	0.254	0.245	0.262	0.331	0.432
1 IESH 6 CPI-U	D	0.152	0.138	0.156	0.115	0.136	0.304	0.298
	D+C	0.234	0.167	0.237	0.183	0.151	0.335	0.454
All IESH All CPI-U	D	0.249	0.128	0.213	0.227	0.220	0.221	0.282
	D+C	0.153	0.137	0.175	0.165	0.094	0.278	0.201
All IESH 12 CPI-U	D	0.222	0.130	0.155	0.174	0.180	0.304	0.276
	D+C	0.214	0.235	0.244	0.224	0.259	0.351	0.411
All IESH 6 CPI-U	D	0.202	0.150	0.166	0.178	0.187	0.323	0.302
	D+C	0.234	0.195	0.212	0.184	0.158	0.350	0.444
Data		**TL**	**RJ**	**JK**	**WB**	**UP**	**MHM**	**MHN**
IESH		0.246	0.276	0.416	0.328	0.289	0.243	0.277
IESH-BA		0.168	0.362		0.284	0.210	0.318	0.255
Reg-based		0.123	0.177		0.122	0.130	0.167	0.165
1 IESH 12 CPI-U	D	0.113	0.152	0.107	0.203	0.146	0.167	0.126
	D+C	0.205	0.200	0.318	0.283	0.227	0.222	0.223
1 IESH 6 CPI-U	D	0.238	0.155	0.126	0.213	0.176	0.186	0.148
	D+C	0.257	0.231	0.310	0.333	0.267	0.255	0.271
All IESH All CPI-U	D	0.390	0.176	0.201	0.318	0.207	0.238	0.243
	D+C	0.299	0.193	0.273	0.228	0.203	0.234	0.231
All IESH 12 CPI-U	D	0.189	0.196	0.107	0.215	0.148	0.211	0.219
	D+C	0.208	0.176	0.305	0.278	0.186	0.230	0.233
All IESH 6 CPI-U	D	0.297	0.209	0.141	0.223	0.184	0.178	0.185
	D+C	0.290	0.221	0.307	0.324	0.248	0.257	0.262
Data		**BR**	**KL**	**CH**	**JH**	**CHH**	**AC**	
IESH		0.202	0.266	0.341	0.191	0.323	0.283	
IESH-BA		0.483	0.382	0.188	0.283	0.185	0.213	
Reg-based		0.191	0.073	0.118	0.118	0.158	0.102	

1 IESH 12 CPI-U	D	0.198	0.098	0.156	0.159	0.211	0.097	
	D+C	0.277	0.268	0.301	0.329	0.322	0.176	
1 IESH 6 CPI-U	D	0.166	0.090	0.147	0.170	0.184	0.104	
	D+C	0.275	0.230	0.245	0.318	0.301	0.175	
All IESH All CPI-U	D	0.179	0.139	0.120	0.146	0.156	0.187	
	D+C	0.202	0.189	0.175	0.281	0.240	0.117	
All IESH 12 CPI-U	D	0.196	0.118	0.139	0.159	0.200	0.131	
	D+C	0.283	0.224	0.280	0.341	0.294	0.151	
All IESH 6 CPI-U	D	0.172	0.167	0.159	0.155	0.166	0.132	
	D+C	0.269	0.239	0.236	0.319	0.279	0.140	

Sources: RBI, MOSPI and Authors' calculations.

From the tables, adjustment of bias using historical deviations of inflation perceptions and expectations from the realised inflation in the 'IESH-BA' estimates do not produce nowcasts and forecasts that are closer to the realised inflation than the nowcasts and forecasts obtained using this methodology for most states. The estimates from discrete estimates bear lower errors in nowcasts and forecasts as compared to the sum of discrete and continuous estimates. Table 8 displays the methods for which the error measure Theil's U is lower than the errors in the remaining methods. For the states excluding Karnataka, Assam, West Bengal, Uttar Pradesh and Kerala, the proposed exercise yields better inflation nowcasts and forecasts than the other benchmark methods.

Table 8: Methods Producing Estimates with Errors Lower than Other Methods

State	Nowcasts	Three-months-ahead Forecasts	One-Year-Ahead Forecasts
Gujarat	1 IESH 6 CPI-U	1 IESH 12 CPI-U	1 IESH 6 CPI-U
Karnataka	Reg-based	Reg-based	Reg-based
Madhya Pradesh	1 IESH 6 CPI-U	All IESH 12 CPI-U	1 IESH 12 CPI-U
Odisha	All IESH 12 CPI-U	1 IESH 12 CPI-U	1 IESH 6 CPI-U
Tamil Nadu	All IESH 6 CPI-U	IESH-BA	All IESH All CPI-U
Delhi	All IESH All CPI-U	All IESH All CPI-U	Reg-based
Assam	All IESH 6 CPI-U	Reg-based	Reg-based
Telangana	1 IESH 12 CPI-U	IESH-BA	1 IESH 12 CPI-U
Rajasthan	1 IESH 6 CPI-U	All IESH 12 CPI-U	1 IESH 12 CPI-U
Jammu and Kashmir	1 IESH 6 CPI-U	All IESH 6 CPI-U	1 IESH 12 CPI-U
West Bengal	1 IESH 6 CPI-U	IESH-BA	Reg-based
Uttar Pradesh	All IESH 12 CPI-U	Reg-based	Reg-based
Maharashtra (using Mumbai)	1 IESH 6 CPI-U	IESH-BA	1 IESH 12 CPI-U
Maharashtra (using Nagpur)	1 IESH 6 CPI-U	IESH-BA	1 IESH 12 CPI-U
Bihar	All IESH 6 CPI-U	All IESH 6 CPI-U	1 IESH 6 CPI-U
Kerala	All IESH 12 CPI-U	Reg-based	Reg-based
Chandigarh	All IESH 6 CPI-U	All IESH 12 CPI-U	Reg-based
Jharkhand	All IESH All CPI-U	All IESH All CPI-U	Reg-based
Chhattisgarh	All IESH All CPI-U	All IESH 6 CPI-U	All IESH All CPI-U
All India	1 IESH 6 CPI-U	IESH-BA	1 IESH 12 CPI-U

Source: Authors' calculations.

Tables A4, A4 (I), 4(II), A5, A5 (I), A5 (II), A6, A6 (I) and A6 (II) display the performances of the nowcasts and forecasts, computed using other measures of errors defined in Table A3.

An alternative comparison of the forecasts is made in terms of the percentage number of times the directions of forecasts match with the directions of the realised inflation figures from one period to another. The results are shown in Tables A7, A7 (I), and A7 (II). In about half of the states, the nowcasts using the proposed methodology display more directional matches with the realised inflation than the nowcasts from IESH, 'IESH-BA' and 'Reg-based'. The three-months-ahead and one-year-ahead forecasts obtained using the proposed methodology in most of the states display more directional matches with the realised inflation than the forecasts derived from IESH, 'IESH-BA' and 'Reg-based'. This phenomenon is more noticeable in case of the one-year ahead forecasts. Further, in case of three-month ahead and one-year ahead forecasts, the directional matches of proposed estimates and realised inflation are more compared to the directional matches of the estimates from IESH, 'IESH-BA' and 'Reg-based' with the direction of the realised inflation.

Part of the forecast errors arise because the estimates from the proposed methodologies (explored here), obtained using the survey data of the cities/ centres (where IESH are being conducted), are assumed to be the forecasts of the CPI-U inflation of the entire state. Further, the out-of-sample nowcasts and forecasts are studied for (a) the COVID-19 pandemic period and (b) the post-pandemic period, during which economic uncertainty was a major challenge in forecasting macroeconomic variables. The one-quarter ahead and one-year ahead CPI – Combined (CPI-C) inflation forecasts (for the study period) of the professional forecasters from the Survey of Professional Forecasters conducted by the RBI on a bimonthly basis are plotted against the realised CPI-C inflation in Chart A5.

The errors in one-quarter ahead and one-year ahead CPI-C inflation forecasts of the professional forecasters are compared with the error measures (the least error measure obtained among the five proposed measures) of the forecasts pertaining to all states combined, i.e., 'AC', in the Tables A4, A4 (I), A4 (II), A5, A5 (I), A5 (II), A6, A6 (I), and A6 (II), and presented in Table A8. It is observed that the error measures are quite competitive for the three-month ahead forecasts and lower in quantum for the one-year ahead forecasts obtained from the proposed methodologies.

The findings indicate that the proposed method emerges with better performance than a few benchmarks for most of the states. Thus, it opens a path for further exploration in comparison with the conventional econometric model-based forecasts.

V. Conclusion

The modelling of inflation expectations to map these data with the realised inflation prints is an evolving area of research. In this paper, we propose a new approach to modelling inflation expectations, which not only uses centre-wise survey data and state-wise inflation data but also redistributes the inflation expectation of respondents suitably to gain further precision.

For most of the states, the results show a noticeable reduction in the quantum of nowcast/ forecast errors in state-level nowcasts/ forecasts obtained using the proposed methodology when compared with the errors of the survey forecasts, bias-adjusted survey forecasts and linear regression-based forecasts. The percentage of occurrences of directional matches of the nowcasts/ forecasts and the realised inflation figures are more in the case of nowcasts, three-months-ahead forecasts and especially one-year-ahead forecasts obtained using our method than in the estimates 'IESH', 'IESH-BA' and 'Reg-based'.

Variation in state-wise inflation can be attributed to factors like transport costs (like fuel prices, tolls, *etc.*), differences in the state taxation policies and supply chain efficiencies. In such a scenario especially in an inflation targeting regime, one of the plausible ways to reduce forecast error would be to aggregate state-level forecasts, as attempted in this paper. Further, studying these forecasts in comparison with complex econometric model-based state-level forecasts may throw more light on the performance of the proposed method. Going forward, it is possible to develop a model as a mixture of the existing approaches, *viz*., econometric modelling, Bayesian forecasting, and the approach proposed in this paper to gain greater precision in forecasting inflation.

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Annex

Table A1: Fitted Distributions to State-wise CPI-U Inflation

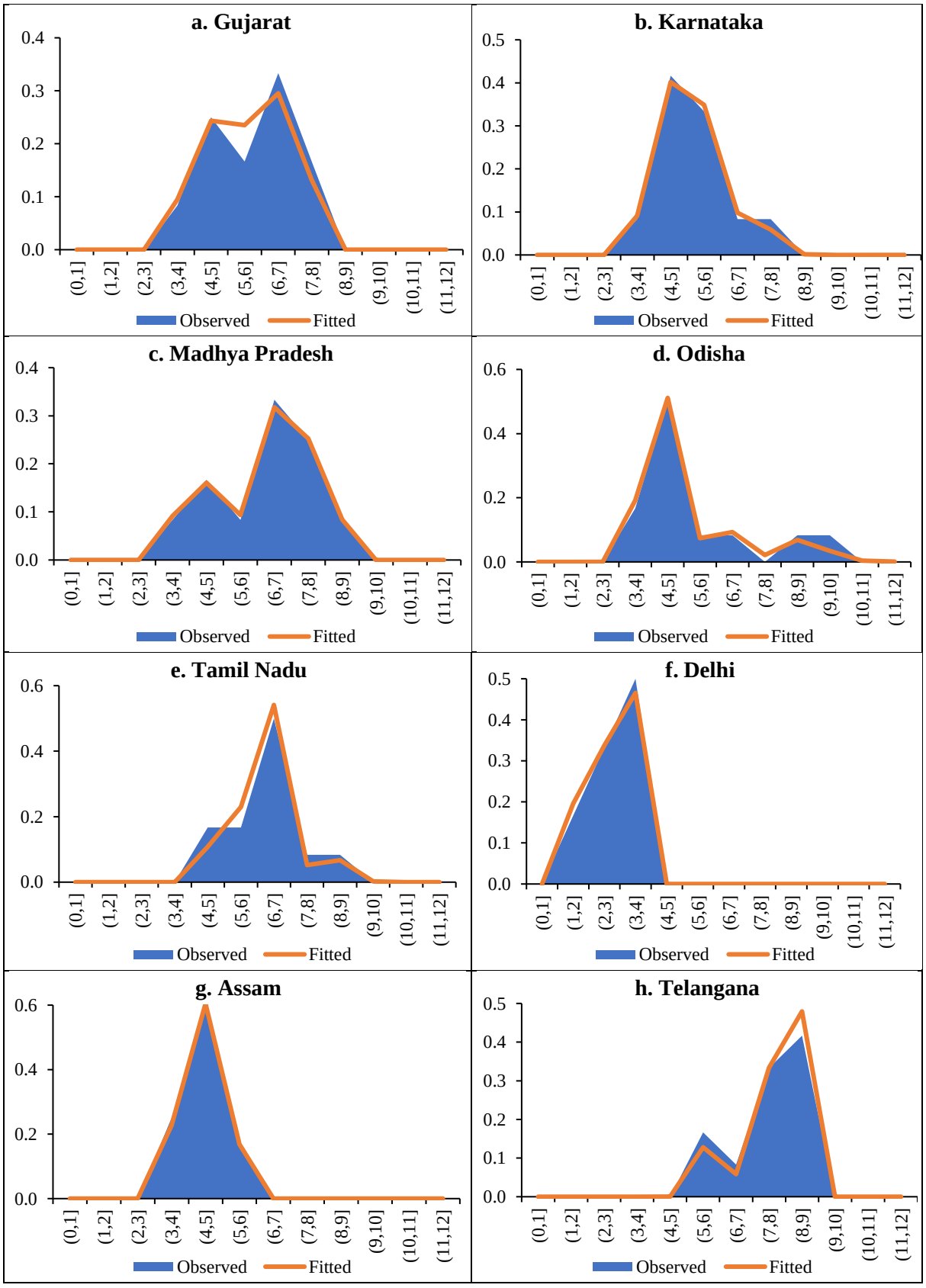
State	Data Range	Distribution	Estimated Parameters
Gujarat	$3 < x \leq 4$	Exponential(λ)	$\lambda = 0.174$
	$4 < x \leq 5$	Lognormal(μ, σ)	$\mu = 1.725, \sigma = 0.214$
	$5 < x \leq 6$	Johnson $S_B(\gamma, \delta, \xi, \lambda)$	$\gamma = 0.071, \delta = 0.504, \xi = 4.044, \lambda = 3.517$
	$6 < x \leq 8$	Weibull(α, σ)	$\alpha = 5.339, \sigma = 6.236$
Karnataka	$3 < x \leq 4$	Johnson $S_B(\gamma, \delta, \xi, \lambda)$	$\gamma = 0.000, \delta = 5.193, \xi = -0.008, \lambda = 5.115$
	$4 < x \leq 5$ or $7 < x \leq 8$	Inverse Weibull(τ, θ)	$\tau = 4.703, \theta = 4.582$
	$5 < x \leq 6$	Gamma(α, β)	$\alpha = 22.535, \beta = 4.314$
	$6 < x \leq 7$	Cauchy(x_0, γ)	$x_0 = 5.1126, \gamma = 0.696$
	$8 < x \leq 9$	Weibull(α, σ)	$\alpha = 5.225, \sigma = 5.671$
Madhya Pradesh	$3 < x \leq 4$	Exponential(λ)	$\lambda = 0.159$
	$4 < x \leq 5$	Lognormal(μ, σ)	$\mu = 1.814, \sigma = 0.240$
	$5 < x \leq 6$ or $7 < x \leq 8$	Cauchy(x_0, γ)	$x_0 = 6.870, \gamma = 0690$
	$6 < x \leq 7$	Weibull(α, σ)	$\alpha = 5.821, \sigma = 6.840$
	$8 < x \leq 9$	Logistic(μ, σ)	$\mu = 6.447, \sigma = 0.805$
Odisha	$3 < x \leq 4$	Gamma(α, β)	$\alpha = 7.862, \beta = 1.481$
	$4 < x \leq 5$ or $7 < x \leq 8$	Cauchy(x_0, γ)	$x_0 = 4.320, \gamma = 0.637$
	$5 < x \leq 6$ or $9 < x \leq 10$	Exponential(λ)	$\lambda = 0.188$
	$6 < x \leq 7$	Johnson $S_B(\gamma, \delta, \xi, \lambda)$	$\gamma = -2.355, \delta = 1.092, \xi = 3.214, \lambda = 0.321$
	$8 < x \leq 9$	Weibull(α, σ)	$\alpha = 2.710, \sigma = 5.984$
	$10 < x \leq 11$	Laplace(α, b)	$\alpha = 4.667, b = 1.222$
	$11 < x \leq 12$	Normal(μ, σ)	$\mu = 5.333, \sigma = 1.818$
Tamil Nadu	$4 < x \leq 5$	Normal(μ, σ)	$\mu = 6.250, \sigma = 1.090$
	$5 < x \leq 6$	Johnson $S_B(\gamma, \delta, \xi, \lambda)$	$\gamma = 0.386, \delta = 1.590, \xi = 6.758, \lambda = 1.268$
	$6 < x \leq 7$	Laplace(α, b)	$\alpha = 6.333, b = 0.806$
	$7 < x \leq 8$	Exponential(λ)	$\lambda = 0.156$
	$8 < x \leq 9$	Inverse Weibull(τ, θ)	$\tau = 6.064, \theta = 5.781$
	$9 < x \leq 10$	Weibull(α, σ)	$\alpha = 6.310, \sigma = 6.855$
Delhi	$1 < x \leq 2$	Exponential(λ)	$\lambda = 0.345$
	$2 < x \leq 3$	Laplace(α, b)	$\alpha = 3.000, b = 0.667$
	$3 < x \leq 4$	Johnson $S_B(\gamma, \delta, \xi, \lambda)$	$\gamma = -0.199, \delta = 0.582, \xi = 1.531, \lambda = 2.467$

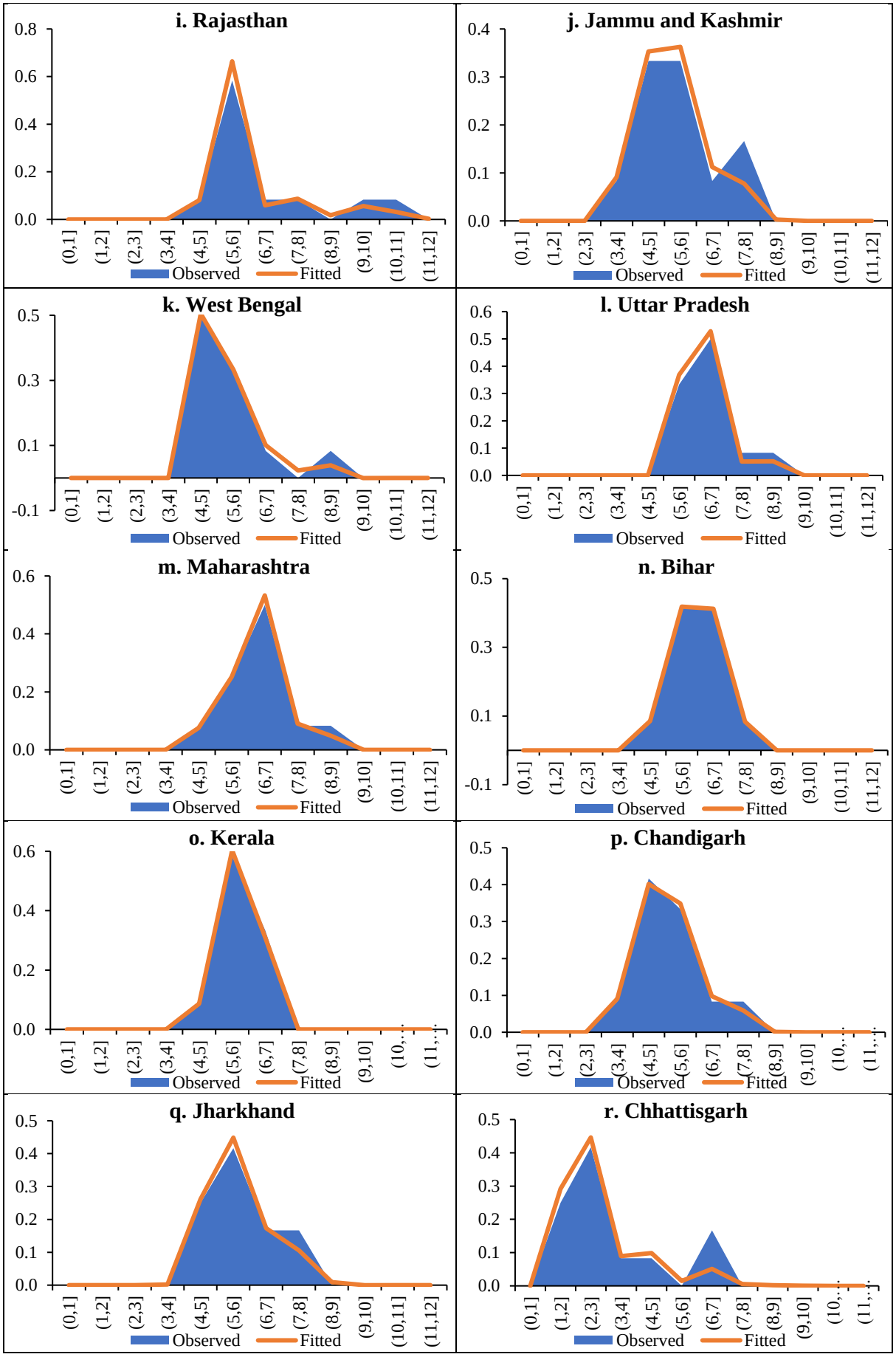
Assam	$3 < x \leq 4$	Normal(μ, σ)	$\mu = 4.417, \sigma = 0.640$
	$4 < x \leq 5$	Inverse Weibull(τ, θ)	$\tau = 8.006, \theta = 4.243$
	$5 < x \leq 6$	Logistic(μ, σ)	$\mu = 4.623, \sigma = 0.305$
Telangana	$4 < x \leq 6$	Inverse Weibull(τ, θ)	$\tau = 5.541, \theta = 6.794$
	$6 < x \leq 7$	Cauchy(x_0, γ)	$x_0 = 7.964, \gamma = 0.434$
	$7 < x \leq 8$	Lognormal(μ, σ)	$\mu = 2.002, \sigma = 0.157$
	$8 < x \leq 9$	Weibull(α, σ)	$\alpha = 9.315, \sigma = 7.929$
Rajasthan	$4 < x \leq 5$ or $6 < x \leq 7$ or $10 < x \leq 11$	Exponential(λ)	$\lambda = 0.158$
	$5 < x \leq 6$ or $8 < x \leq 9$	Cauchy(x_0, γ)	$x_0 = 5.497, \gamma = 0.501$
	$7 < x \leq 8$	Johnson $S_B(\gamma, \delta, \xi, \lambda)$	$\gamma = 0.000, \delta = 1.014, \xi = 4.689, \lambda = 1.000$
	$9 < x \leq 10$	Weibull(α, σ)	$\alpha = 3.725, \sigma = 6.993$
	$11 < x \leq 12$	Logistic(μ, σ)	$\mu = 6.027, \sigma = 0.895$
Jammu and Kashmir	$3 < x \leq 4$	Burr(α, γ, θ)	$\alpha = 32.867, \gamma = 5.591, \theta = 10.957$
	$4 < x \leq 5$	Inverse Gamma(α, β)	$\alpha = 27.688, \beta = 0.007$
	$5 < x \leq 6$ or $7 < x \leq 8$	Normal(μ, σ)	$\mu = 5.417, \sigma = 1.187$
	$6 < x \leq 7$	Cauchy(x_0, γ)	$x_0 = 5.247, \gamma = 0.649$
	$8 < x \leq 9$	Weibull(α, σ)	$\alpha = 5.490, \sigma = 5.895$
West Bengal	$4 < x \leq 5$	Inverse Weibull(τ, θ)	$\tau = 7.306, \theta = 4.849$
	$5 < x \leq 7$	Laplace(α, b)	$\alpha = 5.000, b = 0.833$
	$7 < x \leq 8$	Cauchy(x_0, γ)	$x_0 = 4.902, \gamma = 0.497$
	$8 < x \leq 9$	Exponential(λ)	$\lambda = 0.186$
Uttar Pradesh	$5 < x \leq 6$ or $8 < x \leq 9$	Inverse Weibull(τ, θ)	$\tau = 8.972, \theta = 6.069$
	$6 < x \leq 7$	Inverse Gamma(α, β)	$\alpha = 68.312, \beta = 0.002$
	$7 < x \leq 8$	Exponential(λ)	$\lambda = 0.154$
Maharashtra	(4,5]	Exponential(λ)	$\lambda = 0.160$
	(5,6]	Weibull(α, σ)	$\alpha = 7.131, \sigma = 6.645$
	(6,7]	Laplace(α, b)	$\alpha = 6.333, b = 0.722$
	(7,8]	Cauchy(x_0, γ)	$x_0 = 6.299, \gamma = 0.497$
	(8,9]	Inverse Weibull(τ, θ)	$\tau = 6.708, \theta = 5.701$
Bihar	(4,5]	Log Logistic(α, β)	$\alpha = 12.140, \beta = 5.942$
	(5,6]	Normal(μ, σ)	$\mu = 6.000, \sigma = 0.764$
	(6,7]	Burr(α, γ, θ)	$\alpha = 2.988, \gamma = 9.430, \theta = 6.927$
	(7,8]	Johnson $S_B(\gamma, \delta, \xi, \lambda)$	$\gamma = 0.239, \delta = 1.269, \xi = 4.038, \lambda = 4.250$
Kerala	(4,5]	Laplace(α, b)	$\alpha = 5.714, b = 0.488$
	(5,6]	Weibull(α, σ)	$\alpha = 13.548, \sigma = 5.951$
	(6,7]	Normal(μ, σ)	$\mu = 5.750, \sigma = 0.595$

Chandigarh	$3 < x \leq 4$	Johnson $S_B(\gamma, \delta, \xi, \lambda)$	$\gamma = 0.000, \delta = 5.193, \xi = -0.008, \lambda = 5.115$
	$4 < x \leq 5$ or $7 < x \leq 8$	Inverse Weibull(τ, θ)	$\tau = 4.703, \theta = 4.582$
	$5 < x \leq 6$	Gamma(α, β)	$\alpha = 22.535, \beta = 4.314$
	$6 < x \leq 7$	Cauchy(x_0, γ)	$x_0 = 5.126, \gamma = 0.696$
	$8 < x \leq 9$	Weibull(α, σ)	$\alpha = 5.225, \sigma = 5.671$
Jharkhand	$3 < x \leq 4$ or $6 < x \leq 7$	Inverse Weibull(τ, θ)	$\tau = 6.050, \theta = 5.046$
	$4 < x \leq 5$	Gamma(α, β)	$\alpha = 28.780, \beta = 5.120$
	$5 < x \leq 6$	Log Logistic(α, β)	$\alpha = 9.239, \beta = 5.488$
	$7 < x \leq 9$	Weibull(α, σ)	$\alpha = 5.398, \sigma = 6.074$
Chhattisgarh	$1 < x \leq 2$	Lognormal(μ, σ)	$\mu = 1.023, \sigma = 0.513$
	$2 < x \leq 3$	Laplace(α, b)	$\alpha = 2.600, b = 1.200$
	$3 < x \leq 4$ or $5 < x \leq 6$ or $7 < x \leq 8$	Cauchy(x_0, γ)	$x_0 = 2.243, \gamma = 0.423$
	$4 < x \leq 5$	Johnson $S_B(\gamma, \delta, \xi, \lambda)$	$\gamma = 1.850, \delta = 0.766, \xi = 1.518, \lambda = 12.548$
	$6 < x \leq 7$	Weibull(α, σ)	$\alpha = 1.894, \sigma = 3.643$
	(8,9]	Normal(μ, σ)	$\mu = 3.167, \sigma = 1.700$

Sources: MOSPI and Authors' calculations.

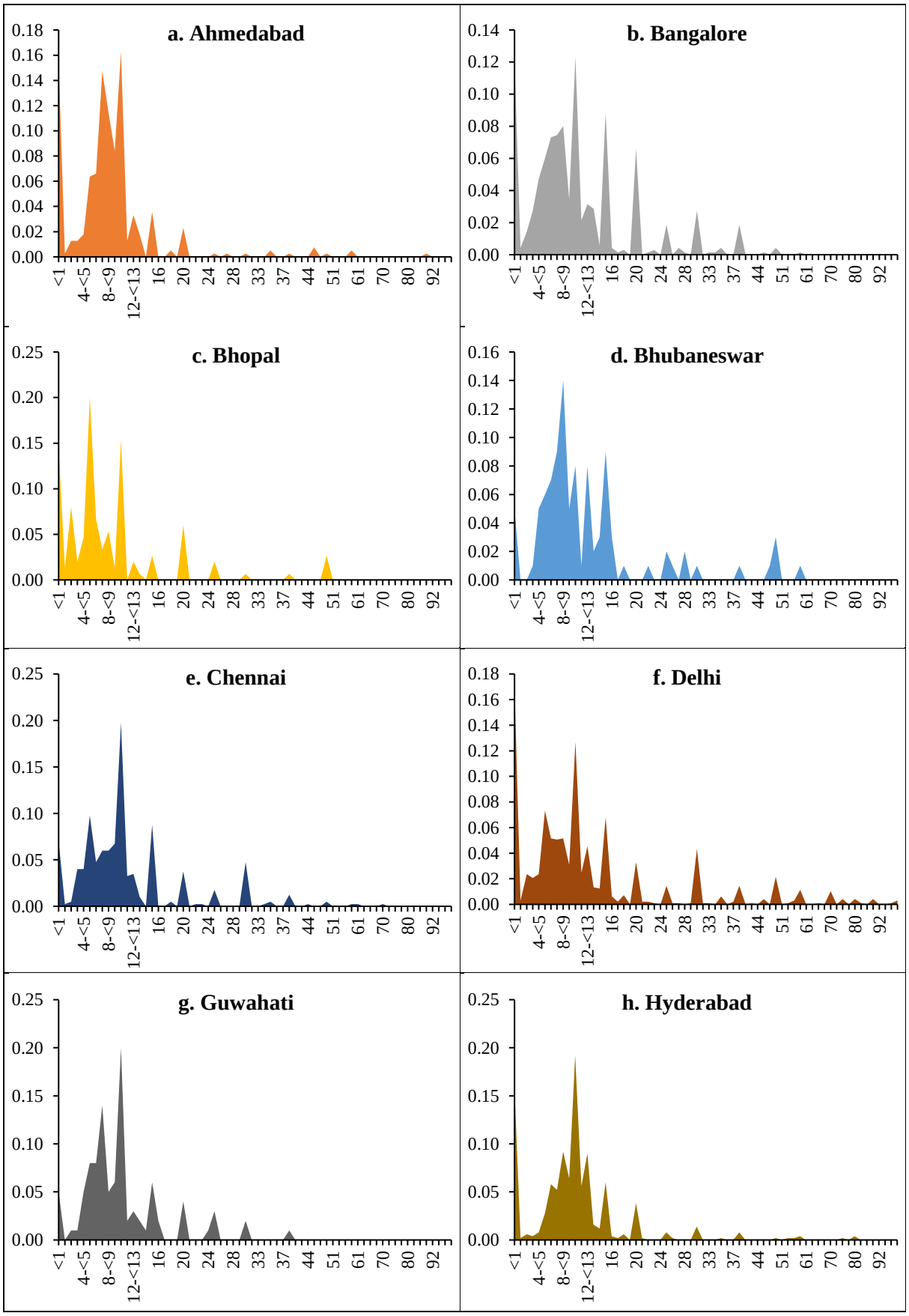
Chart A1: Fitting State-wise CPI-U Inflation from September 2022 to August 2023

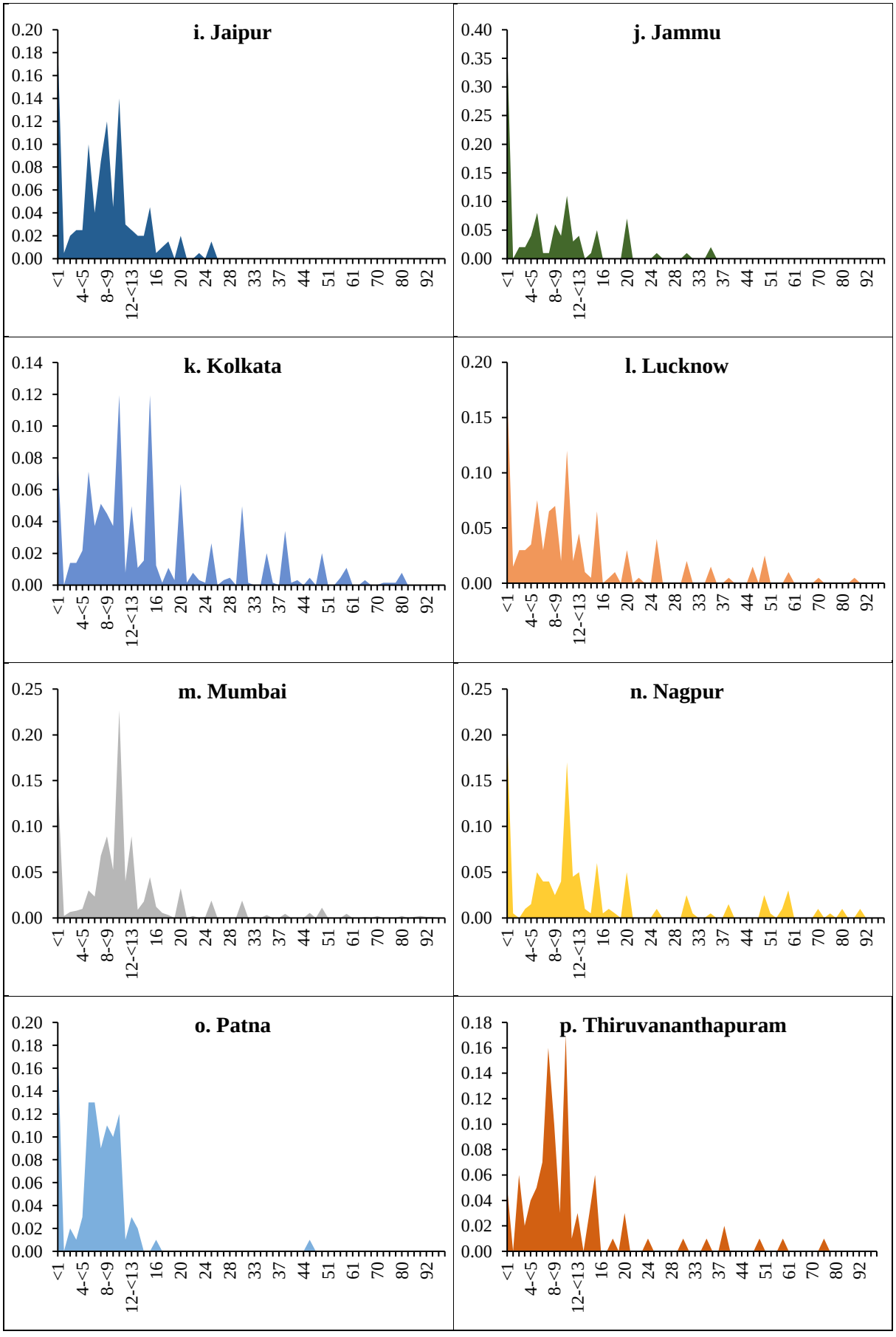


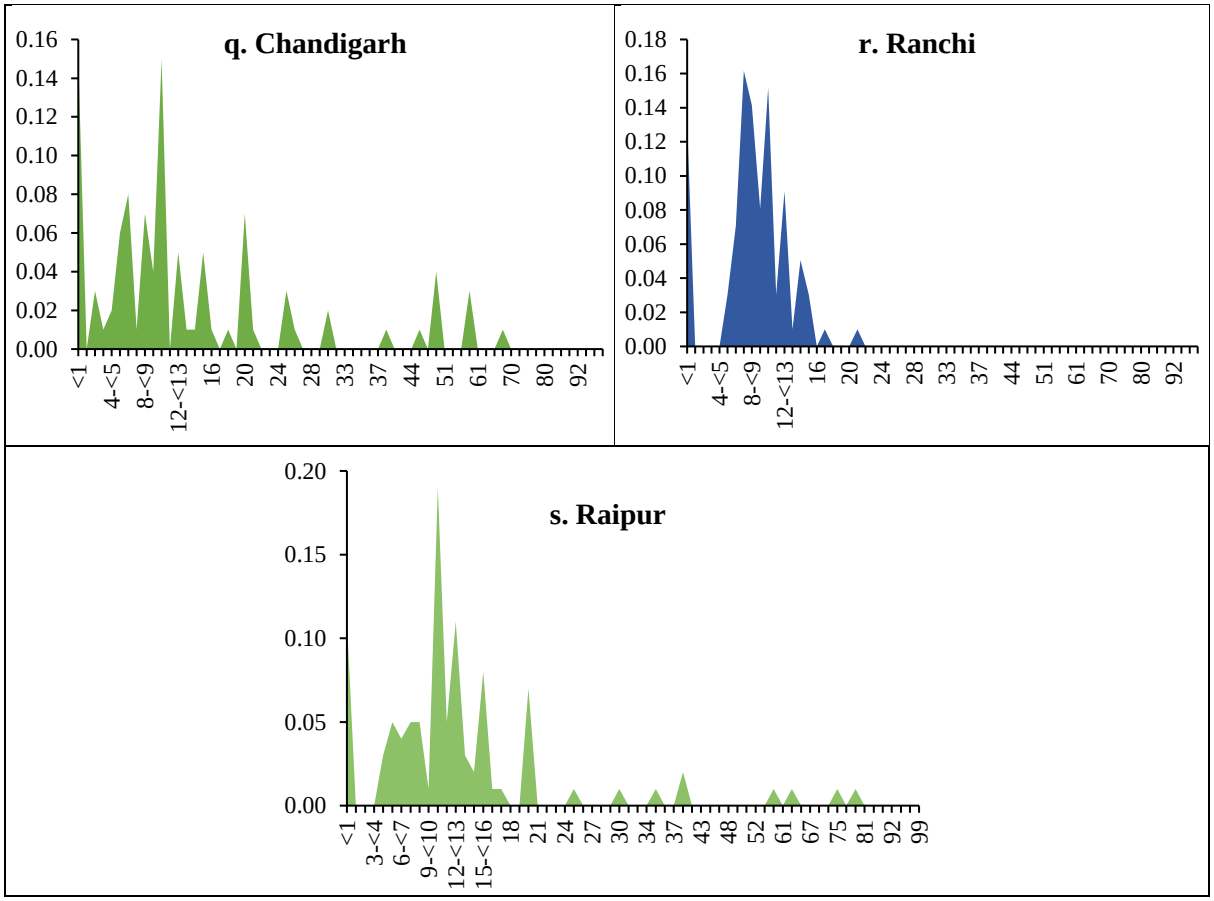


Sources: MOSPI and Authors' calculations.

Chart A2: Observed Frequency Distribution of Responses on One-year-ahead Inflation Expectations in September 2023 Survey Round

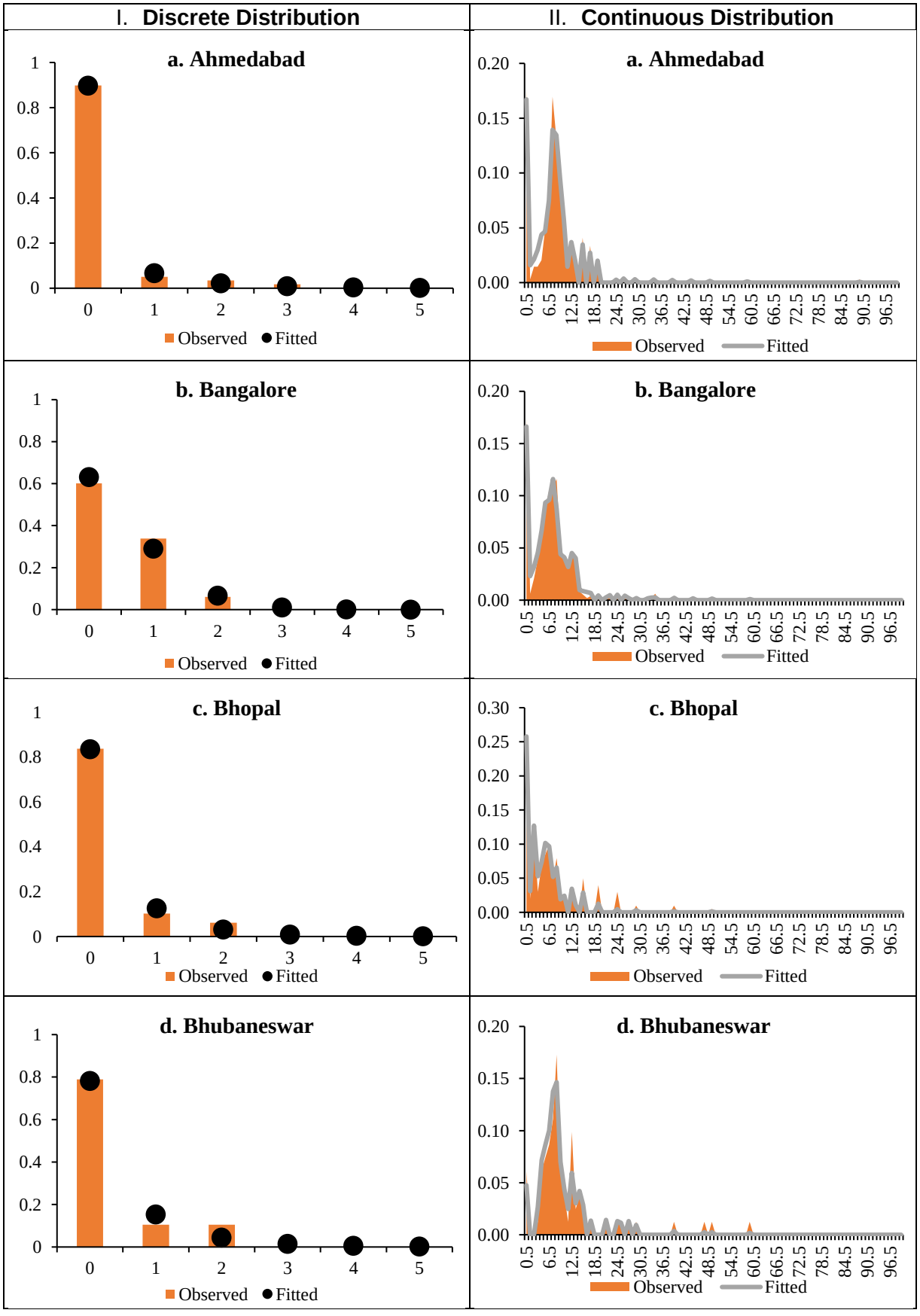


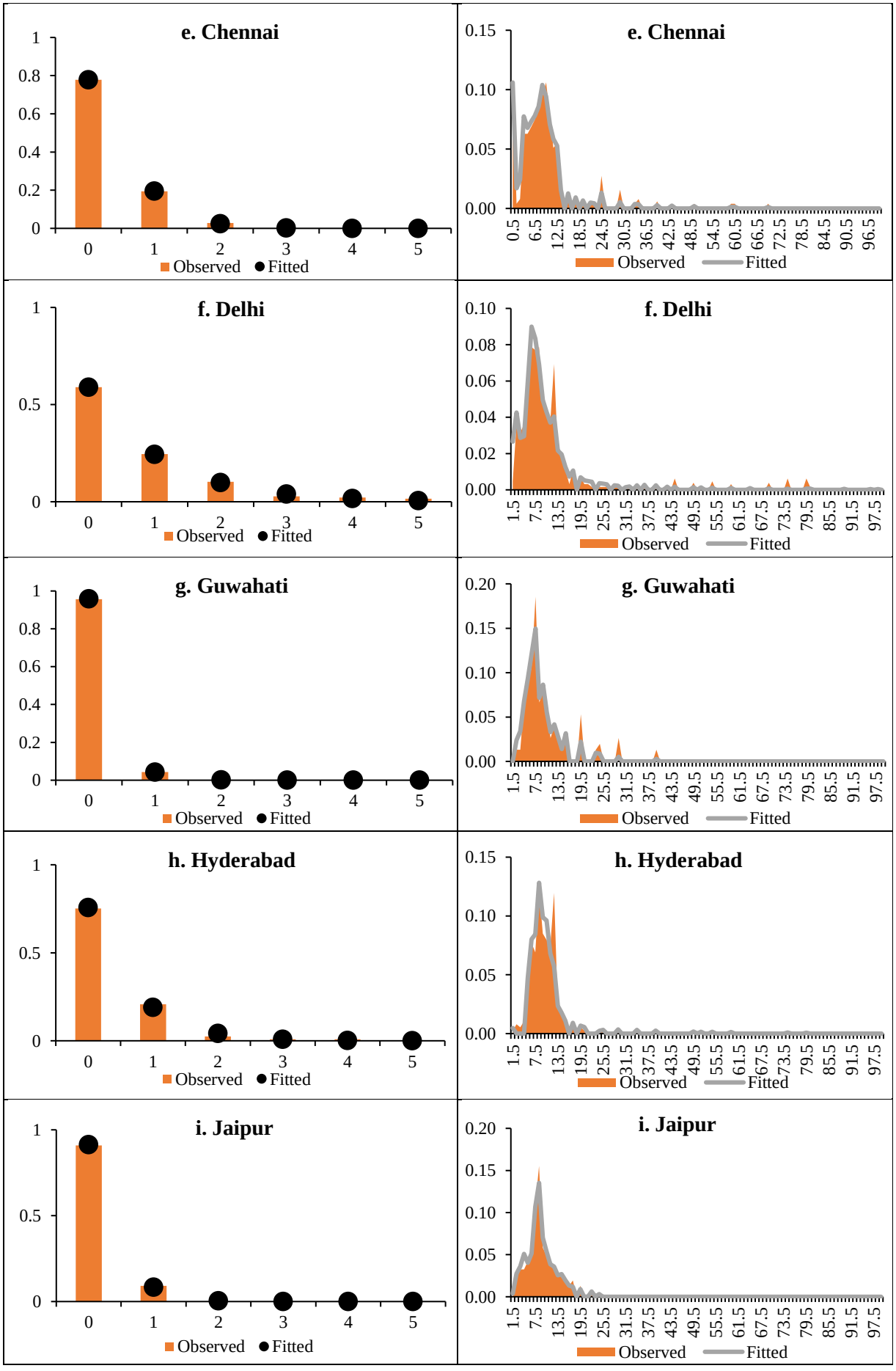

i. Jaipur
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
<1
4-<5
8-<9
12-<13
16
20
24
28
33
37
44
51
61
70
80
92
j. Jammu
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
k. Kolkata
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
l. Lucknow
0.20
0.15
0.10
0.05
0.00
m. Mumbai
0.25
0.20
0.15
0.10
0.05
0.00
n. Nagpur
0.25
0.20
0.15
0.10
0.05
0.00
o. Patna
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
p. Thiruvananthapuram
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00

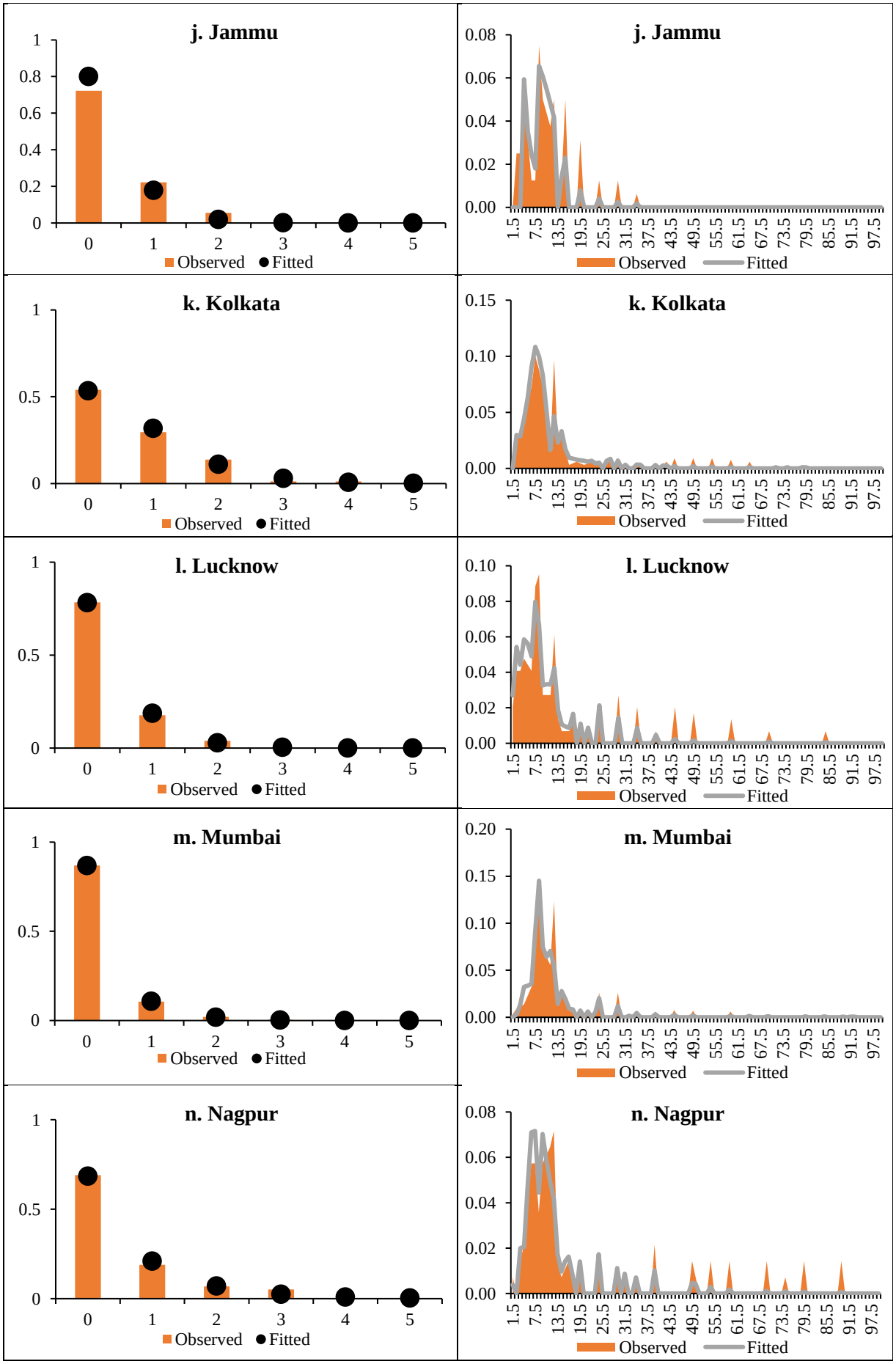


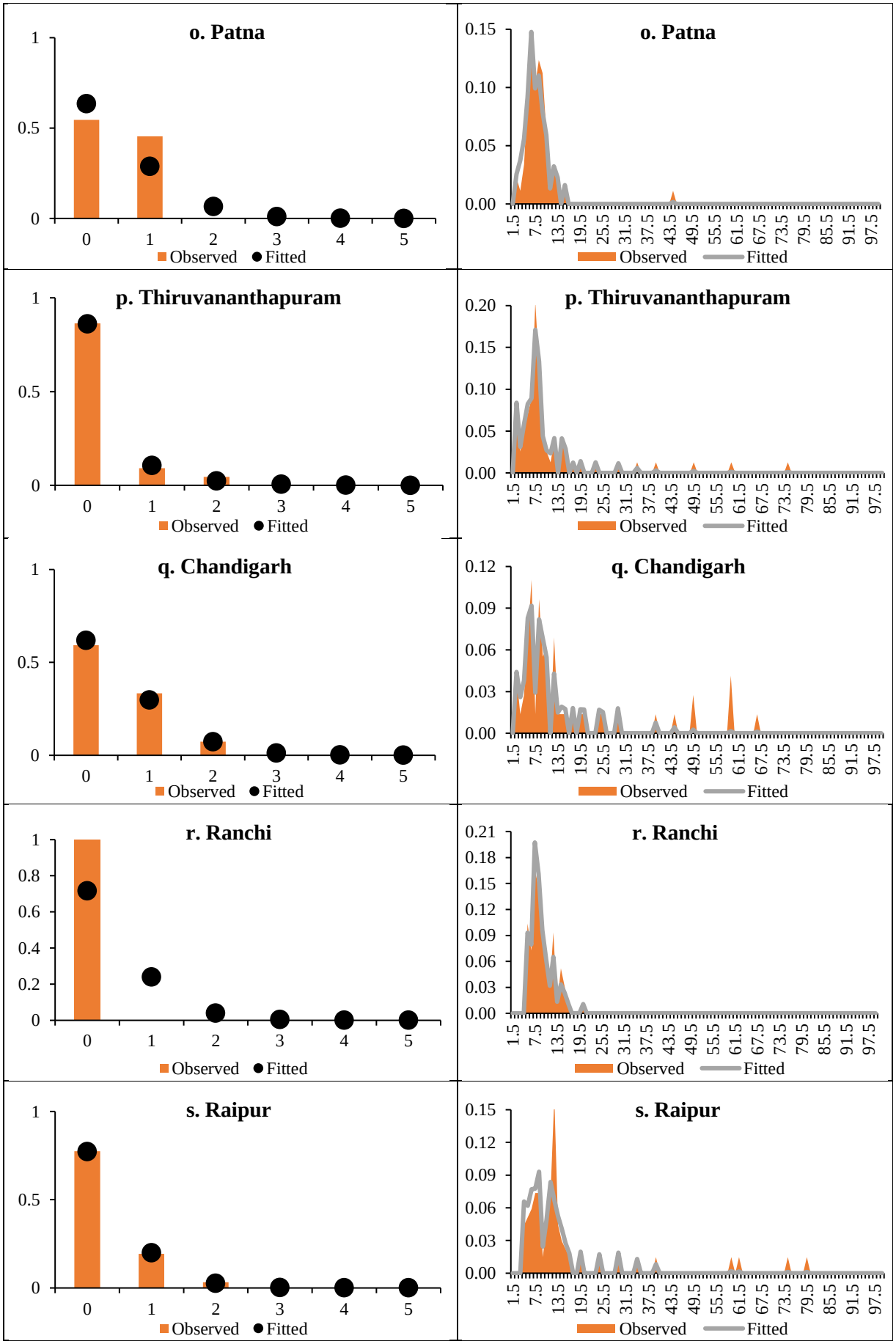
Sources: RBI and Authors' calculations.

Chart A3: Fitting Discrete and Continuous Probability Distribution Functions to One-year-ahead Inflation Expectations in September 2023 Survey Round



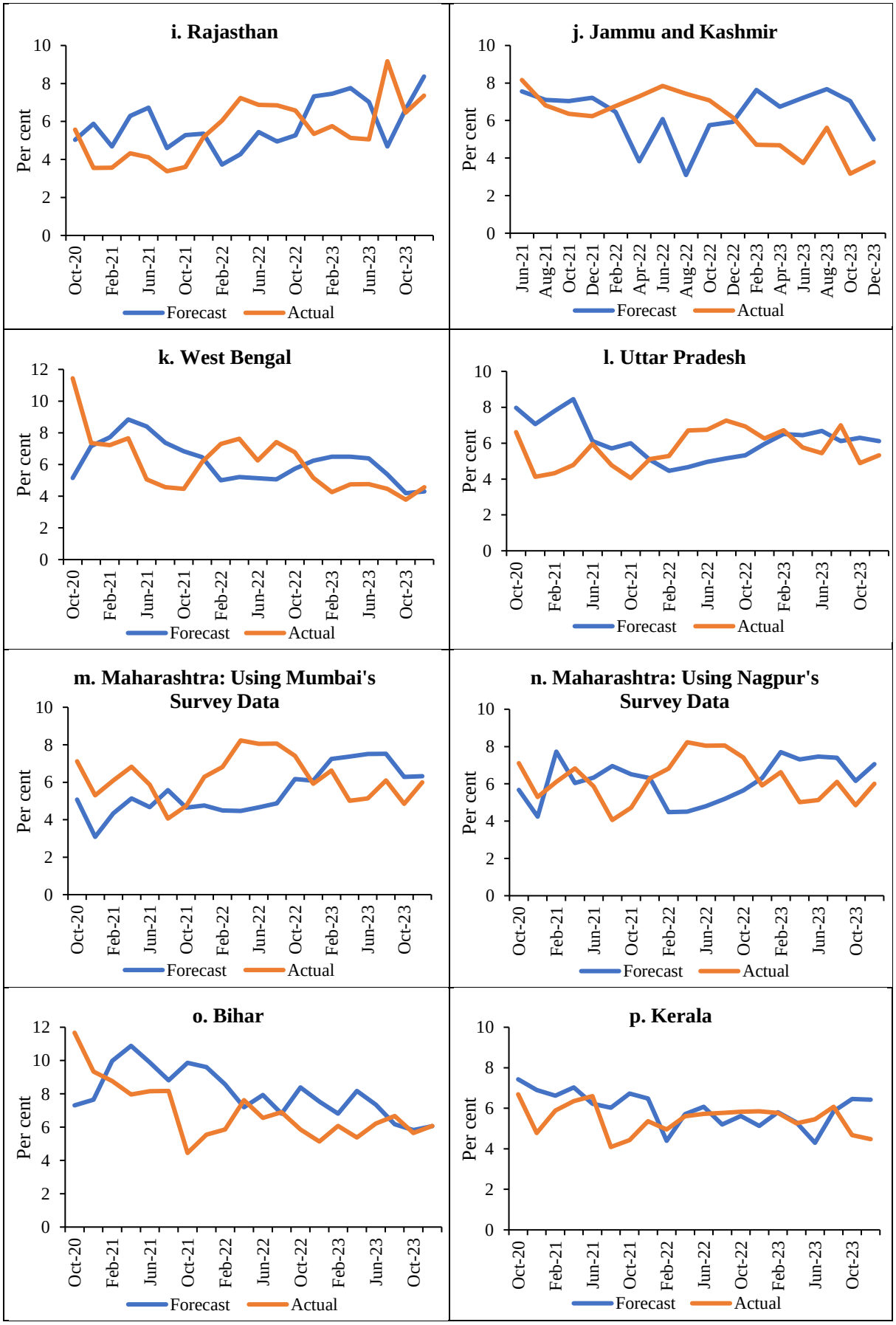

e. Chennai
Observed
Fitted
e. Chennai
Observed
Fitted
f. Delhi
Observed
Fitted
f. Delhi
Observed
Fitted
g. Guwahati
Observed
Fitted
g. Guwahati
Observed
Fitted
h. Hyderabad
Observed
Fitted
h. Hyderabad
Observed
Fitted
i. Jaipur
Observed
Fitted
i. Jaipur
Observed
Fitted

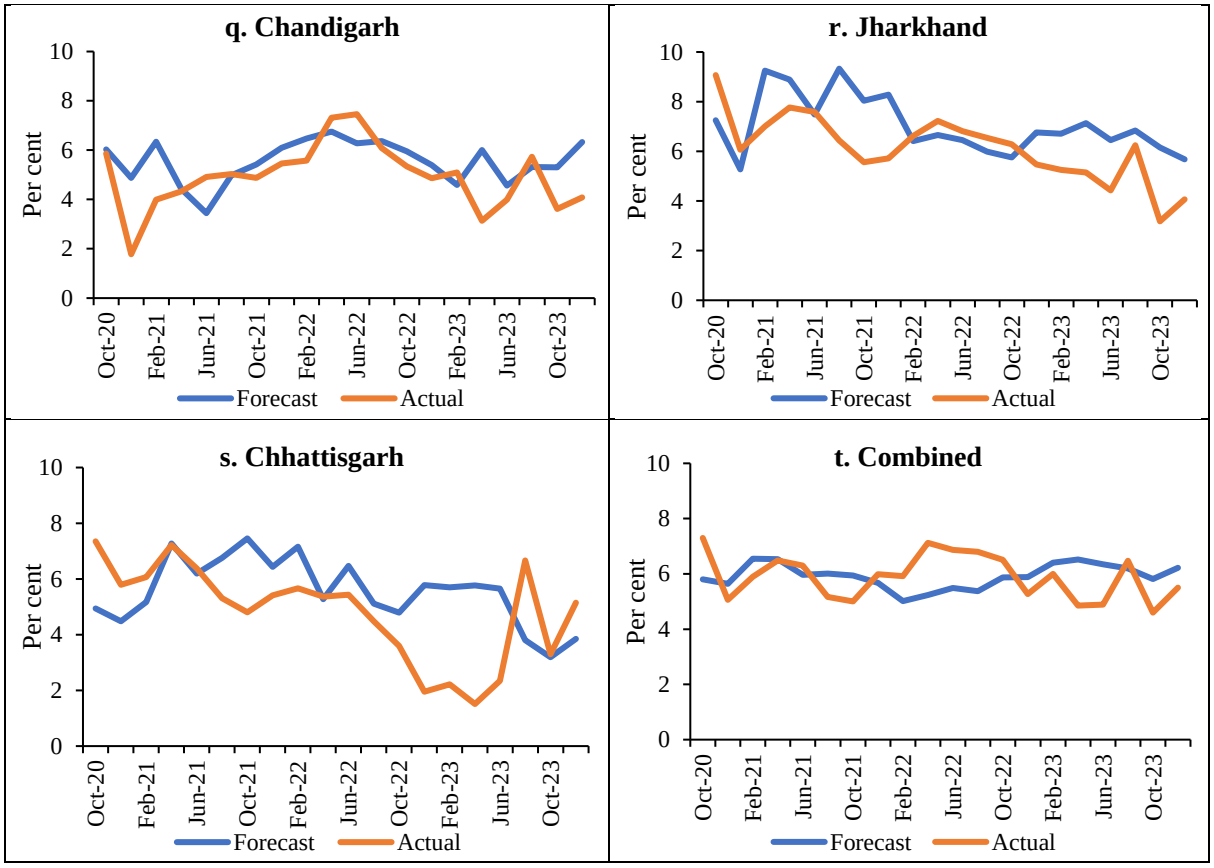

j. Jammu
Observed
Fitted
j. Jammu
Observed
Fitted
k. Kolkata
Observed
Fitted
k. Kolkata
Observed
Fitted
l. Lucknow
Observed
Fitted
l. Lucknow
Observed
Fitted
m. Mumbai
Observed
Fitted
m. Mumbai
Observed
Fitted
n. Nagpur
Observed
Fitted
n. Nagpur
Observed
Fitted



Sources: RBI and Authors' calculations.

Chart A4: Three-months-ahead CPI-U Inflation Forecasts Using One Survey Round IESH Data and Previous Twelve Months' CPI-U Data


i. Rajasthan
Per cent
Forecast
Actual
j. Jammu and Kashmir
Per cent
Forecast
Actual
k. West Bengal
Per cent
Forecast
Actual
l. Uttar Pradesh
Per cent
Forecast
Actual
m. Maharashtra: Using Mumbai's Survey Data
Per cent
Forecast
Actual
n. Maharashtra: Using Nagpur's Survey Data
Per cent
Forecast
Actual
o. Bihar
Per cent
Forecast
Actual
p. Kerala
Per cent
Forecast
Actual



Sources: RBI, MOSPI and Authors' calculations.

Table A2: Fitting of Poisson(λ) Distribution to Discrete Survey Data of September 2023 Round: Estimated Values of λ

Survey Centre	Inflation Perceptions	Three-months-ahead Inflation Expectations	One-year-ahead Inflation Expectations
Ahmedabad	0.054	0.017	0.169
Bangalore	0.114	0.301	0.460
Bhopal	0.034	0.042	0.224
Bhubaneswar	0.091	0.357	0.316
Chennai	0.092	0.190	0.250
Delhi	0.425	0.619	0.692
Guwahati	0.067	0.077	0.043
Hyderabad	0.078	0.276	0.312
Jaipur	0.045	0.100	0.091
Jammu	0.174	0.531	0.333
Kolkata	0.318	0.616	0.662
Lucknow	0.230	0.333	0.255
Mumbai	0.257	0.264	0.159
Nagpur	0.205	0.117	0.483
Patna	0.300	0.300	0.455
Thiruvananthapuram	0.455	0.125	0.182
Chandigarh	0.474	0.105	0.481
Ranchi	0.429	0.333	0.333
Raipur	0.167	0.161	0.258

Sources: RBI and Authors' calculations.

Table A3: Measures of Forecast Error

Bias	$\frac{1}{T}\sum_{t=1}^{T} FE_t$
Standard forecast error (SFE)	$\sqrt{\frac{1}{T}\sum_{t=1}^{T}(FE_t - Bias)^2}$
Mean square forecast error (MSE)	$\frac{1}{T}\sum_{t=1}^{T} FE_t^2$
Root mean squared error (RMSE)	$\sqrt{\frac{1}{T}\sum_{t=1}^{T} FE_t^2}$
Mean absolute error (MAE)	$\frac{1}{T}\sum_{t=1}^{T} \lvert FE_t \rvert$
Mean absolute percentage error (MAPE)	$\frac{1}{T}\sum_{t=1}^{T} \left\lvert \frac{FE_t}{A_t} \right\rvert$
$\boldsymbol{FE_t}$	$F_t - A_t$
$\boldsymbol{F_t}$ = forecast for time period $\boldsymbol{t}$	
$\boldsymbol{A_t}$ = actual at time period $\boldsymbol{t}$	
$\boldsymbol{T}$ = number of time periods	

Table A4: Performances of Nowcasts: Values of Errors for Nowcasts *vis-à-vis* Realised Inflation Values

Data	Measures of Forecast Error	GJ	KT	MP	OD	TN	DL	AS
IESH	Bias	3.877	3.585	2.023	3.088	3.594	5.929	3.579
	MSE	17.970	13.892	5.472	12.662	15.327	37.463	16.270
	RMSE	4.239	3.727	2.339	3.558	3.915	6.121	4.034
	MAE	4.506	4.039	2.197	3.661	4.118	7.308	4.150
	MAPE	0.779	0.658	0.351	0.678	0.645	1.872	0.838
	SFE	1.756	1.046	1.203	1.812	1.590	1.558	1.907
IESH-BA	Bias	-2.55	2.15	-1.65	-1.07	-1.30	2.11	-1.91
	MSE	9.454	5.665	4.091	4.277	4.096	6.748	7.094
	RMSE	3.075	2.380	2.023	2.068	2.024	2.598	2.663
	MAE	2.981	2.351	1.860	1.740	1.764	2.355	2.566
	MAPE	0.443	0.409	0.253	0.280	0.241	0.781	0.440
	SFE	1.756	1.046	1.203	1.812	1.590	1.558	1.907
Reg-based	Bias	-1.518	0.535	-1.424	-1.042	-1.029	0.413	0.020
	MSE	3.855	1.178	3.524	3.707	3.245	2.572	5.569
	RMSE	1.963	1.085	1.877	1.925	1.801	1.604	2.360
	MAE	1.754	0.846	1.693	1.539	1.556	1.419	1.852
	MAPE	0.265	0.165	0.229	0.230	0.218	0.472	0.347
	SFE	1.276	0.968	1.254	1.659	1.515	1.588	2.418

1 IESH 12 CPI-U	D	Bias	0.062	-0.065	0.539	0.820	0.411	-0.074	0.889
		MSE	2.128	1.706	2.616	4.138	2.188	2.990	6.316
		RMSE	1.459	1.306	1.618	2.034	1.479	1.729	2.513
		MAE	1.261	1.054	1.287	1.805	1.282	1.426	2.105
		MAPE	0.236	0.188	0.220	0.355	0.226	0.405	0.470
		SFE	1.494	1.337	1.563	1.908	1.456	1.770	2.409
	D+C	Bias	2.243	2.120	4.119	3.480	3.625	1.773	3.703
		MSE	11.166	11.491	23.464	15.805	19.398	9.805	27.005
		RMSE	3.342	3.390	4.844	3.976	4.404	3.131	5.197
		MAE	3.020	3.201	5.207	4.130	4.521	2.761	5.263
		MAPE	0.507	0.529	0.732	0.737	0.682	0.769	0.938
		SFE	2.538	2.711	2.612	1.971	2.563	2.645	3.736
1 IESH 6 CPI-U	D	Bias	0.027	-0.435	0.237	0.439	0.210	-0.169	0.332
		MSE	2.111	1.654	1.868	4.031	1.908	2.472	4.239
		RMSE	1.453	1.286	1.367	2.008	1.381	1.572	2.059
		MAE	1.302	1.100	1.133	1.694	1.089	1.228	1.769
		MAPE	0.240	0.187	0.197	0.314	0.192	0.337	0.381
		SFE	1.488	1.240	1.379	2.008	1.399	1.602	2.082
	D+C	Bias	2.160	1.160	3.057	2.193	1.943	1.198	3.098
		MSE	11.497	7.396	17.376	10.765	9.798	7.062	25.948
		RMSE	3.391	2.720	4.168	3.281	3.130	2.657	5.094
		MAE	3.064	2.491	4.020	3.120	2.729	2.225	5.046
		MAPE	0.515	0.409	0.569	0.582	0.445	0.570	0.831
		SFE	2.678	2.520	2.904	2.500	2.515	2.430	4.143
All IESH All CPI-U	D	Bias	-0.946	-0.516	-1.220	-1.103	-1.108	0.222	-1.785
		MSE	2.512	1.320	4.040	4.577	3.618	2.054	8.333
		RMSE	1.585	1.149	2.010	2.139	1.902	1.433	2.887
		MAE	1.446	0.966	1.917	1.780	1.718	1.200	2.420
		MAPE	0.237	0.155	0.276	0.276	0.249	0.368	0.348
		SFE	1.303	1.052	1.637	1.878	1.584	1.451	2.325
	D+C	Bias	0.981	1.871	1.211	0.664	1.275	2.248	-0.637
		MSE	4.146	6.680	10.146	5.486	7.319	9.542	6.532
		RMSE	2.036	2.585	3.185	2.342	2.705	3.089	2.556
		MAE	1.588	2.433	2.624	1.918	2.212	2.857	2.378
		MAPE	0.284	0.406	0.410	0.382	0.379	0.754	0.456
		SFE	1.828	1.828	3.019	2.302	2.445	2.171	2.536
All IESH 12 CPI-U	D	Bias	-0.659	-0.226	-0.124	-0.101	-0.238	-0.152	-0.001
		MSE	2.442	1.666	2.567	3.083	1.833	2.890	3.775
		RMSE	1.563	1.291	1.602	1.756	1.354	1.700	1.943
		MAE	1.375	1.008	1.321	1.408	1.187	1.436	1.701
		MAPE	0.233	0.175	0.214	0.255	0.195	0.405	0.359
		SFE	1.452	1.302	1.637	1.796	1.366	1.735	1.991
	D+C	Bias	1.317	2.400	3.338	2.399	2.994	1.790	2.183
		MSE	6.926	12.880	18.657	8.883	15.553	10.069	19.603
		RMSE	2.632	3.589	4.319	2.980	3.944	3.173	4.427
		MAE	2.316	3.608	4.494	2.949	3.935	2.796	4.101
		MAPE	0.409	0.592	0.640	0.552	0.597	0.780	0.689
		SFE	2.335	2.734	2.809	1.813	2.630	2.685	3.947

All IESH 6 CPI-U	D	Bias	-0.651	-0.661	-0.501	-0.443	-0.528	-0.236	-0.335
		MSE	2.279	1.511	2.062	3.439	1.683	2.465	3.331
		RMSE	1.510	1.229	1.436	1.854	1.297	1.570	1.825
		MAE	1.335	0.996	1.275	1.431	1.126	1.293	1.509
		MAPE	0.222	0.159	0.202	0.243	0.179	0.362	0.299
		SFE	1.396	1.062	1.379	1.845	1.214	1.590	1.838
	D+C	Bias	1.023	1.319	2.314	1.056	1.233	1.343	1.709
		MSE	6.336	7.498	14.550	7.763	7.856	7.673	18.683
		RMSE	2.517	2.738	3.814	2.786	2.803	2.770	4.322
		MAE	2.178	2.415	3.579	2.461	2.365	2.359	3.881
		MAPE	0.378	0.386	0.512	0.455	0.396	0.601	0.605
		SFE	2.357	2.459	3.107	2.642	2.580	2.483	4.068

Sources: RBI, MOSPI and Authors' calculations.

Table A4 (I): Performances of Nowcasts: Values of Errors for Nowcasts *vis-à-vis* Realised Inflation Values (*contd.)*

Data		Measures of Forecast Error	TL	RJ	JK	WB	UP	MHM	MHN
IESH		Bias	3.075	3.971	1.999	4.123	4.204	3.680	3.045
		MSE	11.440	20.730	26.044	21.045	19.383	15.532	10.825
		RMSE	3.382	4.553	5.103	4.587	4.403	3.941	3.290
		MAE	3.452	4.864	5.631	4.879	4.873	4.207	3.394
		MAPE	0.463	0.937	0.814	0.815	0.780	0.646	0.527
		SFE	1.444	2.283	4.811	2.062	1.340	1.445	1.278
IESH-BA		Bias	-0.96	-0.22		-1.68	-0.10	-0.93	-0.94
		MSE	2.908	5.012		6.880	1.719	2.860	2.431
		RMSE	1.705	2.239		2.623	1.311	1.691	1.559
		MAE	1.476	1.932		2.291	1.011	1.546	1.360
		MAPE	0.190	0.373		0.291	0.178	0.236	0.203
		SFE	1.444	2.283		2.062	1.340	1.445	1.278
Reg-based		Bias	-1.537	-0.645		-1.203	-0.676	-1.263	-1.452
		MSE	3.728	3.606		6.215	1.643	3.244	3.512
		RMSE	1.931	1.899		2.493	1.282	1.801	1.874
		MAE	1.691	1.583		2.079	1.097	1.609	1.685
		MAPE	0.201	0.284		0.275	0.182	0.227	0.232
		SFE	1.197	1.830		2.238	1.116	1.316	1.215
1 IESH 12 CPI-U	D	Bias	0.037	0.616	0.410	0.037	0.209	-0.450	0.423
		MSE	2.810	3.105	2.153	4.274	1.993	2.584	2.404
		RMSE	1.676	1.762	1.467	2.067	1.412	1.607	1.551
		MAE	1.301	1.621	1.210	1.835	1.124	1.419	1.357
		MAPE	0.187	0.325	0.214	0.290	0.213	0.219	0.228
		SFE	1.717	1.692	1.444	2.118	1.431	1.581	1.529
	D+C	Bias	3.761	3.003	4.125	3.162	2.771	2.448	3.247
		MSE	26.768	12.522	25.917	19.243	13.757	13.617	16.424
		RMSE	5.174	3.539	5.091	4.387	3.709	3.690	4.053
		MAE	5.276	3.441	5.555	4.411	3.676	3.413	4.057
		MAPE	0.663	0.650	0.788	0.666	0.617	0.502	0.596
		SFE	3.641	1.917	3.057	3.116	2.527	2.829	2.485

1 IESH 6 CPI-U	D	Bias	-0.827	0.369	0.057	-0.005	-0.097	-0.456	0.253
		MSE	7.207	2.972	1.351	3.281	1.830	2.151	1.964
		RMSE	2.685	1.724	1.162	1.811	1.353	1.466	1.401
		MAE	2.251	1.449	0.880	1.545	1.120	1.277	1.267
		MAPE	0.292	0.264	0.150	0.240	0.205	0.194	0.210
		SFE	2.617	1.725	1.190	1.856	1.383	1.428	1.412
	D+C	Bias	1.626	2.556	3.129	3.040	1.932	2.991	3.431
		MSE	23.426	11.922	18.763	20.798	11.423	17.672	19.928
		RMSE	4.840	3.453	4.332	4.560	3.380	4.204	4.464
		MAE	5.129	3.223	4.247	4.292	3.172	4.118	4.408
		MAPE	0.652	0.553	0.581	0.569	0.519	0.591	0.631
		SFE	4.671	2.378	3.070	3.483	2.842	3.026	2.927
All IESH All CPI-U	D	Bias	-2.135	-0.557	-0.694	-2.389	-1.097	-1.224	-1.185
		MSE	7.878	2.649	2.930	11.570	2.506	3.613	3.642
		RMSE	2.807	1.628	1.712	3.401	1.583	1.901	1.908
		MAE	2.670	1.306	1.461	2.938	1.369	1.747	1.754
		MAPE	0.333	0.243	0.221	0.330	0.215	0.252	0.254
		SFE	1.866	1.567	1.603	2.481	1.169	1.490	1.533
	D+C	Bias	-0.078	1.801	1.731	-0.906	0.785	2.141	2.044
		MSE	11.282	7.481	11.654	8.364	5.451	11.245	11.354
		RMSE	3.359	2.735	3.414	2.892	2.335	3.353	3.370
		MAE	2.872	2.596	3.151	2.422	1.969	2.827	2.840
		MAPE	0.354	0.533	0.473	0.305	0.327	0.413	0.415
		SFE	3.441	2.110	3.015	2.814	2.253	2.645	2.745
All IESH 12 CPI-U	D	Bias	-0.677	-0.480	0.057	-0.433	-0.431	-0.902	-0.826
		MSE	5.295	2.620	1.794	4.196	1.601	4.278	4.255
		RMSE	2.301	1.618	1.340	2.049	1.265	2.068	2.063
		MAE	1.734	1.312	1.133	1.792	1.007	1.722	1.726
		MAPE	0.221	0.241	0.197	0.272	0.181	0.253	0.257
		SFE	2.254	1.584	1.371	2.052	1.219	1.907	1.937
	D+C	Bias	3.336	1.356	3.705	2.680	2.078	1.819	1.866
		MSE	27.952	4.520	23.901	15.368	9.752	12.632	12.841
		RMSE	5.287	2.126	4.889	3.920	3.123	3.554	3.583
		MAE	5.689	1.598	5.332	3.781	3.110	3.366	3.435
		MAPE	0.718	0.359	0.758	0.579	0.535	0.514	0.523
		SFE	4.203	1.678	3.268	2.931	2.389	3.129	3.135
All IESH 6 CPI-U	D	Bias	-1.227	-0.757	-0.203	-0.518	-0.684	-0.532	-0.520
		MSE	5.619	2.710	1.408	3.888	2.230	2.242	2.314
		RMSE	2.370	1.646	1.186	1.972	1.493	1.497	1.521
		MAE	1.973	1.280	1.038	1.664	1.196	1.308	1.340
		MAPE	0.245	0.211	0.171	0.242	0.209	0.199	0.205
		SFE	2.078	1.498	1.198	1.950	1.360	1.434	1.465
	D+C	Bias	1.373	1.147	2.769	2.487	1.321	2.550	2.394
		MSE	19.576	6.932	16.957	19.699	9.392	15.522	15.391
		RMSE	4.425	2.633	4.118	4.438	3.065	3.940	3.923
		MAE	4.557	2.157	4.134	3.976	2.824	3.713	3.664
		MAPE	0.585	0.390	0.576	0.523	0.476	0.538	0.532
		SFE	4.310	2.428	3.123	3.767	2.834	3.078	3.185

Sources: RBI, MOSPI and Authors' calculations.

Table A4 (II): Performances of Nowcasts: Values of Errors for Nowcasts *vis-à-vis* Realised Inflation Values (*contd.)*

Data		Measures of Forecast Error	BR	KL	CH	JH	CHH	AC
IESH		Bias	1.580	0.915	5.555	1.598	3.151	3.569
		MSE	6.629	1.617	32.416	6.567	15.075	13.517
		RMSE	2.575	1.272	5.694	2.563	3.883	3.677
		MAE	2.421	1.127	6.729	2.363	3.701	4.006
		MAPE	0.362	0.222	1.209	0.420	1.099	0.627
		SFE	2.083	0.905	1.280	2.053	2.324	0.904
IESH-BA		Bias	-1.96	-3.04	1.08	-0.70	0.29	-0.73
		MSE	7.955	10.032	2.718	4.507	5.230	1.318
		RMSE	2.820	3.167	1.649	2.123	2.287	1.148
		MAE	2.523	3.351	1.432	1.909	1.959	1.012
		MAPE	0.289	0.535	0.323	0.292	0.636	0.160
		SFE	2.083	0.905	1.280	2.053	2.324	0.904
Reg-based		Bias	-1.521	-0.667	-0.631	-0.704	-0.400	-0.896
		MSE	6.817	1.249	1.643	4.017	3.324	1.620
		RMSE	2.611	1.118	1.282	2.004	1.823	1.273
		MAE	2.240	0.923	1.138	1.799	1.605	1.121
		MAPE	0.259	0.158	0.234	0.272	0.433	0.173
		SFE	2.175	0.919	1.143	1.923	1.823	0.927
1 IESH 12 CPI-U	D	Bias	0.997	0.530	0.574	0.212	0.726	0.196
		MSE	5.522	1.271	1.441	3.396	3.369	1.050
		RMSE	2.350	1.128	1.200	1.843	1.836	1.025
		MAE	1.997	0.805	0.988	1.627	1.487	0.858
		MAPE	0.289	0.161	0.232	0.276	0.450	0.158
		SFE	2.180	1.020	1.080	1.876	1.728	1.031
	D+C	Bias	4.598	4.197	2.714	4.830	3.547	3.035
		MSE	27.220	20.359	11.949	31.137	17.186	10.715
		RMSE	5.217	4.512	3.457	5.580	4.146	3.273
		MAE	5.609	4.914	3.191	6.309	4.494	3.379
		MAPE	0.727	0.782	0.591	0.935	1.053	0.544
		SFE	2.526	1.697	2.193	2.863	2.199	1.258
1 IESH 6 CPI-U	D	Bias	0.559	0.198	0.299	-0.056	0.450	-0.031
		MSE	3.792	1.176	1.427	3.687	3.123	1.011
		RMSE	1.947	1.085	1.195	1.920	1.767	1.005
		MAE	1.725	0.802	0.938	1.673	1.390	0.846
		MAPE	0.251	0.164	0.216	0.269	0.376	0.151
		SFE	1.911	1.093	1.185	1.967	1.751	1.030
	D+C	Bias	3.708	3.171	2.070	4.027	2.751	2.424
		MSE	25.016	14.265	9.681	26.874	13.844	8.046
		RMSE	5.002	3.777	3.111	5.184	3.721	2.836
		MAE	4.971	3.807	2.669	5.631	3.759	2.686
		MAPE	0.646	0.625	0.488	0.819	0.831	0.438
		SFE	3.440	2.102	2.380	3.345	2.567	1.509

All IESH All CPI-U	D	Bias	-0.394	-0.679	0.000	0.712	-0.007	-1.041
		MSE	3.506	1.183	0.833	3.149	2.352	2.218
		RMSE	1.872	1.088	0.913	1.775	1.534	1.489
		MAE	1.429	0.954	0.668	1.599	1.176	1.310
		MAPE	0.189	0.170	0.164	0.285	0.302	0.199
		SFE	1.876	0.871	0.935	1.665	1.572	1.091
	D+C	Bias	2.111	1.837	2.103	3.530	1.872	1.323
		MSE	11.957	7.306	7.757	19.020	8.438	3.604
		RMSE	3.458	2.703	2.785	4.361	2.905	1.898
		MAE	3.296	2.527	2.649	4.379	2.693	1.571
		MAPE	0.468	0.440	0.542	0.681	0.629	0.271
		SFE	2.806	2.032	1.872	2.625	2.276	1.396
All IESH 12 CPI-U	D	Bias	0.879	-0.197	0.330	1.351	0.410	-0.401
		MSE	5.014	0.767	0.913	4.496	2.579	1.050
		RMSE	2.239	0.876	0.956	2.120	1.606	1.025
		MAE	1.953	0.748	0.748	1.906	1.296	0.898
		MAPE	0.275	0.144	0.184	0.344	0.397	0.151
		SFE	2.110	0.875	0.919	1.675	1.591	0.966
	D+C	Bias	5.332	2.866	2.530	5.922	2.920	2.385
		MSE	34.776	11.847	11.260	39.619	13.461	6.960
		RMSE	5.897	3.442	3.356	6.294	3.669	2.638
		MAE	6.636	3.457	3.071	7.403	3.781	2.595
		MAPE	0.833	0.565	0.562	1.063	0.919	0.431
		SFE	2.582	1.953	2.259	2.185	2.277	1.155
All IESH 6 CPI-U	D	Bias	0.462	-0.648	-0.013	0.967	0.065	-0.537
		MSE	3.481	2.300	0.767	3.587	2.502	1.192
		RMSE	1.866	1.517	0.876	1.894	1.582	1.092
		MAE	1.584	1.138	0.705	1.720	1.274	0.938
		MAPE	0.224	0.200	0.153	0.303	0.319	0.151
		SFE	1.852	1.405	0.897	1.669	1.620	0.974
	D+C	Bias	3.899	1.329	1.561	4.810	2.044	1.795
		MSE	27.144	8.765	7.575	30.323	11.186	5.185
		RMSE	5.210	2.961	2.752	5.507	3.345	2.277
		MAE	5.343	2.694	2.294	6.089	3.167	2.015
		MAPE	0.680	0.441	0.408	0.880	0.684	0.338
		SFE	3.541	2.711	2.323	2.747	2.713	1.435

Sources: RBI, MOSPI and Authors' calculations.

Table A5: Performances of Three-months-ahead Forecasts: Values of Errors for Forecasts *vis-à-vis* Realised Inflation Values

Data	Measures of Forecast Error	GJ	KT	MP	OD	TN	DL	AS
IESH	Bias	5.083	4.837	3.133	4.410	5.271	6.930	4.408
	MSE	28.956	24.939	11.578	23.472	29.601	50.524	24.081
	RMSE	5.381	4.994	3.403	4.845	5.441	7.108	4.907
	MAE	6.133	5.718	3.512	5.258	6.337	8.833	5.285
	MAPE	0.970	0.873	0.529	0.906	0.963	2.268	1.062
	SFE	1.811	1.274	1.360	2.055	1.380	1.618	2.210

IESH-BA		Bias	-2.12	2.81	-1.47	-0.69	-0.24	2.40	-0.47
		MSE	7.604	9.466	3.913	4.504	1.872	8.269	4.870
		RMSE	2.758	3.077	1.978	2.122	1.368	2.876	2.207
		MAE	2.496	3.115	1.767	1.770	1.167	2.771	1.955
		MAPE	0.361	0.519	0.238	0.286	0.197	0.915	0.434
		SFE	1.811	1.274	1.360	2.055	1.380	1.618	2.210
Reg-based		Bias	-1.38	0.79	-1.35	-1.23	-0.43	0.57	0.37
		MSE	3.085	1.630	3.453	3.907	2.104	2.889	3.530
		RMSE	1.756	1.277	1.858	1.977	1.451	1.700	1.879
		MAE	1.501	1.042	1.673	1.624	1.206	1.576	1.550
		MAPE	0.222	0.196	0.227	0.233	0.191	0.539	0.336
		SFE	1.115	1.029	1.311	1.587	1.418	1.640	1.888
1 IESH 12 CPI-U	D	Bias	-0.121	-0.432	0.188	0.023	0.201	-0.315	1.013
		MSE	2.801	2.114	2.713	3.852	2.101	4.063	7.283
		RMSE	1.674	1.454	1.647	1.963	1.449	2.016	2.699
		MAE	1.419	1.159	1.431	1.655	1.315	1.718	2.403
		MAPE	0.248	0.189	0.240	0.302	0.238	0.440	0.540
		SFE	1.711	1.423	1.677	2.011	1.471	2.040	2.563
	D+C	Bias	1.745	1.363	3.245	2.285	2.889	1.354	3.545
		MSE	9.089	7.684	17.940	11.906	16.183	9.859	29.941
		RMSE	3.015	2.772	4.236	3.451	4.023	3.140	5.472
		MAE	2.582	2.686	4.263	3.305	3.982	2.890	5.281
		MAPE	0.437	0.434	0.618	0.611	0.641	0.801	0.988
		SFE	2.519	2.473	2.790	2.650	2.869	2.903	4.271
1 IESH 6 CPI-U	D	Bias	-0.313	-0.816	-0.237	-0.334	0.018	-0.433	0.617
		MSE	2.785	2.825	3.438	4.828	2.331	3.658	6.746
		RMSE	1.669	1.681	1.854	2.197	1.527	1.913	2.597
		MAE	1.320	1.354	1.571	1.831	1.363	1.543	2.358
		MAPE	0.220	0.209	0.249	0.317	0.245	0.387	0.500
		SFE	1.680	1.506	1.884	2.225	1.564	1.909	2.585
	D+C	Bias	1.384	0.433	2.065	0.970	1.395	0.684	3.110
		MSE	9.204	6.575	16.271	8.108	7.846	7.436	31.944
		RMSE	3.034	2.564	4.034	2.848	2.801	2.727	5.652
		MAE	2.673	2.423	3.926	2.539	2.290	2.269	5.571
		MAPE	0.450	0.398	0.581	0.459	0.398	0.587	0.959
		SFE	2.766	2.590	3.550	2.743	2.489	2.705	4.836
All IESH All CPI-U	D	Bias	-1.532	-0.861	-1.476	-1.739	-1.403	-0.063	-1.909
		MSE	4.932	2.308	5.293	6.931	4.777	2.565	8.396
		RMSE	2.221	1.519	2.301	2.633	2.186	1.602	2.898
		MAE	2.145	1.212	2.118	2.489	1.948	1.375	2.520
		MAPE	0.345	0.186	0.296	0.380	0.280	0.415	0.383
		SFE	1.647	1.283	1.808	2.026	1.717	1.640	2.233
	D+C	Bias	0.206	1.263	0.752	-0.030	0.742	1.695	-0.893
		MSE	4.693	5.360	9.871	6.532	6.008	7.802	7.165
		RMSE	2.166	2.315	3.142	2.556	2.451	2.793	2.677
		MAE	1.709	2.095	2.688	2.163	2.124	2.311	2.409
		MAPE	0.294	0.353	0.417	0.377	0.376	0.716	0.448
		SFE	2.210	1.988	3.126	2.619	2.394	2.275	2.586
All IESH 12 CPI-U	D	Bias	-1.265	-0.546	-0.424	-0.794	-0.468	-0.419	-0.040
		MSE	3.529	2.072	2.373	3.870	2.337	4.002	6.412
		RMSE	1.879	1.439	1.540	1.967	1.529	2.001	2.532
		MAE	1.696	1.171	1.363	1.612	1.366	1.711	2.351
		MAPE	0.270	0.187	0.211	0.246	0.219	0.426	0.496

		SFE	1.424	1.365	1.517	1.844	1.491	2.004	2.594
	D+C	Bias	0.545	1.705	2.585	1.418	2.498	1.374	1.828
		MSE	5.336	10.045	13.718	7.135	13.821	10.641	25.302
		RMSE	2.310	3.169	3.704	2.671	3.718	3.262	5.030
		MAE	1.969	3.113	3.653	2.441	3.687	2.981	4.865
		MAPE	0.363	0.492	0.535	0.448	0.592	0.812	0.889
		SFE	2.300	2.738	2.718	2.320	2.821	3.032	4.802
All IESH 6 CPI-U	D	Bias	-1.251	-0.960	-0.521	-1.048	-0.796	-0.497	-0.435
		MSE	4.118	2.994	2.955	5.175	2.703	3.509	7.298
		RMSE	2.029	1.730	1.719	2.275	1.644	1.873	2.701
		MAE	1.845	1.409	1.398	1.933	1.470	1.551	2.460
		MAPE	0.294	0.216	0.210	0.299	0.233	0.388	0.468
		SFE	1.638	1.475	1.678	2.069	1.474	1.851	2.732
	D+C	Bias	0.271	0.659	1.736	0.142	0.688	0.806	1.276
		MSE	6.707	8.404	12.766	6.516	6.400	7.635	26.119
		RMSE	2.590	2.899	3.573	2.553	2.530	2.763	5.111
		MAE	2.400	2.769	3.330	2.092	2.164	2.378	4.845
		MAPE	0.423	0.443	0.498	0.363	0.376	0.614	0.794
		SFE	2.639	2.893	3.200	2.612	2.495	2.708	5.071

Sources: RBI, MOSPI and Authors' calculations.

Table A5 (I): Performances of Three-months-ahead Forecasts: Values of Errors for Forecasts *vis-à-vis* Realised Inflation Values (*contd.)*

Data		Measures of Forecast Error	TL	RJ	JK	WB	UP	MHM	MHN
IESH		Bias	4.326	4.401	2.347	5.585	5.008	4.740	4.597
		MSE	20.988	23.603	29.136	34.387	26.435	24.188	22.076
		RMSE	4.581	4.858	5.398	5.864	5.142	4.918	4.699
		MAE	5.062	5.315	6.110	6.850	5.945	5.594	5.362
		MAPE	0.653	0.957	0.926	1.074	0.937	0.826	0.782
		SFE	1.545	2.109	4.981	1.830	1.193	1.343	0.994
IESH-BA		Bias	-0.24	-0.11		-0.28	0.29	-0.14	0.06
		MSE	2.328	4.248		3.267	1.438	1.736	0.944
		RMSE	1.526	2.061		1.807	1.199	1.318	0.971
		MAE	1.296	1.701		1.576	0.947	1.123	0.797
		MAPE	0.193	0.324		0.260	0.182	0.191	0.138
		SFE	1.545	2.109		1.830	1.193	1.343	0.994
Reg-based		Bias	-1.33	-0.68		-0.33	-0.46	-0.99	-1.10
		MSE	2.894	2.738		3.513	1.136	2.381	2.356
		RMSE	1.701	1.655		1.874	1.066	1.543	1.535
		MAE	1.500	1.412		1.600	0.922	1.360	1.328
		MAPE	0.190	0.244		0.256	0.158	0.200	0.189
		SFE	1.093	1.546		1.891	0.987	1.212	1.095
1 IESH 12 CPI-U	D	Bias	-0.270	0.281	0.218	0.127	0.438	-0.711	-0.033
		MSE	3.484	3.923	4.534	4.660	2.924	3.821	3.609
		RMSE	1.867	1.981	2.129	2.159	1.710	1.955	1.900
		MAE	1.629	1.813	1.813	1.801	1.456	1.788	1.707
		MAPE	0.226	0.336	0.326	0.288	0.272	0.275	0.277
		SFE	1.893	2.009	2.170	2.208	1.694	1.866	1.946
	D+C	Bias	3.080	2.203	3.829	3.039	2.701	1.911	2.714
		MSE	21.555	10.554	29.002	19.389	11.698	12.563	15.157
		RMSE	4.643	3.249	5.385	4.403	3.420	3.544	3.893
		MAE	4.699	3.049	5.957	4.329	3.279	3.132	3.612

		MAPE	0.589	0.525	0.924	0.669	0.559	0.487	0.562
		SFE	3.560	2.447	3.880	3.265	2.150	3.059	2.860
1 IESH 6 CPI-U	D	Bias	-1.530	-0.051	-0.038	0.125	-0.037	-0.574	-0.051
		MSE	11.995	6.861	3.811	4.679	2.578	3.397	3.353
		RMSE	3.463	2.619	1.952	2.163	1.606	1.843	1.831
		MAE	2.677	2.093	1.583	1.914	1.356	1.521	1.551
		MAPE	0.295	0.336	0.275	0.305	0.246	0.224	0.245
		SFE	3.184	2.684	2.000	2.213	1.645	1.795	1.876
	D+C	Bias	0.554	1.831	2.848	2.776	1.686	2.383	2.790
		MSE	22.998	15.988	21.423	21.617	10.231	16.317	17.870
		RMSE	4.796	3.998	4.629	4.649	3.199	4.039	4.227
		MAE	4.714	3.724	4.811	4.152	2.967	3.852	3.994
		MAPE	0.561	0.612	0.744	0.563	0.496	0.562	0.581
		SFE	4.881	3.643	3.738	3.821	2.785	3.343	3.254
All IESH All CPI-U	D	Bias	-3.082	-0.630	-1.037	-2.159	-1.131	-1.363	-1.414
		MSE	17.318	3.372	5.114	9.272	2.678	4.761	4.971
		RMSE	4.161	1.836	2.261	3.045	1.636	2.182	2.230
		MAE	3.993	1.534	2.115	2.725	1.328	1.987	2.033
		MAPE	0.457	0.255	0.327	0.366	0.203	0.286	0.292
		SFE	2.865	1.767	2.059	2.200	1.212	1.746	1.766
	D+C	Bias	-1.198	1.448	1.182	-0.763	0.645	1.728	1.614
		MSE	19.506	9.068	14.115	5.620	5.319	10.622	10.508
		RMSE	4.417	3.011	3.757	2.371	2.306	3.259	3.242
		MAE	3.924	2.832	3.393	1.982	1.999	2.691	2.695
		MAPE	0.439	0.530	0.556	0.285	0.331	0.397	0.399
		SFE	4.356	2.706	3.654	2.300	2.269	2.832	2.881
All IESH 12 CPI-U	D	Bias	-1.063	-0.481	-0.113	-0.238	-0.461	-1.100	-1.077
		MSE	5.145	2.705	3.626	4.585	1.911	5.481	5.348
		RMSE	2.268	1.645	1.904	2.141	1.382	2.341	2.313
		MAE	1.858	1.459	1.597	1.746	1.230	1.939	1.896
		MAPE	0.240	0.254	0.274	0.269	0.216	0.276	0.268
		SFE	2.054	1.612	1.948	2.180	1.335	2.118	2.097
	D+C	Bias	2.746	1.137	3.455	2.697	1.849	1.480	1.399
		MSE	22.461	4.075	25.775	17.086	7.834	12.501	11.763
		RMSE	4.739	2.019	5.077	4.134	2.799	3.536	3.430
		MAE	5.099	1.725	5.640	3.941	2.583	3.126	3.013
		MAPE	0.658	0.311	0.867	0.618	0.455	0.485	0.468
		SFE	3.958	1.709	3.812	3.210	2.153	3.291	3.209
All IESH 6 CPI-U	D	Bias	-2.045	-0.833	-0.373	-0.325	-0.682	-0.730	-0.823
		MSE	13.132	3.827	3.405	4.958	2.820	3.451	3.745
		RMSE	3.624	1.956	1.845	2.227	1.679	1.858	1.935
		MAE	2.873	1.614	1.528	1.989	1.402	1.527	1.597
		MAPE	0.309	0.257	0.250	0.310	0.236	0.220	0.229
		SFE	3.066	1.814	1.852	2.257	1.573	1.750	1.795
	D+C	Bias	0.357	0.796	2.484	2.414	0.994	1.990	1.859
		MSE	23.423	9.539	19.853	20.304	8.649	13.916	13.937
		RMSE	4.840	3.089	4.456	4.506	2.941	3.730	3.733
		MAE	4.774	2.561	4.614	3.979	2.655	3.429	3.460
		MAPE	0.572	0.454	0.704	0.545	0.445	0.504	0.511
		SFE	4.946	3.058	3.791	3.899	2.836	3.233	3.317

Sources: RBI, MOSPI and Authors' calculations.

Table A5 (II): Performances of Three-months-ahead Forecasts: Values of Errors for Forecasts *vis-à-vis* Realised Inflation Values (*contd.)*

Data		Measures of Forecast Error	BR	KL	CH	JH	CHH	AC
IESH		Bias	2.415	2.533	5.807	2.362	4.095	4.763
		MSE	9.886	7.326	35.845	8.658	20.594	23.424
		RMSE	3.144	2.707	5.987	2.942	4.538	4.840
		MAE	3.065	2.749	7.121	2.694	4.831	5.577
		MAPE	0.457	0.491	1.391	0.489	1.272	0.840
		SFE	2.063	0.978	1.494	1.798	2.004	0.881
IESH-BA		Bias	-1.72	-1.53	1.35	-0.29	1.03	0.01
		MSE	7.019	3.249	3.950	3.162	4.879	0.740
		RMSE	2.649	1.803	1.987	1.778	2.209	0.860
		MAE	2.350	1.616	1.767	1.536	1.850	0.780
		MAPE	0.285	0.263	0.443	0.274	0.603	0.142
		SFE	2.063	0.978	1.494	1.798	2.004	0.881
Reg-based		Bias	-1.56	-0.28	-0.82	-0.56	-0.22	-0.63
		MSE	5.973	0.623	2.519	2.640	3.281	1.029
		RMSE	2.444	0.789	1.587	1.625	1.811	1.015
		MAE	1.975	0.665	1.384	1.385	1.582	0.859
		MAPE	0.223	0.124	0.286	0.231	0.457	0.136
		SFE	1.931	0.758	1.395	1.561	1.842	0.816
1 IESH 12 CPI-U	D	Bias	1.134	0.504	0.619	0.914	0.764	0.024
		MSE	5.409	1.262	1.837	2.708	4.291	1.002
		RMSE	2.326	1.123	1.355	1.646	2.072	1.001
		MAE	1.989	0.897	1.070	1.454	1.770	0.861
		MAPE	0.293	0.179	0.292	0.264	0.559	0.154
		SFE	2.081	1.029	1.236	1.402	1.973	1.025
	D+C	Bias	4.616	3.735	2.399	4.895	3.284	2.543
		MSE	28.566	18.297	9.581	30.804	18.343	7.786
		RMSE	5.345	4.278	3.095	5.550	4.283	2.790
		MAE	5.887	4.513	2.918	6.168	4.428	2.782
		MAPE	0.787	0.743	0.587	0.908	1.145	0.462
		SFE	2.760	2.136	2.005	2.681	2.817	1.176
1 IESH 6 CPI-U	D	Bias	0.795	0.306	0.487	0.548	0.552	-0.219
		MSE	4.413	1.072	2.100	2.581	4.275	1.304
		RMSE	2.101	1.035	1.449	1.607	2.068	1.142
		MAE	1.847	0.877	1.213	1.481	1.733	0.969
		MAPE	0.271	0.176	0.305	0.259	0.535	0.164
		SFE	1.993	1.013	1.398	1.547	2.042	1.148
	D+C	Bias	3.697	2.709	1.775	4.214	2.587	1.860
		MSE	25.930	12.144	8.470	26.945	14.302	5.865
		RMSE	5.092	3.485	2.910	5.191	3.782	2.422
		MAE	4.990	3.309	2.621	5.503	3.666	2.192
		MAPE	0.673	0.556	0.544	0.817	0.906	0.368
		SFE	3.588	2.246	2.363	3.106	2.826	1.589

All IESH All CPI-U	D	Bias	-0.747	-0.533	-0.091	0.619	-0.257	-1.270
		MSE	3.785	1.224	1.443	2.283	2.963	2.870
		RMSE	1.945	1.106	1.201	1.511	1.721	1.694
		MAE	1.578	0.985	0.944	1.303	1.413	1.525
		MAPE	0.202	0.178	0.245	0.243	0.396	0.236
		SFE	1.841	0.994	1.227	1.412	1.744	1.148
	D+C	Bias	1.490	1.925	1.769	3.277	1.414	0.898
		MSE	10.018	9.310	7.080	17.796	7.333	2.720
		RMSE	3.165	3.051	2.661	4.219	2.708	1.649
		MAE	2.902	2.940	2.581	4.017	2.530	1.323
		MAPE	0.421	0.524	0.604	0.652	0.676	0.230
		SFE	2.862	2.426	2.036	2.722	2.366	1.418
All IESH 12 CPI-U	D	Bias	0.714	-0.081	0.346	1.313	0.164	-0.598
		MSE	5.004	0.972	1.024	3.231	3.300	1.301
		RMSE	2.237	0.986	1.012	1.797	1.817	1.141
		MAE	1.782	0.814	0.766	1.634	1.492	0.979
		MAPE	0.254	0.160	0.221	0.299	0.455	0.157
		SFE	2.173	1.007	0.974	1.258	1.854	0.995
	D+C	Bias	4.598	2.773	2.256	5.603	2.358	1.956
		MSE	28.085	12.929	8.602	34.612	13.339	5.088
		RMSE	5.300	3.596	2.933	5.883	3.652	2.256
		MAE	5.885	3.674	2.671	6.877	3.654	2.144
		MAPE	0.763	0.622	0.542	1.006	0.981	0.366
		SFE	2.700	2.346	1.921	1.838	2.858	1.152
All IESH 6 CPI-U	D	Bias	0.413	-0.520	-0.088	1.047	-0.110	-0.744
		MSE	3.853	2.580	1.505	2.686	2.898	1.676
		RMSE	1.963	1.606	1.227	1.639	1.702	1.294
		MAE	1.651	1.194	0.997	1.528	1.381	1.039
		MAPE	0.237	0.209	0.258	0.277	0.396	0.160
		SFE	1.966	1.557	1.254	1.292	1.741	1.085
	D+C	Bias	3.171	1.344	1.237	4.644	1.625	1.296
		MSE	23.391	10.131	6.982	27.945	10.204	3.747
		RMSE	4.836	3.183	2.642	5.286	3.194	1.936
		MAE	4.596	2.933	2.387	5.687	3.033	1.666
		MAPE	0.627	0.497	0.502	0.847	0.745	0.286
		SFE	3.742	2.956	2.393	2.587	2.818	1.473

Sources: RBI, MOSPI and Authors' calculations.

Table A6: Performances of One-year-ahead Forecasts: Values of Errors for Forecasts *vis-à-vis* Realised Inflation Values

Data	Measures of Forecast Error	GJ	KT	MP	OD	TN	DL	AS
IESH	Bias	5.163	4.690	2.972	3.872	5.437	6.010	4.135
	MSE	28.458	24.453	10.652	18.172	31.928	42.197	25.075
	RMSE	5.335	4.945	3.264	4.263	5.650	6.496	5.008
	MAE	6.183	5.560	3.318	4.511	6.598	7.604	5.306
	MAPE	1.000	0.864	0.535	0.815	1.007	2.065	1.100
	SFE	1.377	1.607	1.383	1.827	1.578	2.527	2.895
IESH-BA	Bias	-3.45	1.63	-2.57	-3.10	-1.64	1.18	-3.71
	MSE	13.700	5.118	8.407	12.804	5.073	7.476	21.722
	RMSE	3.701	2.262	2.900	3.578	2.252	2.734	4.661
	MAE	3.906	1.969	2.835	3.545	2.082	2.509	4.690

		MAPE	0.603	0.356	0.381	0.510	0.299	0.827	0.707
		SFE	1.377	1.607	1.383	1.827	1.578	2.527	2.895
Reg-based		Bias	-1.10	-0.01	-1.17	-0.77	-0.62	0.09	0.95
		MSE	2.535	1.287	3.245	3.640	2.332	2.928	2.620
		RMSE	1.592	1.134	1.801	1.908	1.527	1.711	1.619
		MAE	1.414	0.922	1.579	1.556	1.255	1.531	1.477
		MAPE	0.230	0.174	0.224	0.244	0.191	0.481	0.335
		SFE	1.179	1.162	1.399	1.790	1.430	1.751	1.346
1 IESH 12 CPI-U	D	Bias	-0.600	-0.662	0.089	0.102	-0.171	-0.412	1.971
		MSE	3.102	2.617	2.981	2.608	3.354	5.574	13.016
		RMSE	1.761	1.618	1.726	1.615	1.831	2.361	3.608
		MAE	1.536	1.420	1.565	1.363	1.583	2.224	3.417
		MAPE	0.265	0.238	0.260	0.258	0.256	0.602	0.744
		SFE	1.697	1.512	1.767	1.651	1.868	2.382	3.097
	D+C	Bias	0.976	1.216	2.817	2.501	2.531	1.217	4.623
		MSE	7.244	7.699	16.138	12.415	15.662	11.575	46.827
		RMSE	2.691	2.775	4.017	3.524	3.958	3.402	6.843
		MAE	2.489	2.528	3.852	3.233	3.795	3.095	7.070
		MAPE	0.436	0.441	0.596	0.618	0.616	0.956	1.331
		SFE	2.570	2.556	2.934	2.543	3.117	3.255	5.170
1 IESH 6 CPI-U	D	Bias	-0.456	-0.706	-0.217	0.000	-0.319	-0.424	1.614
		MSE	2.800	2.432	3.873	1.805	2.665	6.551	13.555
		RMSE	1.673	1.560	1.968	1.344	1.633	2.559	3.682
		MAE	1.452	1.328	1.784	1.106	1.367	2.396	3.333
		MAPE	0.252	0.221	0.282	0.206	0.216	0.645	0.725
		SFE	1.650	1.425	2.004	1.377	1.641	2.586	3.391
	D+C	Bias	0.936	0.663	2.057	1.606	0.794	0.827	4.627
		MSE	8.875	4.655	12.904	6.043	4.042	11.175	53.581
		RMSE	2.979	2.158	3.592	2.458	2.010	3.343	7.320
		MAE	2.618	1.913	3.483	2.264	1.661	3.100	7.642
		MAPE	0.448	0.335	0.541	0.426	0.275	0.869	1.439
		SFE	2.898	2.104	3.018	1.907	1.893	3.319	5.812
All IESH All CPI-U	D	Bias	-1.880	-0.775	-1.616	-1.758	-1.891	0.047	-1.785
		MSE	5.699	2.071	5.691	5.137	5.232	3.740	5.956
		RMSE	2.387	1.439	2.385	2.266	2.287	1.934	2.440
		MAE	2.267	1.304	2.377	2.010	2.066	1.766	2.117
		MAPE	0.359	0.219	0.348	0.294	0.283	0.528	0.359
		SFE	1.507	1.242	1.798	1.466	1.319	1.981	1.705
	D+C	Bias	-0.384	1.177	0.190	-0.071	-0.223	2.123	-0.404
		MSE	2.919	3.330	5.318	3.768	1.312	9.312	4.142
		RMSE	1.708	1.825	2.306	1.941	1.145	3.052	2.035
		MAE	1.428	1.570	1.841	1.608	0.932	2.668	1.653
		MAPE	0.240	0.278	0.301	0.292	0.156	0.824	0.355
		SFE	1.706	1.429	2.355	1.988	1.151	2.246	2.044
All IESH 12 CPI-U	D	Bias	-1.570	-0.545	-0.562	-0.652	-0.796	-0.621	0.575
		MSE	4.780	2.231	3.606	3.722	4.355	6.188	9.745
		RMSE	2.186	1.494	1.899	1.929	2.087	2.488	3.122
		MAE	1.788	1.316	1.618	1.540	1.809	2.352	2.975
		MAPE	0.259	0.228	0.241	0.243	0.269	0.617	0.671
		SFE	1.559	1.425	1.858	1.861	1.977	2.468	3.144
	D+C	Bias	-0.162	1.377	1.796	1.132	1.789	0.989	2.938
		MSE	6.111	10.498	13.298	8.509	14.051	12.704	35.379
		RMSE	2.472	3.240	3.647	2.917	3.748	3.564	5.948

		MAE	2.170	3.083	3.466	2.618	3.592	3.252	5.861
		MAPE	0.369	0.525	0.533	0.511	0.590	0.973	1.143
		SFE	2.528	3.005	3.252	2.755	3.375	3.509	5.299
All IESH 6 CPI-U	D	Bias	-1.343	-0.829	-0.627	-0.831	-1.254	-0.722	0.390
		MSE	4.177	2.843	4.107	3.776	4.296	6.883	11.655
		RMSE	2.044	1.686	2.027	1.943	2.073	2.624	3.414
		MAE	1.779	1.480	1.895	1.587	1.782	2.477	3.190
		MAPE	0.282	0.245	0.288	0.250	0.253	0.620	0.714
		SFE	1.579	1.505	1.975	1.800	1.691	2.585	3.475
	D+C	Bias	-0.064	0.345	0.872	0.061	-0.639	0.493	2.632
		MSE	7.555	6.253	8.794	4.836	3.511	11.625	41.758
		RMSE	2.749	2.501	2.966	2.199	1.874	3.410	6.462
		MAE	2.523	2.259	2.782	1.953	1.528	3.184	6.326
		MAPE	0.436	0.370	0.435	0.350	0.240	0.841	1.259
		SFE	2.816	2.538	2.904	2.253	1.805	3.457	6.048

Sources: RBI, MOSPI and Authors' calculations.

Table A6 (I): Performances of One-year-ahead Forecasts: Values of Errors for Forecasts *vis-à-vis* Realised Inflation Values (*contd.)*

Data		Measures of Forecast Error	TL	RJ	JK	WB	UP	MHM	MHN
IESH		Bias	4.326	3.749	-0.048	5.353	4.491	3.526	4.224
		MSE	20.271	17.831	34.492	32.305	21.448	14.892	21.148
		RMSE	4.502	4.223	5.873	5.684	4.631	3.859	4.599
		MAE	5.027	4.393	6.649	6.540	5.235	4.035	5.034
		MAPE	0.657	0.843	1.013	1.094	0.841	0.634	0.775
		SFE	1.279	1.992	6.018	1.956	1.158	1.607	1.864
IESH-BA		Bias	-1.67	-2.65		-2.07	-1.74	-2.70	-1.95
		MSE	4.335	10.812		7.945	4.304	9.730	7.113
		RMSE	2.082	3.288		2.819	2.075	3.119	2.667
		MAE	1.846	3.097		2.588	1.874	3.021	2.349
		MAPE	0.237	0.462		0.358	0.297	0.423	0.319
		SFE	1.279	1.992		1.956	1.158	1.607	1.864
Reg-based		Bias	-1.19	-0.86		-0.33	-0.84	-1.38	-1.39
		MSE	2.470	3.532		2.030	1.910	3.344	3.234
		RMSE	1.572	1.879		1.425	1.382	1.829	1.798
		MAE	1.372	1.573		1.120	1.165	1.577	1.555
		MAPE	0.179	0.268		0.194	0.193	0.222	0.218
		SFE	1.049	1.713		1.419	1.124	1.234	1.167
1 IESH 12 CPI-U	D	Bias	-0.726	-0.316	0.490	-0.089	0.227	-1.050	-0.301
		MSE	2.234	2.909	1.913	6.020	2.997	3.595	2.337
		RMSE	1.495	1.706	1.383	2.454	1.731	1.896	1.529
		MAE	1.297	1.341	1.027	2.008	1.562	1.713	1.353
		MAPE	0.174	0.263	0.215	0.342	0.283	0.255	0.222
		SFE	1.815	1.717	1.326	2.513	1.758	1.996	2.025
	D+C	Bias	1.803	1.737	4.832	2.444	2.500	0.907	1.291
		MSE	10.991	7.107	31.625	17.590	10.407	9.150	9.878
		RMSE	3.315	2.666	5.624	4.194	3.226	3.025	3.143
		MAE	3.159	2.462	6.136	4.252	3.111	2.588	2.725
		MAPE	0.424	0.506	0.895	0.730	0.534	0.415	0.428
		SFE	2.851	2.072	2.948	3.493	2.089	2.957	2.936

1 IESH 6 CPI-U	D	Bias	-1.602	-0.203	0.426	0.296	-0.064	-0.866	-0.008
		MSE	9.231	3.095	2.632	7.098	4.179	4.670	3.395
		RMSE	3.038	1.759	1.622	2.664	2.044	2.161	1.843
		MAE	2.453	1.442	1.130	2.238	1.875	1.925	1.653
		MAPE	0.287	0.280	0.242	0.383	0.330	0.290	0.279
		SFE	2.645	1.791	1.604	2.713	2.094	2.029	1.888
	D+C	Bias	0.643	1.921	4.107	3.023	1.909	2.044	2.317
		MSE	15.796	9.976	27.630	27.811	13.785	14.274	16.841
		RMSE	3.974	3.158	5.256	5.274	3.713	3.778	4.104
		MAE	3.640	2.918	5.313	5.052	3.639	3.509	3.893
		MAPE	0.466	0.557	0.843	0.755	0.608	0.535	0.579
		SFE	4.019	2.569	3.362	4.428	3.263	3.256	3.471
All IESH All CPI-U	D	Bias	-3.574	-0.918	-0.881	-2.126	-1.508	-1.641	-1.700
		MSE	17.987	3.459	5.403	10.068	4.368	6.692	6.934
		RMSE	4.241	1.860	2.325	3.173	2.090	2.587	2.633
		MAE	4.368	1.575	2.137	3.033	1.913	2.505	2.569
		MAPE	0.525	0.269	0.375	0.437	0.295	0.365	0.375
		SFE	2.339	1.657	2.204	2.414	1.483	2.049	2.061
	D+C	Bias	-2.097	1.360	1.541	-0.814	0.403	1.245	0.893
		MSE	14.314	6.306	15.392	6.712	6.162	10.759	9.953
		RMSE	3.783	2.511	3.923	2.591	2.482	3.280	3.155
		MAE	3.402	2.302	3.080	2.413	1.909	2.586	2.480
		MAPE	0.404	0.480	0.579	0.383	0.325	0.396	0.378
		SFE	3.227	2.163	3.697	2.520	2.510	3.110	3.101
All IESH 12 CPI-U	D	Bias	-1.633	-1.136	0.316	-0.480	-0.810	-1.449	-1.547
		MSE	5.597	4.159	1.864	6.317	2.536	5.469	5.840
		RMSE	2.366	2.039	1.365	2.513	1.593	2.339	2.417
		MAE	2.002	1.750	1.069	2.060	1.315	2.039	2.124
		MAPE	0.254	0.296	0.227	0.340	0.209	0.292	0.304
		SFE	1.754	1.735	1.361	2.528	1.405	1.881	1.902
	D+C	Bias	0.967	0.331	4.402	1.976	1.348	0.590	0.021
		MSE	10.472	4.410	27.701	15.957	5.959	9.557	9.071
		RMSE	3.236	2.100	5.263	3.995	2.441	3.091	3.012
		MAE	3.030	1.920	5.781	3.933	2.173	2.725	2.658
		MAPE	0.410	0.401	0.865	0.683	0.384	0.431	0.415
		SFE	3.164	2.125	2.956	3.557	2.086	3.109	3.086
All IESH 6 CPI-U	D	Bias	-2.417	-1.095	0.156	-0.068	-0.838	-0.909	-1.014
		MSE	12.984	4.783	3.140	7.400	3.974	4.226	4.509
		RMSE	3.603	2.187	1.772	2.720	1.993	2.056	2.123
		MAE	3.132	1.892	1.328	2.221	1.667	1.902	1.972
		MAPE	0.365	0.305	0.268	0.366	0.261	0.294	0.303
		SFE	2.738	1.940	1.809	2.787	1.853	1.889	1.912
	D+C	Bias	-0.491	0.605	3.479	2.505	0.906	1.476	1.063
		MSE	18.092	7.700	25.397	24.707	10.289	13.695	13.591
		RMSE	4.253	2.775	5.040	4.971	3.208	3.701	3.687
		MAE	4.090	2.544	5.207	4.525	3.026	3.438	3.404
		MAPE	0.523	0.449	0.839	0.672	0.501	0.522	0.510
		SFE	4.329	2.775	3.736	4.399	3.153	3.478	3.617

Sources: RBI, MOSPI and Authors' calculations.

Table A6 (II): Performances of One-year-ahead Forecasts: Values of Errors for Forecasts *vis-à-vis* Realised Inflation Values (*contd.)*

Data		Measures of Forecast Error	BR	KL	CH	JH	CHH	AC
IESH		Bias	2.165	3.730	4.817	1.687	4.212	4.429
		MSE	10.487	15.004	25.860	7.051	20.965	20.875
		RMSE	3.238	3.873	5.085	2.655	4.579	4.569
		MAE	3.125	4.226	5.743	2.412	4.956	5.150
		MAPE	0.464	0.738	1.098	0.454	1.238	0.806
		SFE	2.468	1.072	1.671	2.101	1.840	1.148
IESH-BA		Bias	-4.15	-2.88	-0.70	-2.04	0.91	-1.80
		MSE	23.041	9.382	3.157	8.350	4.060	4.511
		RMSE	4.800	3.063	1.777	2.890	2.015	2.124
		MAE	5.114	3.170	1.628	2.626	1.778	1.988
		MAPE	0.608	0.521	0.331	0.352	0.512	0.304
		SFE	2.468	1.072	1.671	2.101	1.840	1.149
Reg-based		Bias	-1.51	-0.02	-0.35	-0.18	0.72	-0.72
		MSE	5.498	0.614	1.305	2.004	2.796	1.260
		RMSE	2.345	0.784	1.142	1.416	1.672	1.123
		MAE	1.932	0.622	0.924	1.258	1.383	0.962
		MAPE	0.232	0.129	0.201	0.220	0.457	0.155
		SFE	1.837	0.803	1.115	1.439	1.546	0.879
1 IESH 12 CPI-U	D	Bias	0.737	0.245	0.681	0.990	0.825	-0.329
		MSE	8.477	1.185	2.807	4.461	5.117	1.228
		RMSE	2.912	1.089	1.675	2.112	2.262	1.108
		MAE	2.489	0.932	1.409	1.978	2.025	0.947
		MAPE	0.332	0.192	0.336	0.360	0.640	0.166
		SFE	2.886	1.087	1.568	1.912	2.158	1.084
	D+C	Bias	3.313	3.237	2.516	4.734	3.235	1.952
		MSE	23.211	14.532	15.213	31.946	18.216	5.836
		RMSE	4.818	3.812	3.900	5.652	4.268	2.416
		MAE	5.011	3.962	3.612	6.213	4.251	2.284
		MAPE	0.686	0.693	0.741	0.987	1.183	0.399
		SFE	3.584	2.063	3.054	3.165	2.852	1.458
1 IESH 6 CPI-U	D	Bias	0.531	0.250	0.596	0.679	0.894	-0.266
		MSE	5.773	0.998	2.464	4.910	3.969	1.426
		RMSE	2.403	0.999	1.570	2.216	1.992	1.194
		MAE	1.984	0.803	1.368	2.025	1.758	1.026
		MAPE	0.266	0.168	0.329	0.357	0.565	0.179
		SFE	2.401	0.991	1.488	2.161	1.824	1.193
	D+C	Bias	3.430	2.228	1.862	3.903	2.849	1.761
		MSE	23.483	9.230	8.949	27.670	15.222	5.639
		RMSE	4.846	3.038	2.991	5.260	3.902	2.375
		MAE	5.035	2.641	2.806	5.457	3.648	2.171
		MAPE	0.659	0.487	0.568	0.872	1.027	0.373
		SFE	3.508	2.117	2.399	3.613	2.731	1.633

All IESH All CPI-U	D	Bias	-0.976	-0.976	-0.258	0.873	0.387	-1.487
		MSE	5.234	1.892	1.394	3.648	2.563	3.709
		RMSE	2.288	1.375	1.181	1.910	1.601	1.926
		MAE	1.734	1.261	0.981	1.663	1.314	1.842
		MAPE	0.203	0.224	0.216	0.323	0.449	0.290
		SFE	2.120	0.994	1.181	1.741	1.592	1.255
	D+C	Bias	0.980	1.249	1.586	3.232	2.058	0.513
		MSE	9.101	5.401	4.235	19.313	8.263	2.061
		RMSE	3.017	2.324	2.058	4.395	2.875	1.436
		MAE	2.705	2.097	1.873	4.163	2.468	1.098
		MAPE	0.388	0.399	0.414	0.731	0.809	0.201
		SFE	2.924	2.008	1.343	3.051	2.057	1.374
All IESH 12 CPI-U	D	Bias	0.408	-0.466	0.201	1.451	0.314	-0.889
		MSE	7.930	1.492	2.045	4.734	4.166	2.019
		RMSE	2.816	1.222	1.430	2.176	2.041	1.421
		MAE	2.464	1.009	1.187	2.049	1.739	1.251
		MAPE	0.332	0.188	0.273	0.387	0.537	0.202
		SFE	2.855	1.157	1.451	1.661	2.066	1.135
	D+C	Bias	3.419	1.959	1.927	5.236	2.348	1.202
		MSE	24.619	8.501	11.953	36.067	13.339	3.851
		RMSE	4.962	2.916	3.457	6.006	3.652	1.962
		MAE	5.130	2.827	3.282	6.936	3.597	1.711
		MAPE	0.697	0.520	0.674	1.092	1.024	0.306
		SFE	3.684	2.212	2.941	3.015	2.867	1.590
All IESH 6 CPI-U	D	Bias	0.422	-0.795	-0.184	1.300	0.377	-0.862
		MSE	6.056	2.881	2.509	4.372	2.899	2.073
		RMSE	2.461	1.697	1.584	2.091	1.703	1.440
		MAE	2.117	1.370	1.326	1.884	1.401	1.248
		MAPE	0.288	0.245	0.290	0.358	0.470	0.200
		SFE	2.484	1.537	1.612	1.678	1.701	1.182
	D+C	Bias	3.250	0.375	0.873	4.528	1.984	0.835
		MSE	21.934	7.800	7.192	29.410	11.396	3.142
		RMSE	4.683	2.793	2.682	5.423	3.376	1.773
		MAE	4.768	2.443	2.427	5.782	2.963	1.525
		MAPE	0.620	0.456	0.472	0.926	0.891	0.269
		SFE	3.455	2.836	2.598	3.058	2.798	1.602

Sources: RBI, MOSPI and Authors' calculations.

Table A7: Directional Matches (in Per cent) in Nowcasts and Forecasts with Realised Inflation Figures

	Data		GJ	KT	MP	OD	TN	DL	AS
Nowcasts	IESH		31.6	57.9	57.9	63.2	57.9	68.4	31.6
	IESH-BA		31.6	57.9	57.9	63.2	57.9	68.4	31.6
	Reg-based		26.3	57.9	57.9	47.4	57.9	52.6	57.9
	1 IESH 12 CPI-U	D	73.7	31.6	57.9	31.6	36.8	42.1	52.6
		D+C	68.4	36.8	63.2	52.6	31.6	31.6	52.6
	1 IESH 6 CPI-U	D	63.2	26.3	57.9	31.6	57.9	36.8	47.4
		D+C	52.6	31.6	52.6	47.4	47.4	26.3	36.8
	All IESH All CPI-U	D	57.9	31.6	36.8	36.8	42.1	36.8	47.4
		D+C	57.9	26.3	42.1	26.3	42.1	26.3	47.4
	All IESH 12 CPI-U	D	47.4	31.6	47.4	42.1	36.8	42.1	36.8

		D+C	63.2	31.6	57.9	57.9	36.8	36.8	36.8
	All IESH 6 CPI-U	D	31.6	36.8	52.6	42.1	52.6	31.6	57.9
		D+C	31.6	42.1	52.6	42.1	52.6	31.6	47.4
Three-months-ahead Forecasts	IESH		21.1	21.1	57.9	47.4	42.1	42.1	31.6
	IESH-BA		21.1	21.1	57.9	47.4	42.1	42.1	31.6
	Reg-based		57.9	21.1	57.9	47.4	42.1	42.1	63.2
	1 IESH 12 CPI-U	D	42.1	52.6	47.4	36.8	52.6	63.2	42.1
		D+C	42.1	52.6	42.1	47.4	42.1	63.2	47.4
	1 IESH 6 CPI-U	D	31.6	47.4	42.1	36.8	47.4	57.9	47.4
		D+C	31.6	57.9	47.4	47.4	42.1	47.4	42.1
	All IESH All CPI-U	D	57.9	52.6	57.9	42.1	47.4	57.9	36.8
		D+C	52.6	47.4	47.4	42.1	42.1	63.2	42.1
	All IESH 12 CPI-U	D	36.8	57.9	57.9	31.6	42.1	52.6	26.3
		D+C	47.4	57.9	52.6	31.6	42.1	52.6	31.6
	All IESH 6 CPI-U	D	52.6	57.9	52.6	36.8	47.4	57.9	57.9
		D+C	47.4	57.9	52.6	47.4	47.4	57.9	52.6
One-year-ahead Forecasts	IESH		47.4	57.9	47.4	31.6	31.6	36.8	68.4
	IESH-BA		47.4	57.9	47.4	31.6	31.6	36.8	68.4
	Reg-based		57.9	47.4	42.1	63.2	63.2	26.3	36.8
	1 IESH 12 CPI-U	D	31.6	47.4	57.9	57.9	47.4	68.4	57.9
		D+C	36.8	47.4	42.1	42.1	47.4	57.9	57.9
	1 IESH 6 CPI-U	D	63.2	52.6	57.9	68.4	68.4	47.4	52.6
		D+C	52.6	68.4	63.2	63.2	63.2	68.4	42.1
	All IESH All CPI-U	D	68.4	57.9	47.4	68.4	57.9	78.9	36.8
		D+C	63.2	63.2	47.4	57.9	52.6	84.2	36.8
	All IESH 12 CPI-U	D	47.4	42.1	36.8	36.8	47.4	57.9	63.2
		D+C	52.6	42.1	36.8	26.3	47.4	52.6	57.9
	All IESH 6 CPI-U	D	63.2	52.6	63.2	42.1	47.4	63.2	47.4
		D+C	57.9	68.4	68.4	47.4	42.1	73.7	31.6

Sources: RBI, MOSPI and Authors' calculations.

Table A7 (I): Directional Matches (in Per cent) in Nowcasts and Forecasts with Realised Inflation Figures (*contd.)*

	Data		**TL**	**RJ**	**JK**	**WB**	**UP**	**MHM**	**MHN**
Nowcasts	IESH		57.9	47.4	73.7	68.4	52.6	57.9	57.9
	IESH-BA		57.9	47.4	73.7	68.4	52.6	57.9	57.9
	Reg-based		52.6	42.1	0.0	63.2	47.4	47.4	52.6
	1 IESH 12 CPI-U	D	47.4	63.2	47.4	47.4	57.9	42.1	42.1
		D+C	31.6	63.2	42.1	47.4	42.1	52.6	26.3
	1 IESH 6 CPI-U	D	57.9	73.7	52.6	47.4	52.6	42.1	47.4
		D+C	42.1	68.4	47.4	52.6	42.1	36.8	42.1
	All IESH All CPI-U	D	57.9	68.4	57.9	42.1	36.8	63.2	47.4
		D+C	57.9	52.6	63.2	36.8	36.8	52.6	36.8
	All IESH 12 CPI-U	D	36.8	73.7	52.6	57.9	47.4	57.9	57.9
		D+C	26.3	63.2	47.4	47.4	42.1	47.4	52.6
	All IESH 6 CPI-U	D	47.4	68.4	57.9	42.1	36.8	42.1	42.1
		D+C	42.1	63.2	63.2	36.8	31.6	31.6	36.8

Three-months-ahead Forecasts	IESH		47.4	36.8	26.3	26.3	42.1	36.8	57.9
	IESH-BA		47.4	36.8	26.3	26.3	42.1	36.8	57.9
	Reg-based		36.8	26.3	0.0	26.3	42.1	26.3	47.4
	1 IESH 12 CPI-U	D	42.1	47.4	47.4	52.6	47.4	63.2	47.4
		D+C	52.6	47.4	42.1	57.9	42.1	57.9	42.1
	1 IESH 6 CPI-U	D	57.9	36.8	42.1	52.6	57.9	57.9	36.8
		D+C	63.2	36.8	52.6	52.6	63.2	68.4	57.9
	All IESH All CPI-U	D	42.1	26.3	47.4	52.6	52.6	42.1	63.2
		D+C	42.1	36.8	47.4	57.9	57.9	57.9	68.4
	All IESH 12 CPI-U	D	52.6	36.8	57.9	31.6	47.4	42.1	42.1
		D+C	52.6	42.1	42.1	42.1	42.1	47.4	47.4
	All IESH 6 CPI-U	D	57.9	31.6	42.1	42.1	52.6	52.6	57.9
		D+C	63.2	31.6	47.4	47.4	63.2	68.4	68.4
One-year-ahead Forecasts	IESH		52.6	26.3	15.8	42.1	36.8	36.8	31.6
	IESH-BA		52.6	26.3	15.8	42.1	36.8	36.8	31.6
	Reg-based		57.9	36.8	15.8	52.6	57.9	52.6	52.6
	1 IESH 12 CPI-U	D	63.2	63.2	89.5	52.6	57.9	63.2	57.9
		D+C	73.7	63.2	84.2	52.6	57.9	57.9	68.4
	1 IESH 6 CPI-U	D	42.1	73.7	78.9	36.8	57.9	42.1	52.6
		D+C	47.4	57.9	68.4	42.1	57.9	52.6	57.9
	All IESH All CPI-U	D	36.8	21.1	73.7	47.4	52.6	57.9	63.2
		D+C	42.1	36.8	73.7	57.9	42.1	68.4	73.7
	All IESH 12 CPI-U	D	73.7	36.8	78.9	52.6	52.6	57.9	57.9
		D+C	73.7	52.6	68.4	47.4	57.9	57.9	57.9
	All IESH 6 CPI-U	D	36.8	42.1	57.9	36.8	57.9	47.4	47.4
		D+C	42.1	47.4	63.2	47.4	57.9	47.4	47.4

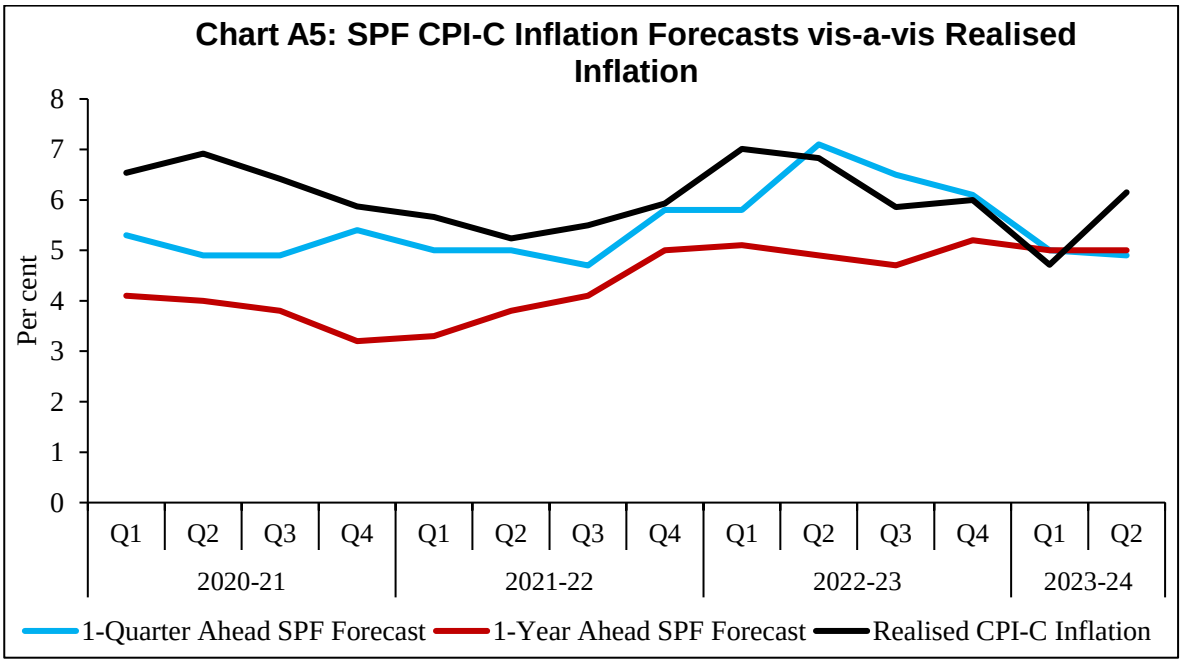
Sources: RBI, MOSPI and Authors' calculations.

Table A7 (II): Directional Matches (in Per cent) in Nowcasts and Forecasts with Realised Inflation Figures (*contd.)*

	Data		**BR**	**KL**	**CH**	**JH**	**CHH**	**AC**
Nowcasts	IESH		52.6	73.7	52.6	21.1	42.1	57.9
	IESH-BA		52.6	73.7	52.6	21.1	42.1	57.9
	Reg-based		47.4	68.4	36.8	21.1	26.3	68.4
	1 IESH 12 CPI-U	D	47.4	63.2	47.4	63.2	21.1	42.1
		D+C	68.4	47.4	57.9	42.1	36.8	42.1
	1 IESH 6 CPI-U	D	47.4	63.2	47.4	52.6	31.6	52.6
		D+C	47.4	52.6	63.2	52.6	31.6	36.8
	All IESH All CPI-U	D	36.8	63.2	68.4	52.6	36.8	42.1
		D+C	42.1	42.1	52.6	47.4	42.1	47.4
	All IESH 12 CPI-U	D	31.6	52.6	47.4	42.1	47.4	47.4
		D+C	31.6	52.6	57.9	31.6	57.9	57.9
	All IESH 6 CPI-U	D	36.8	68.4	68.4	63.2	26.3	47.4
		D+C	47.4	57.9	63.2	42.1	36.8	36.8

Three-months-ahead Forecasts	IESH		68.4	52.6	57.9	47.4	52.6	26.3
	IESH-BA		68.4	52.6	57.9	47.4	52.6	26.3
	Reg-based		57.9	47.4	31.6	42.1	47.4	15.8
	1 IESH 12 CPI-U	D	15.8	57.9	57.9	68.4	57.9	52.6
		D+C	31.6	47.4	63.2	42.1	68.4	57.9
	1 IESH 6 CPI-U	D	31.6	57.9	52.6	52.6	63.2	47.4
		D+C	42.1	52.6	52.6	42.1	73.7	52.6
	All IESH All CPI-U	D	47.4	42.1	63.2	36.8	57.9	52.6
		D+C	36.8	42.1	52.6	47.4	52.6	47.4
	All IESH 12 CPI-U	D	31.6	47.4	63.2	42.1	52.6	36.8
		D+C	42.1	36.8	57.9	47.4	52.6	47.4
	All IESH 6 CPI-U	D	42.1	31.6	57.9	47.4	63.2	42.1
		D+C	36.8	31.6	52.6	42.1	63.2	47.4
One-year-ahead Forecasts	IESH		57.9	26.3	31.6	36.8	63.2	26.3
	IESH-BA		57.9	26.3	31.6	36.8	63.2	26.3
	Reg-based		42.1	73.7	63.2	52.6	57.9	52.6
	1 IESH 12 CPI-U	D	42.1	52.6	52.6	52.6	52.6	47.4
		D+C	42.1	42.1	63.2	47.4	47.4	47.4
	1 IESH 6 CPI-U	D	57.9	63.2	47.4	57.9	68.4	52.6
		D+C	63.2	42.1	68.4	47.4	78.9	52.6
	All IESH All CPI-U	D	68.4	42.1	52.6	52.6	68.4	57.9
		D+C	42.1	36.8	52.6	57.9	52.6	63.2
	All IESH 12 CPI-U	D	36.8	42.1	52.6	57.9	57.9	47.4
		D+C	31.6	47.4	52.6	52.6	57.9	31.6
	All IESH 6 CPI-U	D	63.2	26.3	52.6	47.4	68.4	31.6
		D+C	47.4	26.3	52.6	47.4	63.2	42.1

Sources: RBI, MOSPI and Authors' calculations.



Source: RBI

Table A8: Performance of SPF Forecasts
***vis-à-vis* Forecasts from Proposed Methodology**

Measures of Forecast Error	1-Quarter Ahead SPF Forecast	Three-months-ahead Proposed Forecast	1-Year Ahead SPF Forecast	One-year-ahead Proposed Forecast
Bias	-0.587	0.024	-1.672	0.266
MSE	0.919	1.002	3.544	1.228
RMSE	0.959	1.001	1.883	1.108
MAE	0.773	0.861	1.713	0.947
MAPE	0.124	0.154	0.278	0.166
Theil's U	0.029	0.084	0.070	0.097
SFE	0.575	1.025	0.747	1.084
Directional Matches (in per cent)	38.5	52.6	76.9	63.2

Sources: RBI, MOSPI and Authors' calculations.