Data Revisions in India and its Implications for Monetary Policy

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Abstract

This paper studies data revision properties of GDP growth and inflation as measured by the Wholesale Price Index (WPI) for the Indian economy. We find that data revisions to GDP growth and WPI inflation in India are significant. The results show that revisions to GDP growth and WPI inflation can not be characterized as either containing pure news or pure noise. We also find that there is a significant predictable component in revisions to GDP growth and inflation. Our findings suggest that if the Reserve Bank of India were to follow a Taylor rule for its monetary policy formulation, then the interest rate based on the preliminary data would be much lower than the one based on the fully revised data.

1 Introduction

Most of the macroeconomic time-series data are subject to revisions. Data revisions pose a problem for policymakers since they formulate policies in real-time without access to the fully revised data. It also causes problems for economic researchers since their empirical work is based on heavily revised data, and the policy conclusions based on the use of heavily revised data can often be misleading in real-time. Recently there has been a surge in literature on data revisions and its implications for policy making[1]. Most research on data revisions has

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[1]See Croushore (2008b) for a comprehensive literature survey on real-time data.

been performed on OECD countries especially the U.S. economy. The issue of data revisions in developing countries has not attracted a great deal of attention due to lack of real-time data[2].

The macroeconomic time-series data in India are also subject to revisions. GDP growth and the Wholesale Price Index (WPI)- the primary measure of inflation in India- undergo heavy revisions. Figures 1 and 2 plot revisions to GDP growth and aggregate inflation in India. It is evident from the graph that the final estimate of inflation is higher than the preliminary estimate for the larger part of the sample since revisions are almost always positive. The revisions to GDP growth show higher volatility before 2001, and has been mostly positive though less volatile since then.

This paper studies the data revision properties of GDP growth and the WPI inflation and its sub-components in India, namely, primary, manufacturing, and fuel inflation[3]. We examine whether data revisions to GDP growth and inflation have zero mean, and whether it can be forecasted using the information available at the time of the preliminary data announcement. This fits in with the news versus noise literature in the data revision that has been studied extensively for the key macroeconomic variables in the U.S.[4]. Conventional wisdom also suggests that data revisions pose a serious problem for monetary policy formulation, as the monetary policy makers are uncertain about the true state of the economy on the basis of preliminary estimate of macroeconomic variables. We also examine the effect of data revisions on monetary policy formulation in India. Specifically, we examine how the interest rate prescribed by a Taylor rule would differ if real-time data is used instead of the fully revised data.

Literature on data revisions has become quite extensive after compilation of the real-time data set at the Federal Reserve Bank of Philadelphia by Croushore and Stark (2001). Croushore and Stark (2001) show that the data revisions pose a serious challenge for policy

[2]Notable exceptions are Urdaneta (1974), Van de Eng (1999), Chumacero and Gallego (2001) and Palis et al. (2003)

[3]Fuel, power and light sub-component is represented as fuel in this paper.

[4]Mankiw, Runkle, and Shapiro (1984), Mankiw and Shapiro (1986)

formulation as well as the econometric estimation of the macroeconomic models. A big part of the literature on data revisions investigate the revision properties, and tests whether these revisions are predictable or not. Mankiw et al. (1984) tests whether preliminary announcement of money stock are rational forecasts of final announcements. Mankiw and Shapiro (1986) applied the similar analysis to GNP data. Faust et al. (2005) tested the news versus noise hypothesis for revisions to the OECD output data, and found evidence in support of the noise hypothesis. Croushore (2008) studied the patterns of data revisions to the inflation rate in the U.S., and found that it is possible to forecast revisions from the initial release. He noted that the initial release of inflation is likely to be revised up, as the initial release is usually too low.

We find that revisions to GDP growth between 1997 and 2001 are characterized by two regimes: volatile and insignificant revisions between 1997-2001:Q1 and mostly positive and significant revisions after 2001:Q1. The revisions to GDP growth after 2001 are also associated with lower volatility. Data revisions to inflation in India are always significant. Specifically, we find that revisions to the WPI inflation and its sub-components are likely to be revised up, as the preliminary estimates are too low. This effect is especially pronounced for manufacturing inflation which accounts for the biggest share of aggregate inflation.

Our results show that the data revisions to output growth and inflation in India can not be strictly characterized as either containing pure news or pure noise. There is evidence of predictability in data revisions using the preliminary announcement. We find that 39 percent of the variation in the data revisions to GDP growth between 1997:Q2-2001:Q1 can be explained using preliminary release of GDP growth, whereas the corresponding explanatory power of the initial release is 22 percent after 2001:Q1. Around 17 percent of the variation in data revision to aggregate inflation can be explained by the initial release of the inflation. The degree of predictability is greater for revisions to the manufacturing component of inflation as compared to the fuel and light, and the primary products. Around 39 percent of the variations in revisions to manufacturing inflation can be explained using the preliminary announcement. The greater degree of predictability for the manufacturing inflation is consistent with the late arrival of source data for the manufacturing component of the WPI. The rejection of the pure news and the pure noise hypothesis is consistent with what has been found by Mork (1987), and Aruoba (2008) for most of the U.S. macroeconomic time series data. The ex-post predictability of data revision does not imply that data revisions are forecastable in real-time. To investigate the real time predictability of data revisions, we compare the forecast error of revision forecast generated in real-time with the actual revision (assuming preliminary data as forecast of the final data), and we find that revision forecasts can be substantially improved upon in real-time.

Our results show that ignoring data revision can have serious implications for monetary policy formulation. We find that if the Reserve Bank of India were to follow the Taylor rule in setting the interest rate, then the interest rate based on heavily revised data is significantly different than the one based on real-time data. The Taylor interest rates based on the preliminary data tends to be usually too low. This implies that if the Reserve Bank of India does not take into account the data revision that could take place in future, then the monetary policy action may turn out to be too expansionary ex-post.

The plan of the remainder of this paper is as follows. Section 2 discusses the data and its properties. Section 3 reviews the standard models of revision process and presents the empirical results. Section 4 assesses the impact of data revisions on monetary policy formulation in India and section 5 summarizes the main results.

2 Data Description

2.1 GDP Growth

The quarterly estimates of the GDP in India were introduced in 1999 beginning with the year 1996-97[5]. The quarterly GDP estimates once released are not revised till the release of Q4 estimates of GDP. This implies that the GDP growth rates of Q1, Q2 and Q3 are revised only at the time of releasing the fourth quarter GDP estimates.

[5] The fiscal year in India runs from April to March. Hence 1996-97 implies April 1996 to March 1997. Q1 is April-June, Q2 is July-September, Q3 is October-December, and Q4 is January-March.

The revisions to the GDP growth are performed annually[6]. The Advanced Estimates of annual national income are released two months before the close of the year. These advanced estimates are subsequently revised and released alongwith 4th quarterly estimates of GDP, on the last working day of June, i.e. with a lag of 3 months. The Quick Estimates are released in the month of January of the following year with 10 months lag. Alongwith the Quick Estimates, the estimates for the previous years are also revised and released simultaneously. The quarterly estimates are also revised alongwith the annual estimates in January. Revisions in GDP growth rates take place over a period of four years with the first revision termed as Quick Estimates. All these revisions take place annually, at the end of January.

In this paper, we focus on the first release and the current estimate of the GDP growth. Ideally, it would have been more interesting to examine the data revision properties of different vintages of output growth, however, we are constrained by data availability and focus on the final revisions in this paper.

2.2 Inflation

Three different price indices are published in India: the Wholesale Price Index (WPI), the Consumer Price Index (CPI), and the GDP deflator. The CPI has different classifications: CPI for industrial workers, CPI for urban non-manual employees, and the CPI for the rural sector. The WPI is a weekly series announced every Thursday, the CPI is a monthly index and is made available with a lag of about one month, while GDP deflator data are available annually.

The WPI is the most comprehensive measure of prices in India, and is used widely for policy deliberations[7].. The Reserve Bank of India (RBI) also cites WPI movements in every policy draft. The WPI covers 447 commodities and is heavily weighted towards manufactured products. The WPI has three main sub-components: primary product, fuel, power and light,

[6] For details on data revisions to GDP growth, see Kolli (2004).
[7] For example, Business Standard (2008).

and manufacturing products. Primary products mainly include food products. The current weights of these three components in the calculation of the WPI are 22%, 14% and 64% respectively. The WPI represents the quoted price of bulk transaction generally at primary stage. It differs from producer prices as the latter excludes all kind of taxes and transport charges[8].

The first release of the WPI is provisional with a two week lag. There is only one round of revision and the final index is released after a gap of eight weeks. The difference between provisional and the final index is mainly due to the poor response from the manufacturing sector. The Department of Industrial Policy and Promotion (DIPP) is able to collect only 20 per cent of the data sought from the manufacturing sector when the first numbers are released. But when the final numbers are released, the response increases to 65 per cent. There is an almost 100 per cent reporting in primary goods when the final numbers are released.

Our sample period runs through 1998:Q2 to 2008:Q4. The quarterly estimate of WPI is calculated using the average of the weekly estimates of WPI, and the inflation rate is the quarterly changes in the price level. These quarterly changes are in percentage terms and annualized. The sample size is constrained by the availability of the data set on the Reserve Bank of India's website. Unlike the U.S., there is no central database for real-time data in India. We gather provisional data on WPI and its sub-components from the weekly statistical supplement (WSS) published by the Reserve Bank of India. The supplement also publishes data on the different components of WPI.

3 Forecastability of Data Revisions

3.1 Bias in Revisions and Other Summary Statistics

Table 1 shows the summary statistics of revisions to GDP growth. While we find that revisions are insignificant for the whole sample, the graph of revisions in figure 1 indicates that

[8]Manual on WPI: Ministry of Commerce, Government of India.

the period prior to 2001 is characterized by huge swings in revisions. We suspect that the huge revisions prior to 2001 may disproportionately affect the results for the whole sample. Therefore we divide the sample into pre-2001:Q1 and 2001:Q1-2008:Q4 subperiods[9]. Our findings suggest that revisions are highly variable though insignificant in the first subsample with maximum revision at 3.6 percent and minimum at -2 percent. The mean revision after 2001 has been larger and significant at 10 percent. We use Newey-West (1987) heteroskedasticity and autocorrelation consistent errors to test for the significance of data revisions.

Table 2 reports summary statistics of data revisions to inflation and its sub-components for the Indian economy. The results indicate that revisions are quite large and positive for all variables. Among the sub-components of inflation, fuel component has the highest mean revision, though the standard deviation of revision is also very high. The revisions to inflation and its sub-components are significant, as t-statistics are greater than two for the null of mean revision equal to zero. The t-stat is based on Newey-West (1987) heteroskedasticity and autocorrelation consistent errors. The interpretation of this result is that the initial announcements of the statistical agencies are biased estimates of the final values. On average the preliminary inflation is revised upwards with the mean annualized revision around 1.3 percent for the aggregate inflation. Table 2 also reports the minimum and the maximum revisions for different components of inflation. The range of revisions are quite large for inflation and its sub-components. The revision variability is highest for fuel followed by primary components. We find that the range of revisions to manufacturing is small relative to the other sub-components, and similar to the overall inflation. This is not surprising since manufacturing accounts for two-thirds of the overall WPI in India. Hence, our results indicate that revisions to inflation are significant and positive, and the final estimate of inflation is usually larger than the preliminary estimate.

[9] The formal test for choosing the first quarter of 2001 as the break date is provided in next subsection.

3.2 Data Revisions: News or Noise

There are two extreme cases of data revision characterized by either containing news or noise according to Mankiw, Runkle, and Shapiro (1984) and Mankiw and Shapiro (1986). Under the news view, a statistical agency optimally uses all the available information in announcing the preliminary data and revisions must reflect news that arrive after the preliminary announcement. Therefore revisions must be orthogonal to all the available information at that time. Under the noise characterization, the preliminary announcement is a noisy measure of the final announcement and this noise gets reduced after rounds of revisions. These two types of data revision properties have implications for the standard error of preliminary data and the final release of data. The standard error of preliminary release data is higher than that of the final release under noise hypothesis, whereas the standard error of the final release is higher than the preliminary release if the data revisions are characterized as news.

Formally speaking, if y_t^p is the preliminary estimate of variable y_t and y_t^f is the final estimate, then we can characterize the preliminary data as equal to the final plus an error term:

$$y_t^p = y_t^f + \varepsilon_t \tag{1}$$

If the noise model is correct, then the error term is orthogonal to y_t^f, whereas the error term is orthogonal to the preliminary data if the news hypothesis is correct. In a regression framework, Mankiw et al. (1984) considered the following framework:

$$y_t^p = \alpha_1 + \beta_1 y_t^f + \varepsilon_t^1 \tag{2}$$

$$y_t^f = \alpha_2 + \beta_2 y_t^p + \varepsilon_t^2 \tag{3}$$

where the noise hypothesis implies testing a joint hypothesis of $\alpha_1 = 0, \beta_1 = 1$,while a joint hypothesis of $\alpha_2 = 0, \beta_2 = 1$ tests the news hypothesis. As argued by Aruoba (2008), these two hypotheses are mutually exclusive but are not collectively exhaustive, that is, we can reject both hypotheses.

Table 3 reports the estimate of news versus noise model for GDP growth. The results show that except for the news model for the whole sample, we reject the null of news as well as the noise model for all sample periods. P-value in the table is the P-value for a null hypothesis of $\alpha_i = 0, \beta_i = 1, i = 1, 2$. We observe a significant difference in the estimate of α and β for different subsamples. The constant term is relatively large for the first subsample, whereas the coefficient on the preliminary estimate for the news model and the final estimate for the noise model is insignificant. This implies that revisions are on average large though highly volatile. The results for the second subsample also rejects both the news and the noise hypothesis. In both models, significant unconditional mean is the main source of the rejection of both hypotheses.

Table 4 reports the results for news versus noise test for aggregate inflation and its sub-components. The results indicate that both the news and the noise hypotheses are rejected at 10% significance level for all variables. Among the sub-components of WPI, manufacturing provides the strongest evidence against both hypotheses. When we investigate the source of the rejection of both hypotheses, we find that the constant is significantly zero in all cases, and the slope coefficient is statistically different from zero for manufacturing and aggregate inflation. This implies that the positive unconditional mean of revisions is the main source of the rejection of the news and the noise hypotheses.

Therefore our results suggest that revisions to GDP growth and inflation in India can not be characterized as optimal forecast error or measurement error. The results obtained here is consistent with what Mork (1987) and Aruoba (2008) found for the U.S. data.

3.3 Ex-Post Forecastability of Data Revisions

The results presented in the previous section suggest that data revisions to GDP growth and inflation in India can not be characterized as either containing pure news or pure noise. Rejection of pure news hypothesis implies that there is some degree of forecastability present in the data revision. If revisions are not forecastable, then the conditional mean of revision with respect to the information set at the time of the initial announcement should be zero.

To test the degree of forecastability present in the revision process, we run the following baseline regression:

$$r_t = \alpha + \beta y_t^p + v_t \tag{4}$$

where r_t is the difference between the first release and the final estimate of GDP growth and inflation[10]. We test for joint hypothesis of $\alpha = \beta = 0$. This equation can also be augmented by including the variables known at time t[11]. This test of ex-post forecastability of data revisions is sometimes called the Mincer-Zarnowitz test.

Table 5 presents estimation results for output growth. The results are consistent with the rejection of the news hypothesis in the previous section. We find that revisions to GDP growth for the whole sample can not be predicted using the preliminary estimate[12]. However, there is strong evidence of predictability in revisions when we perform the same analysis for different subsamples. The results imply that the coefficient on the explanatory variable cancels each other out when the whole sample is taken into account. Surprisingly, the results for the sample period before 2001:01 show that a percentage increase in the growth rate of preliminary estimate of real GDP leads to a downward revision of 0.85 percent. Thirty two percent of the variations to revisions in the first subsample is explained by the preliminary estimate. Our results show that around 22 percent of the variations in revisions after 2001:02 are explained by the preliminary estimate. The estimated results indicate that a percentage increase in preliminary estimate of GDP growth leads to a 0.22 percent increase in revisions.

For inflation, the results indicate that the preliminary announcement of WPI and its components help in predicting subsequent revisions in 3 out of 4 cases. The degree of predictability varies across different components. The results show that preliminary measure of manufacturing inflation explains 39% of the variations in subsequent revisions, whereas the preliminary measure of the aggregate inflation explains 17% of the variation in revisions.

[10] The test of forecastability is very similar to testing for the news hypothesis.

[11] Similar tests have been performed by several researchers for the U.S. data, examples include Faust et al. (2005), Kavajecz and Collins (1995), Aruouba (2008), Croushore (2008).

[12] We test for the stability of equation (4) using Andrews-Ploberger test, and find that the null of no structural break is rejected at all significance levels. The maximum value of the LR statistic is associated with 2001:Q1.

For revisions to primary goods inflation, 10 percent of its variations can be explained by its preliminary measure. Our results show that preliminary estimate explains 7 percent of the variations in revisions to fuel inflation. Overall, results indicate that preliminary announcement of different components of inflation can be used to predict the subsequent revisions, though the degree of predictability differs for different components of inflation.

3.4 A Real-Time Forecasting Exercise For Inflation

The forecastability result obtained above does not imply that the data revisions are forecastable in real-time. The estimation results can only be observed after the fact from the complete sample. We use the full sample information to estimate equation (4), whereas a forecaster in real-time does not have the access to the future data. For example, if one's goal in 1999:Q2 is to forecast the data revisions in future, one is constrained by the availability of data in1999:Q2 and hence can not use the future data.

Since we are constrained by the availability of different vintages of data for the GDP growth, we focus on forecasting revisions to inflation in real-time. To investigate the real-time predictability of data revisions in inflation in India, we perform the following recursive exercise. The first step, using t+1 vintage data is to run the following regression:

$$r(t, t+1) = \alpha + \beta y_t^p + v_t \tag{5}$$

where $r(t, t+1)$ is the revision of period-t inflation that becomes available at t+1. Since we are using quarterly data, and there is a lag of one period in the announcement of the final data, the final estimate of period-t inflation and the preliminary estimate of period-t+1 inflation are available at t+1. Therefore using the information available at time t+1, we run a simple OLS regression of the revision on its preliminary estimate y_t^p. Using the estimated value of α and β, and the preliminary estimate y_{t+1}^p, which is available at t+1, we predict the revision of period-t+1 inflation $r(t+1, t+2)$. In the second step, we calculate the forecast of the final estimate of inflation by adding the revision to the preliminary estimate, and compare it with the actual period-t+1 final estimate that becomes available at t+2. This procedure is repeated for every new release from 2002:Q2 to 2008:Q4. Total number of forecasts for this exercise turns out be 41. This recursive forecasting exercise provides us the real-time forecasts of revisions.

Table 7 reports the ratio of mean squared errors (MSE) of the real-time forecasts generated from the above methodology and mean squared error computed with preliminary data as the forecast of the final estimate of inflation. The ratio below unity represents a superior forecasting performance of the real-time recursive forecast. The results in table 4 indicate that except for fuel component of WPI inflation, we are able to reduce the MSE of the revision forecasts in real-time significantly. The degree of reduction in MSE is highest for the manufacturing component, which is not surprising since the preliminary announcement of manufacturing inflation explains 35 percent of the variation in revisions ex-post. We do not observe a big improvement in the forecast of fuel inflation, which is consistent with Mincer-Zarnowitz test results. The improvement in forecasting performance is driven by the biasedness and the predictability of data revisions. Our examination of the property of data revisions in previous sections shows that revisions to inflation are not insignificant, in fact, they are large and significant for aggregate and manufacturing inflation. Similarly, we find that a significant portion of the variation in revisions to inflation can be explained using the preliminary announcement. The results obtained in this section indicate that we can use preliminary data to predict data revisions in real-time, and the improvement can be substantial for aggregate and manufacturing inflation.

4 Impact of Data Revisions on Monetary Policy Formulation

The results obtained in the previous section suggest that the GDP growth and inflation undergo significant revisions. As a result, it is possible that the monetary policy that may seem appropriate in real-time may turn out to be either too tight or too loose. To investigate the potential impact of data revisions on monetary policy in India, we perform a very simple experiment. We compute the interest rate implied by a Taylor rule (1993) with preliminary as well as the fully revised data. In doing so, we do not intend to evaluate the actual impact of data revisions on the monetary policy actions of the Reserve Bank of India. Our simple goal is to examine the differences in the interest rates suggested by Taylor rule that could arise as a result of data revisions.

We follow Taylor (1993) in computing the appropriate interest rate, which is based on inflation and output gap. Taylor (1993) considers a representative policy rule which looks like:

$$r_t = \pi + .5y + .5(\pi - 2) + 2 \tag{6}$$

where r_t is the federal funds rate implied by Taylor rule, π is the rate of inflation, y is output gap. We calculate first release and current vintage output gap using Christiano-Fitzgrald asymmetric filter[13][14].

The interest rates based on the first release and the latest vintage data of inflation and output gap are shown in figure 3. It is evident from the graph that the interest rate based on fully revised data is higher on average than the interest rate based on first release data. This is not surprising since our previous results show that inflation is most likely to be revised up after the first release. To make the comparison between interest rates of these two vintages, we also plot the difference between the interest rate based on fully revised data and the first release data. As shown in figure 4, except for a short span in 2002 and 2006, the difference is always positive. In fact, the mean of the difference between the interest rates is 40 basis points and it is significant[15]. The results imply that if monetary policy is based on the first release data, then according to the Taylor rule, the interest rates will be too loose and may inflate the economy.

[13] The results are qualitatively similar if we use HP filter.

[14] We are also aware of the problems associated with estimation of output gap, especially in a developing country like India, however, the purpose of this exercise is not to estimate output gap but to assess the impact of data revisions on monetary policy. As long as estimated output gaps based on different methods do not move in opposite direction, the results obtained will be qualitatively similar.

[15] To test the significance of the difference beween interest rates, we regress the difference on a constant. We use Newey-West HAC errors in calculating the t-statistic.

5 Concluding Remarks

This paper studies the data revision properties of GDP growth and inflation and its implications for monetary policy formulation in the Indian economy. While the GDP undergoes multiple rounds of revisions, WPI which is the primary measure of prices in India, and is used widely for policy deliberations undergoes one round of revision with a lag of eight weeks. We find that revisions to WPI inflation and its sub-components are positive and significant. The results indicate that on average the final estimate of inflation is higher than the preliminary estimate, and is likely to be revised up. The revisions to GDP growth were volatile and insignificant before 2001, but positive and significant after 2001.

Our results show that the data revisions to GDP growth and WPI inflation and its sub-components can not be characterized as either containing pure news or pure noise. We find that the use of preliminary data can significantly improve the naive zero-forecast, which would be optimal if the preliminary announcements are the optimal forecasts of the final values. This holds for both in an ex-post forecasting exercise, as well as real-time forecasting exercise for inflation.

Our results indicate that around 22 percent of the variations in revisions to output growth after 2001:Q1 can be explained using the preliminary estimate of GDP growth, whereas the corresponding number for aggregate inflation is 17 percent. The degree of predictability for data revisions to manufacturing inflation is higher than the other sub-components of inflation. We find that 39 percent of the variations in revisions to manufacturing inflation can be explained using the first release.

The results obtained in this paper suggest that ignoring data revisions in GDP growth and WPI inflation can have significant policy consequences. If the Reserve Bank of India were to follow a Taylor rule in monetary policy formulation, then our results indicate that monetary policy based on preliminary data is too expansionary ex-post. More specifically, interest rates based on preliminary data turns out to be lower than the interest rates based on the final release.

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Figure 1: Revisions to GDP Growth

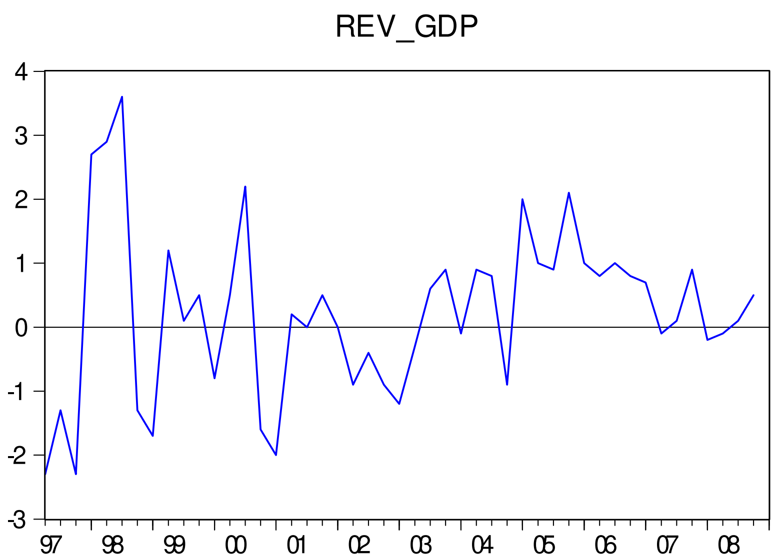

Figure 2: Revisions to WPI Inflation

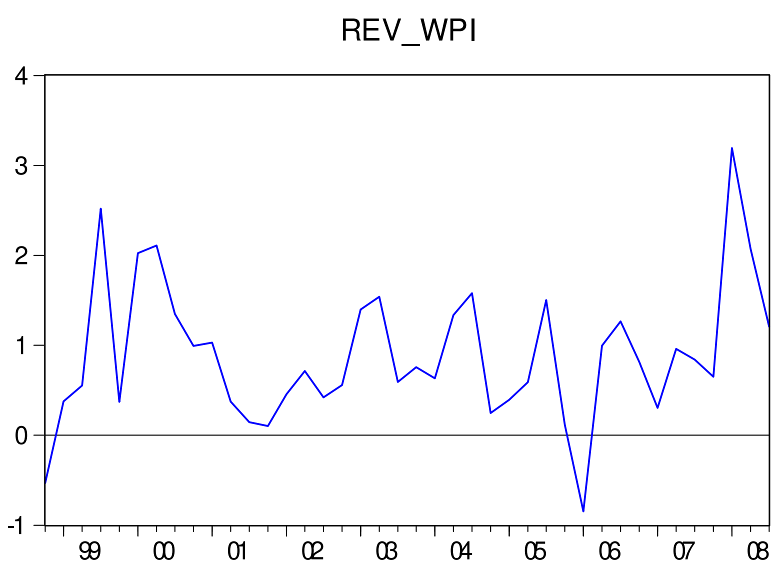

Figure 3: Interest Rates Based on Taylor Rule for Preliminary and Heavily Revised Data

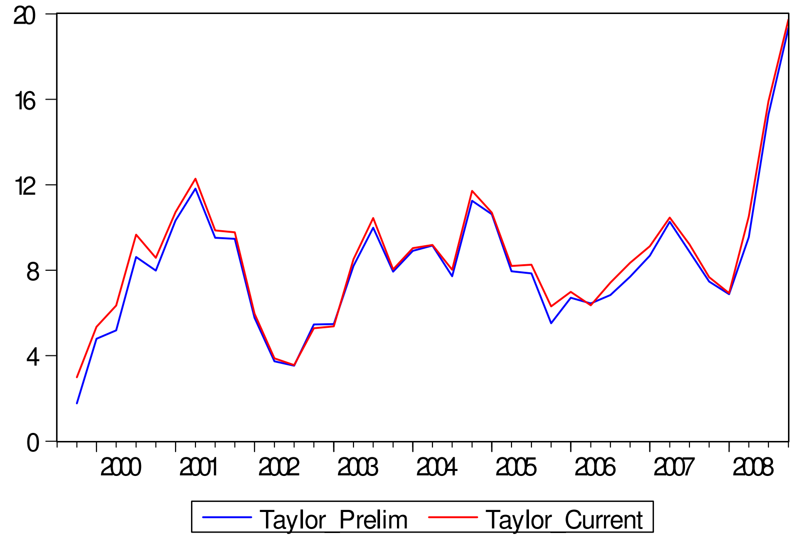

Figure 4: Difference in the Interest Rates Based on Taylor Rule for Preliminary and Heavily Revised Data

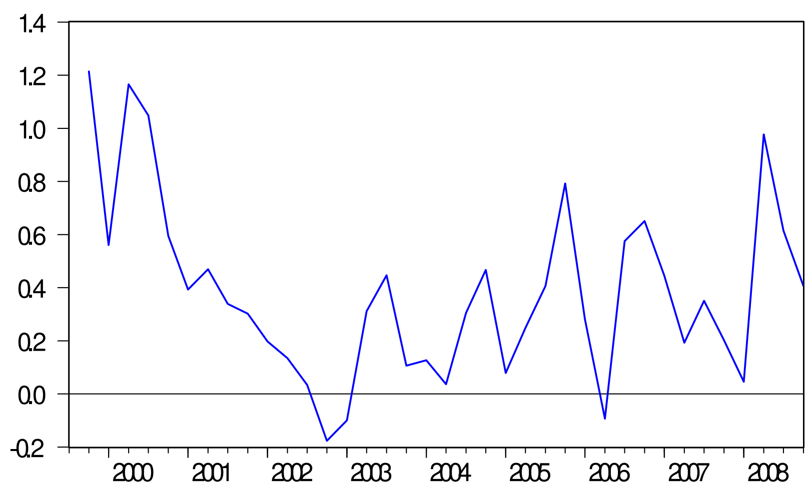

Table 1: Summary Statistics of Revisions to GDP Growth

Model	Mean	Minimum	Maximum	Std Dev	t-stat
Full Sample (1997:02-2008:04)	0.23	-2	3.6	1.26	1.16
First Sub-Sample (1997:02-2001:01)	0.01	-2	3.6	1.89	0.03
Second Sub-Sample (2001:02-2008:04)	0.35	-1.2	2.1	0.78	1.70

[a]Revision is final minus preliminary estimate. The t-stat is based on autocorrelation and heteroskedastic consistent errors and are for the hypothesis that the mean of the revision is zero.

Table 2: Summary Statistics of Revisions to Inflation

Model	Mean	Minimum	Maximum	Std Dev	t-stat
WPI	0.89	-0.84	3.19	0.78	6.22
Primary	0.50	-2.63	6.73	1.82	1.95
Manufacturing	0.97	-1.41	3.10	0.83	6.29
Fuel	1.13	-7.48	14.42	3.22	1.83

[a]The final and the preliminary numbers are calculated as quarterly changes in the price level, and is annualized. Revision is final minus preliminary estimate. The t-stat is based on autocorrelation and heteroskedastic consistent errors and are for the hypothesis that the mean of the revision is zero.

Table 3: News versus Noise Model (Output Growth)

News Model				Noise Model			
Model	α	β	p-value	α	β	p–value	Stdev Ratio
Full Sample	0.23	1.00	0.45	1.95	0.68	0.00	0.83
	(0.85)	(0.00)		(0.00)	(0.00)		
First Sub-Sample	4.67	0.15	0.00	4.64	0.15	0.00	1.01
	(0.61)	(0.00)		(0.00)	(0.40)		
Second Sub-Sample	-1.28	1.22	0.00	1.61	0.74	0.00	0.78
	(0.02)	(0.00)		(0.00)	(0.00)		

[a]P-values are in parentheses. Newey-West heteroscedastic errors are used in estimation.

Table 4: News versus Noise Model (Inflation)

News Model				Noise Model			
Model	α	β	p-value	α	β	p–value	Stdev Ratio
WPI	0.56	1.07	0.00	-0.42	0.91	0.00	0.86
	(0.00)	(0.00)		(0.02)	(0.00)		
Primary	0.10	1.09	0.02	0.11	0.88	0.00	0.88
	(0.61)	(0.00)		(0.41)	(0.00)		
Manufacturing	0.45	1.16	0.00	-0.29	0.84	0.00	0.77
	(0.00)	(0.00)		(0.00)	(0.00)		
Fuel	1.91	0.90	0.07	-1.15	1.00	0.15	0.95
	(0.02)	(0.00)		(0.10)	(0.00)		

[a] P-values are in parentheses. Newey-West heteroscedastic errors are used in estimation.

Table 5: Mincer-Zarnowitz Test (Output Growth)

Model	α	β	p-value	R^2	$Serial Correlation$
Full Sample (1997:02-2008:04)	0.23	0.01	0.45	0.00	0.21
	(0.85)	(0.99)			(0.10)
First Sub-Sample (1997:02-2001:01)	4.67	-0.85	0.00	0.39	0.16
	(0.61)	(0.00)			(0.00)
Second Sub-Sample (2001:02-2008:04)	-1.27	0.22	0.00	0.22	0.30
	(0.00)	(0.00)			(0.00)

[a] P-values are in parentheses. Newey-West heteroscedastic errors are used in estimation.

Table 6: Mincer-Zarnowitz Test (Inflation)

Model	α	β	p-value	R^2	$SerialCorrelation$
WPI	0.56	0.08	0.00	0.17	0.24
	(0.00)	(0.00)			(0.10)
Primary	0.10	0.09	0.02	0.10	0.05
	(0.61)	(0.00)			(0.00)
Manufacturing	0.45	0.16	0.00	0.39	0.28
	(0.00)	(0.00)			(0.00)
Fuel	1.91	-0.09	0.07	0.08	0.37
	(0.02)	(0.04)			(0.18)

[a]P-values are in parentheses. Newey-West heteroscedastic errors are used in estimation.

Table 7: Real-Time Forecasting Performance

Model	$MSE2/MSE1$
WPI	0.43
Primary	0.95
Manufacturing	0.65
Fuel	0.76

[a]MSE1 is the mean squared error when the preliminary data is the forecast of the final data. MSE2 is the mean squared error calculated from the forecast of the data revision generated from the recursive exercise explained in section 3.4.