Appendix for Data Revisions are not Well-Behaved*

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A Data Issues

RTDS includes two sets of variables: core and non-core variables. Core variables refer to the original set of variables that was initially released in 1999 and they are available in two versions: monthly observations or quarterly observations, both of which contain quarterly vintages. The monthly observations version include only the core variables that are available monthly. In this analysis we use the version of the data set that has quarterly observations for the core variables.

The variables we use, along with their respective samples, observation frequencies and sources are listed on Table A.1. The variables listed as Main Variables are the set of variables that we use throughout the paper. We also list the Components of Real Output that we use in Section 5.2 and Appendix F. In the last two columns we list the original source that produces the data and source of the real-time data that we use for our analysis.

A few comments as to why we chose not to use the variables available in the RTDS in our analysis are in order. We do not use monetary measures in our analysis due to the numerous fundamental definition changes they underwent, especially in the 1980s. Even though the dates and the natures of these changes are known today,[1] the severity of these definitional

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[1] See Kavajecz (1994).

changes makes it impossible to track them through time. For example the definition of M1 was changed three times in the two year period between February 1980 to February 1982. There was also another definitional change in 1988. The same problem is also true for banking system data. The Consumer Price Index in the data set, on the other hand, starts from 1987, leaving very few observations for the analysis.[2]

A.1 Defining the Final Revision

Figures 1 and 2 shows the final revision series we derive for two of the variables we use, annual growth of real output and annual growth of labor productivity, along with the results from the two forecasting exercises we conduct in the paper.

A.1.1 NIPA Variables

From BEA documents, we are able to find the specific schedule for informative revisions of the NIPA variables which we summarize below:

Time	Announced	Revised	Revised	Revised	Revised
t Q1	t Q2	t Q3	t+1 Q3	t+2 Q3	t+3 Q3
t Q2	t Q3	t Q4	t+1 Q3	t+2 Q3	t+3 Q3
t Q3	t Q4	t+1 Q1	t+1 Q3	t+2 Q3	t+3 Q3
t Q4	t+1 Q1	t+1 Q2	t+1 Q3	t+2 Q3	t+3 Q3

As can be seen from the table, the variables are not revised after three years from their announcement. When we look at the actual revisions in our data set, most incremental revisions except those shown on the table are zero, confirming the validity of the information in the table.

[2]There is a more fundamental reason for not including CPI in our analysis. By its nature CPI is based on measurement of prices at given dates and any further revisions would simply change the weights of these prices or be due to seasonal adjustment. As we explain in Section 2.4 we would not want to include such revisions in our analysis.

Using these results, for the NIPA variables, we replace r_t^f with r_t^K where

$$K = \begin{cases} 13 & \text{if } t \text{ is Q1} \\ 12 & \text{if } t \text{ is Q2} \\ 11 & \text{if } t \text{ is Q3} \\ 10 & \text{if } t \text{ is Q4} \end{cases}$$

A.1.2 Labor Productivity

As we collected the labor productivity data from published issues of MLR, we have a very limited deep history information. In particular, we are able to track the data corresponding to a certain quarter for approximately 10 quarters. This might suggest using the last observed revision as the final revision. However, we do not have any information about the revision schedule for labor productivity data and doing this may mean omitting some important revisions. The data for a certain quarter will be no longer reported in the MLR due to, most probably, lack of space rather than lack of revisions. Therefore, we choose to use the vintage at the time of our analysis (March 2006) as the final observation and define the final revision to be difference between this vintage and the initial observation. In order to allow sufficient revisions, we omit the data for the last three years.

A.1.3 Other Variables

For the remaining variables we look at the incremental revisions and identify the number of periods that is necessary for the them to converge to zero. We find that for all monthly variables three years and for the unemployment rate five years is sufficient. Because we have no information about the revision schedule for these variables, the numbers we report above are a compromise between allowing enough informative revisions and avoiding uninformative revisions.

B News vs. Noise Revisited

As we will demonstrate below, the news and noise hypotheses are mutually exclusive. The analysis of MS proceed as if they are in fact collectively exhaustive. In fact, in both of the papers, the authors are able to reject one of the hypotheses and fail to reject the other. It turns out, however, in general these two hypotheses are not collectively exhaustive, that is, we can reject both hypotheses. The key is the mean of final revisions. To see why this is the case, suppose the final revision have a zero mean and the noise hypothesis is true. Then in (1), since the independent variable and the residual are orthogonal, least squares will give $\alpha_1 = 0$ and $\beta_1 = 1$. On the other hand, it is straightforward to show that in (2), $\alpha_2 = 0$ and $\beta_2 = 1 + \frac{cov\left(r_t^f, y_t^{t+1}\right)}{var\left(y_t^{t+1}\right)} \neq 1$, which shows that when noise hypothesis is true, we will reject the news hypothesis. The reverse result can also be easily shown. Now suppose that $E\left(r_t^f\right) = \mu > 0$. If the noise hypothesis is true we get $\alpha_1 = -\mu$ and $\beta_1 = 1$, which violates the joint hypothesis $\alpha_1 = 0, \beta_1 = 1$. Similarly we get $\alpha_2 = \mu$ and $\beta_2 = 1$ when news hypothesis is true. Therefore, when the revisions have a non-zero mean (as is the case in the data), we can reject both hypotheses and there is no guidance in the original MS methodology when this happens.

Using the original MS framework, we run two experiments. First, we replicate the results obtained in MS for real output growth using our data set and their original sample. We then extend this analysis to all relevant variables in our data set and to the full samples of each variable.

The results for the first exercise is reported in Table A.2. On the left side of the table, we report results regarding the noise hypothesis and on the right we report results regarding the news hypothesis. In the first and the second column we replicate the MS results by estimating (1) and (2) using our data set and the MS sample (1975Q4-1982Q4). We obtain the same result, that is, we reject the noise hypothesis and fail to reject the news hypothesis, which leads to the conclusion that initial announcements of real output growth are best characterized as rational forecasts of the final value. In the last column we estimate (2) with the addition of r_{t-1}^1. The estimated coefficient of r_{t-1}^1 is statistically significant and, more importantly, the F-test with null hypothesis setting all coefficients to zero is now rejected. Therefore, with this small change, which simply follows from the statement of the news hypothesis, we now reject both hypotheses. As explained above, there is no guidance in MS about this case.

Next, we apply the MS methodology for all variables except for the level of nominal output and employment using the longest available sample for each variable and report the results in Table A.3. The upper panel of the table contains the results for the noise hypothesis and the lower panel contains the results for the news hypothesis. For each variable and hypothesis, we report the estimated coefficients along with the R^2 from the regressions and the results of the F-test with the null that the intercept is zero and the slope is one in each regression. We denote coefficients that are statistically different from the appropriate values (zero for the intercept and one for the slope) at the 10% level and F-statistics whose p-values are less than 10% by boldface. The results are discussed in the paper in detail.

C Details of the Real-Time Forecasting Exercise

We proceed as follows. Using t to denote 1984:1, (first quarter or first month, depending on the frequency) we want a forecast of the final revision to the variable realized in 1984:1, which we denote r_t^K in the text, using information as of 1984:2.[3]. To that end, we consider the state space defined by

$$\alpha_s = \mu + \rho(\alpha_{s-1} - \mu) + \sigma\nu_s \quad (1)$$

$$Z_s = \alpha_s + \Lambda X_s \quad (2)$$

for $s = 1, 2, ..., t$ and where α_s is a latent state variable and ν_s is an iid standard normal innovation for the transition equation.[4] X_s is a column of a $2 \times t$ matrix X which contains the initial announcements for y up to an including period t and the first difference of the unemployment rate, and Λ is a coefficient matrix. Z_s is an element of a row vector Z which includes all r_s^K, $s \leq t$ observed at the time of estimation.To be specific, letting K denote the number of periods between the initial announcement and what we consider to be the final

[3]Remember that our convention is that we use use subscripts to reflect the time a variable is realized, regardless of when it is observed. As such, all time t variables observed in $t+1$ will have a time t subscript.

[4]Note that since we have only one observed variable, we can only have one random variable in the system whose variance we can identify. We choose to put it in the transition equation. Alternatively we could have set $\sigma = 1$ (or any number) and included another innovation in the measurement equation. The results would have been identical.

revision,[5] we have

$$Z = \begin{bmatrix} r_1^K & r_2^K & \cdots & r_{t-K}^K & NA & NA & \cdots & NA \end{bmatrix}_{1\times t} \tag{3}$$

$$X = \begin{bmatrix} y_1^2 & y_2^3 & \cdots & y_t^{t+1} \\ \Delta N_1 & \Delta N_1 & \cdots & \Delta N_t \end{bmatrix}_{2\times t} \tag{4}$$

$$\Lambda = \begin{bmatrix} \beta_1 & \beta_2 \end{bmatrix}_{1\times 2} \tag{5}$$

where we have K missing observations at the end of Z. The last element of Z corresponds to r_t^K, which is what we are trying to forecast.

We estimate the 5 parameters $(\mu, \rho, \sigma, \beta_1, \beta_2)$ of this state space system via maximum likelihood using standard methods.[6] In all our implementations this system is stationary and given a set of parameters the Kalman filter is initialized by

$$\alpha_1 \sim N\left(\mu, \frac{\sigma^2}{1-\rho^2}\right) \tag{6}$$

Given the first two moments of α_1, denoted a_1 and P_1, we use the Kalman filter to generate the conditional moments $a_s \equiv E(\alpha_s|I_{s-1})$ and $P_s \equiv var(\alpha_s|I_{s-1})$ for $s = 2, 3, ..., t$, where I_s denotes the information at period s. Let us first list the standard Kalman filter recursions for $s = 2, ..., t-K$ which are the periods where we have observations for Z_s. Given a_s and P_s, the recursive equations to get a_{s+1} and P_{s+1} adapted for our problem are given by

$$a_{s+1} = \mu + \rho(a_s - \mu) + \rho v_s \tag{7}$$

$$P_{s+1} = \sigma^2 \tag{8}$$

$$v_s = Z_s - a_s - \Lambda X_s \tag{9}$$

where v_s is the prediction error for period s.

For each period $s = 2, ..., t-K$, the contribution to the log likelihood is computed using

[5] For exposition purposes we keep K constant here but in the implementation K depends on the quarter as we explain in Appendix A.1.

[6] We follow exactly the methodology in Durbin and Koopman (2001) regarding the Kalman filter recursions and handling missing observations.

the prediction error decomposition

$$\boldsymbol{L}_s = -\frac{1}{2}\left[\log(2\pi) + \log(P_s) + \frac{v_s^2}{P_s}\right] \tag{10}$$

For $s = t-K+1, ..., t$, the observations for Z_s are missing. The standard way of handling this situation is to skip the updating stage of the filter which means we have

$$\begin{aligned} a_{s+1} &= \mu + \rho(a_s - \mu) & (11) \\ P_{s+1} &= \rho^2 P_s + \sigma^2 & (12) \end{aligned}$$

and the contribution of these periods to the loglikelihood is zero.[7] This means that the log-likelihood will be simply

$$\log L = \sum_{s=1}^{t-K} \boldsymbol{L}_s \tag{13}$$

To sum up, we use standard Kalman filter techniques to estimate this system and obtain a filtered estimate of the mean of the state vector $\{a_s\}_{s=1}^{t}$ and proceed as described in the text to obtain real-time forecasts of r_t^K.

D Intermediate Revisions

In order to understand which revisions, among the many revisions our variables go through, are responsible for the rejection of (P1), (P2) and (P3), we analyze the intermediate revisions, r_t^h for $h < K$, for some key variables.[8] Table A.4 reports the summary of our results. The first panel reports the mean revision of three intermediate revisions: one-quarter,[9] one-year and two-year revisions along with that of the final revision for comparison. With the exception of the unemployment rate and annual growth of real output, whose mean final revision were not statistically significant, we find that the mean revision for all variables increase with each incremental revision and they are statistically significant. In other words it is not the case that the source of the rejection of (P1) can be traced to a particular revision.

[7] This implies that estimating this system with Z as shown above or without the missing observations would lead to the same parameter estimates.

[8] We exclude labor productivity and final sales from this analysis.

[9] Due to our observation frequency, the one-quarter revision for NIPA variables will include the "final" announcement of the BEA which is done 3 months after the end of the quarter.

The second panel reports the standard deviation of the intermediate revisions. We see that about half of the volatility of the final revision comes from the revision after one quarter and about 72% of it comes from the one-year revision. Once again we conclude that it is not the case that the rejection of (P2) can be traced to a particular revision, although the revisions immediately following the initial announcement seems to have a bigger effect.

Finally, the third panel reports the p-value of the Wald test statistic testing the news hypothesis or the rationality of the initial announcements as explained in Appendix B. We find that except for annual growth of real output and unemployment, for whose revisions we have failed to reject the news hypothesis and two other intermediate revisions, we reject the news hypothesis for all intermediate revisions of all variables.

From our analysis we conclude that most of the intermediate revisions contribute to the rejection of (P1), (P2) and (P3). We can also infer from our results that simply ignoring the initial announcement and using the second or third announcement would not eliminate the problems with revisions.

E Revisions to NIPA Variables Realized in a Certain Quarter

According to the revision schedule of the BEA, a NIPA variables that is realized in the first quarter of year t, is announced about 30 days after the end of the quarter (this is captured by our Q2 vintage) and revised twice more in the following two months (the last of these revisions is in our Q3 vintage). The BEA also revises all variables that are realized within the last three calendar years every summer. It is conceivable that there are differences in the "quality" of revisions because the number of revisions are different for variables realized in different quarters. To investigate this further, we compute the same three statistics as in the previous section for the NIPA variables realized in each quarter. Table A.5 reports our findings. We find that for the most part revisions for variables realized in a particular quarter share the same characteristics with the final revision. One can also conclude that revisions for Q3 variables are more "well-behaved" than others and revisions for Q1 variables are the least "well-behaved", based on these three sets of statistics. This is an interesting finding because Q3 variables are announced in Q4, right after the annual revision and as such their first annual revision comes more than 9 months later.

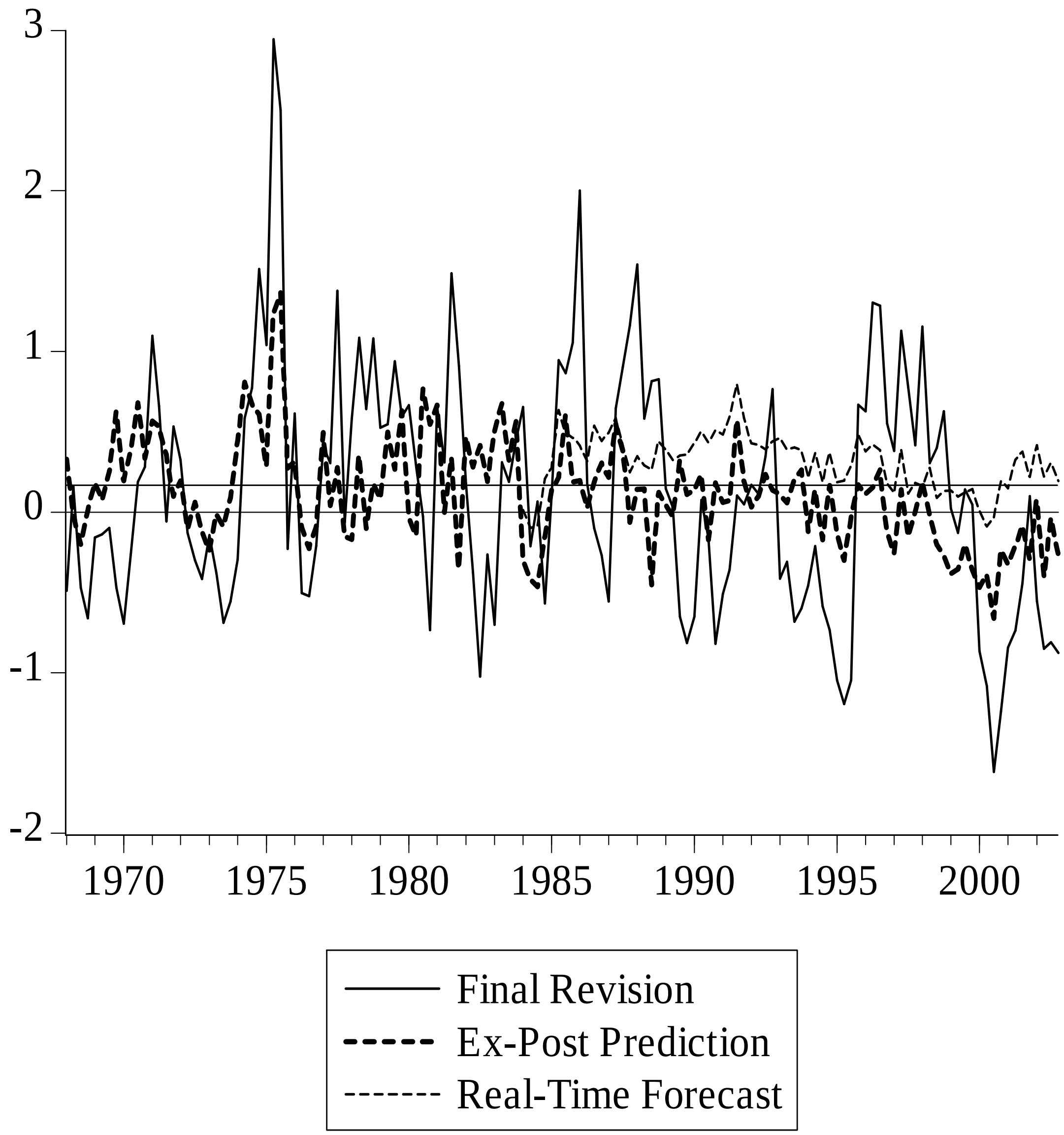
F Components of Real Output

We repeat our analysis for components of real output in order to identify the source of the results we find for revisions to real output. The summary of the results are in Table A.6. We report the mean and the noise-signal ratio of the final revisions along with the R^2 and the relative RMSE from the ex-post forecasting exercise and p-value of the CW statistic from the real-time forecasting exercise.[10] We find that the mean revisions for the annual and quarterly growth of all components are positive, except for three of them. Of these, only three of them are statistically significant but the magnitudes are in general bigger than the mean revision for output. Durables consumption and exports stand out as two components with significant (both statistical and economic) mean revisions. We also find that all components have larger noise-signal ratios as output itself with only two exceptions. Similarly, almost all $R^{2\prime}s$ are higher and most of the relative RMSEs are lower for the components than for output itself. It is interesting to note that the real-time forecastability of the components of output is significantly stronger than output itself, especially consumption and its subcomponents.

Overall, our results from this section indicate that the failure of (P1), (P2) and (P3) for revisions to real output is not entirely due to one or a few of its components but rather a general phenomenon which is valid for almost all of its components. Consumption, in particular durables consumption seems to be the component that contributes most to these results. This result is quite significant given the debate concerning measurement of consumer electronics and similar goods whose quality changes quite remarkably in short amounts of time. Our results are at least suggestive that the revisions to components of output which are arguably harder to measure contribute to the results we find in this paper regarding revisions to output.

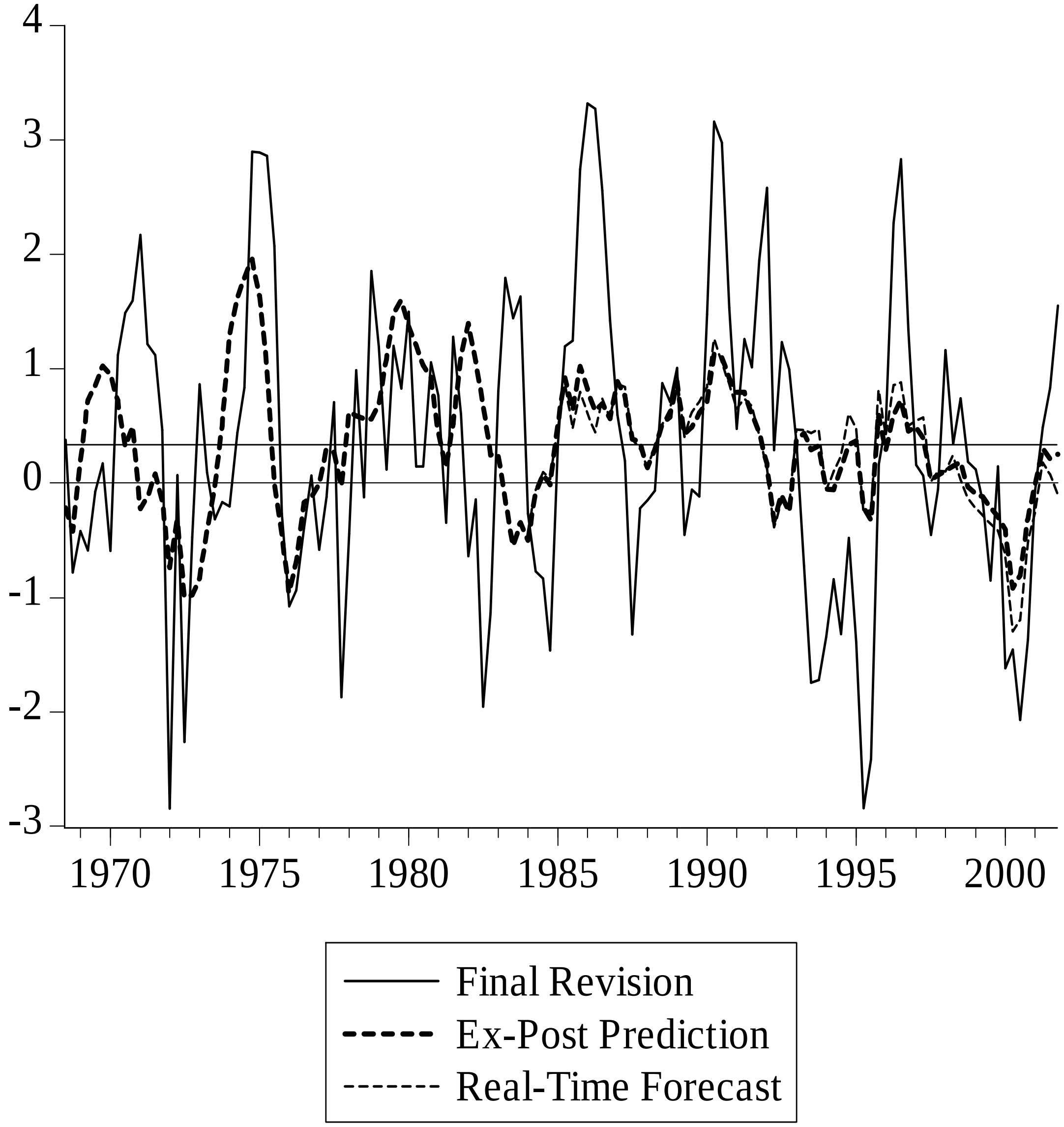
[10] With the exception of annual growth of residential investment all CW statistics are positive and they are not reported.

Figure 1 - Final Revision and Forecasts
Annual Growth of Real Output



Notes: The lowest horizontal line is the zero-line and the other one shows the unconditional mean of the final revision.

Figure 2 - Final Revision and Forecasts
Annual Growth of Labor Productivity



Notes: The lowest horizontal line is the zero-line and the other one shows the unconditional mean of the final revision.

Table A.1 -Variables Used in the Analysis

Name	Frequency	Number of Obs	Full Sample	Source	Original Source
Main Variables					
Annual Growth of Real Output	Quarterly	150	(1965Q3 - 2002Q4)	RTDS - Core	BEA
Annual Growth of Nominal Output	Quarterly	150	(1965Q3 - 2002Q4)	RTDS - Core	BEA
Annual Inflation (Output Deflator)	Quarterly	150	(1965Q3 - 2002Q4)	RTDS - Core	BEA
Annual Growth Real Final Sales	Quarterly	108	(1965Q3 - 1995Q3)	RTDS - Core (*)	BEA (*)
Annual Growth of Labor Productivity	Quarterly	134	(1968Q3 - 2001Q4)	MLR	BLS
Annual Growth of Non-Farm Payroll Employment	Monthly	458	(1964:11 - 2002:12)	RTDS - Non-Core	BLS
Annual Growth of Industrial Production (Total Industry)	Monthly	483	(1962:10 - 2002:12)	RTDS - Non-Core	BOG
Annual Growth of Industrial Production (Manufacturing)	Monthly	336	(1975:01 - 2002:12)	RTDS - Non-Core	BOG
Quarterly Growth of Real Output	Quarterly	150	(1965Q3 - 2002Q4)	RTDS - Core	BEA
Quarterly Growth of Nominal Output	Quarterly	150	(1965Q3 - 2002Q4)	RTDS - Core	BEA
Quarterly Inflation (Output Deflator)	Quarterly	150	(1965Q3 - 2002Q4)	RTDS - Core	BEA
Quarterly Growth of Real Final Sales	Quarterly	108	(1965Q3 - 1995Q3)	RTDS - Core (*)	BEA (*)
Quarterly Growth of Labor Productivity	Quarterly	134	(1968Q3 - 2001Q4)	MLR	BLS
Monthly Growth of Non-Farm Payroll Employment	Monthly	458	(1964:11 - 2002:12)	RTDS - Non-Core	BLS
Monthly Growth of Industrial Production (Total Industry)	Monthly	483	(1962:10 - 2002:12)	RTDS - Non-Core	BOG
Monthly Growth of Industrial Production (Manufacturing)	Monthly	336	(1975:01 - 2002:12)	RTDS - Non-Core	BOG
Civilian Unemployment Rate	Quarterly	150	(1965Q3 - 2002Q4)	RTDS - Core	BLS
Capacity Utilization (Total Industry)	Monthly	235	(1983:06 - 2002:12)	RTDS - Non-Core	BOG
Capacity Utilization (Manufacturing)	Monthly	282	(1979:07 - 2002:12)	RTDS - Non-Core	BOG
Annual and Quarterly Growth Components of Real Output (**)					
Real Personal Consumption Expenditures	Quarterly	137	(1965Q4 - 2000Q4)	RTDS - Core	BEA
Real Personal Consumption Expenditures, Durables	Quarterly	137	(1965Q4 - 2000Q4)	RTDS - Core	BEA
Real Personal Consumption Expenditures, Nondurables	Quarterly	137	(1965Q4 - 2000Q4)	RTDS - Core	BEA
Real Personal Consumption Expenditures, Services	Quarterly	137	(1965Q4 - 2000Q4)	RTDS - Core	BEA
Real Business Fixed Investment Expenditures	Quarterly	137	(1965Q4 - 2000Q4)	RTDS - Core	BEA
Real Residential Investment Expenditures	Quarterly	137	(1965Q4 - 2000Q4)	RTDS - Core	BEA
Real Government Purchases of Goods and Services	Quarterly	137	(1965Q4 - 2000Q4)	RTDS - Core	BEA
Real Exports of Goods and Services	Quarterly	137	(1965Q4 - 2000Q4)	RTDS - Core	BEA
Real Imports of Goods and Services	Quarterly	137	(1965Q4 - 2000Q4)	RTDS - Core	BEA

Notes: RTDS : Real-Time Data Set of Federal Reserve Bank of Philadelphia. MLR : Monthly Labor Review published by Bureau of Labor Statistics. BEA : Bureau of Economic Analysis. BLS : Bureau of Labor Statistics. BOG : Board of Governors of the Federal Reserve.

(*) Author's own calculations using output and change in inventories.

(**) For these variables, we have observations for only Q4 for years 1965-1969.

Table A.2 - Tests for News and Noise Hypotheses - 1975Q4-1982Q4

	Regression of Initial Announcement of Quarterly Output Growth on the Final Value (Noise Hypothesis)	Regression of Final Value of Quarterly Output Growth on the Initial Announcement (News Hypothesis)	
Intercept	-0.13	0.61	0.00
Slope	**0.82**	0.97	0.91
Revision1 (-1)	-	-	**1.55**
F -test	**13.56**	1.76	**15.39**
p -value	0.00	0.19	0.00
R^2	0.79	0.79	0.90
N	29	29	29

Notes : Revision1(-1) is the first revision to the variable at t-1, announced at the time of the current announcement. *F* -tests in the first two columns test the joint hypothesis that the intercept is zero and the slope is one and in the third column the hypothesis includes the restriction that coefficient of Revision1(-1) is equal to zero. All tests conducted using Newey-West standard errors. Boldface denotes rejection of the relevant null hypothesis at the 10% significance level. N denotes the number of observations in each regression.

Table A.3 - Tests for News and Noise Hypotheses - Full Sample

	Intercept	Slope	F-test	R^2	N
Regression of Initial Announcement on the Final Value (Noise Hypothesis)					
Annual Growth Variables					
Nominal Output	**0.44**	**0.90**	**0.00**	0.92	150
Real Output	-0.03	0.95	0.15	0.90	150
Inflation (Output Deflator)	-0.07	0.99	**0.04**	0.98	150
Labor Productivity	0.08	**0.77**	**0.01**	0.51	134
Real Final Sales	-0.09	0.97	0.24	0.90	108
Non-Farm Payroll Employment	**0.10**	**0.89**	**0.00**	0.96	458
Industrial Production (Total Industry)	**-0.23**	**0.94**	**0.00**	0.96	483
Industrial Production (Manufacturing)	**-0.32**	**0.94**	**0.00**	0.95	336
Quarterly Growth Variables					
Nominal Output	**0.97**	**0.80**	**0.00**	0.79	150
Real Output	0.27	**0.82**	**0.00**	0.76	150
Inflation (Output Deflator)	0.09	**0.93**	**0.00**	0.89	150
Labor Productivity	**0.68**	**0.44**	**0.00**	0.25	134
Real Final Sales	-0.03	**0.90**	**0.00**	0.76	108
Monthly Growth Variables					
Non-Farm Payroll Employment	-0.11	**0.88**	**0.00**	0.75	458
Industrial Production (Total Industry)	-0.32	**0.77**	**0.00**	0.71	483
Industrial Production (Manufacturing)	-0.54	**0.80**	**0.00**	0.71	336
Variables in Percentage					
Civilian Unemployment Rate	0.01	1.00	0.87	1.00	150
Capacity Utilization (Total Industry)	2.12	0.97	0.36	0.90	235
Capacity Utilization (Manufacturing)	-1.81	1.02	0.44	0.94	282
Regression of Final Value on the Initial Announcement (News Hypothesis)					
Annual Growth Variables					
Nominal Output	0.12	1.03	**0.00**	0.92	150
Real Output	0.31	0.95	0.21	0.90	150
Inflation (Output Deflator)	**0.16**	0.99	**0.03**	0.98	150
Labor Productivity	**0.82**	**0.66**	**0.00**	0.51	134
Real Final Sales	**0.35**	**0.93**	0.13	0.90	108
Non-Farm Payroll Employment	-0.03	**1.08**	**0.00**	0.96	458
Industrial Production (Total Industry)	**0.38**	1.01	**0.00**	0.96	483
Industrial Production (Manufacturing)	**0.48**	1.01	**0.00**	0.95	336
Quarterly Growth Variables					
Nominal Output	0.53	0.99	**0.01**	0.79	150
Real Output	**0.42**	0.94	**0.09**	0.76	150
Inflation (Output Deflator)	**0.37**	0.96	**0.00**	0.89	150
Labor Productivity	**0.93**	**0.57**	**0.00**	0.25	134
Real Final Sales	**0.65**	**0.84**	**0.00**	0.76	108
Monthly Growth Variables					
Non-Farm Payroll Employment	**0.61**	**0.85**	**0.00**	0.75	458
Industrial Production (Total Industry)	**1.16**	**0.92**	**0.00**	0.71	483
Industrial Production (Manufacturing)	**1.41**	**0.89**	**0.00**	0.71	336
Variables in Percentage					
Civilian Unemployment Rate	0.00	1.00	0.95	1.00	150
Capacity Utilization (Total Industry)	**6.11**	**0.93**	**0.08**	0.90	235
Capacity Utilization (Manufacturing)	**6.21**	**0.92**	**0.00**	0.94	282

Notes: Boldface denotes rejection of the appropriate null at 10%. N denotes the number of observations in each regression.

Table A.4 - Analysis of Intermediate Revisions

	Mean				**Standard Deviation**				**Wald Test *p* -value (News)**			
	1Q	**1Y**	**2Y**	**Final**	**1Q**	**1Y**	**2Y**	**Final**	**1Q**	**1Y**	**2Y**	**Final**
Annual Growth Variables												
Nominal Output	**0.09**	**0.15**	**0.25**	**0.31**	0.32	0.55	0.79	0.79	**0.00**	**0.01**	**0.02**	**0.00**
Real Output	**0.05**	0.06	0.10	0.17	0.32	0.56	0.77	0.78	**0.10**	0.64	0.51	0.21
Inflation (Output Deflator)	**0.03**	**0.07**	**0.12**	**0.12**	0.17	0.28	0.36	0.37	0.10	**0.03**	**0.02**	**0.03**
Non-Farm Payroll Employment	**0.04**	**0.07**	**0.11**	**0.13**	0.14	0.25	0.38	0.39	**0.00**	**0.00**	**0.00**	**0.00**
Industrial Production (Total Industry)	**0.15**	**0.22**	**0.29**	**0.41**	0.47	0.75	0.91	1.04	**0.00**	**0.00**	**0.00**	**0.00**
Industrial Production (Manufacturing)	**0.14**	**0.16**	**0.31**	**0.52**	0.48	0.75	1.02	1.29	**0.00**	0.12	**0.01**	**0.00**
Quarterly Growth Variables												
Nominal Output	**0.29**	**0.30**	**0.40**	**0.47**	0.85	1.17	1.53	1.71	**0.00**	**0.01**	**0.02**	**0.01**
Real Output	**0.18**	**0.18**	0.17	**0.26**	0.77	1.19	1.53	1.72	**0.00**	**0.10**	0.23	**0.09**
Inflation (Output Deflator)	**0.11**	**0.12**	**0.21**	**0.20**	0.47	0.61	0.77	0.85	**0.03**	**0.04**	**0.00**	**0.00**
Monthly Growth Variables												
Non-Farm Payroll Employment	**0.27**	**0.27**	**0.31**	**0.35**	1.15	1.18	1.33	1.40	**0.00**	**0.00**	**0.00**	**0.00**
Industrial Production (Total Industry)	**0.73**	**0.76**	**0.91**	**1.00**	3.42	4.21	4.86	5.17	**0.00**	**0.00**	**0.00**	**0.00**
Industrial Production (Manufacturing)	**0.74**	**0.77**	**0.86**	**1.19**	4.11	4.63	4.83	5.44	**0.00**	**0.00**	**0.00**	**0.00**
Variables in Percentage												
Civilian Unemployment Rate	0.00	0.00	0.00	0.00	0.03	0.05	0.07	0.07	0.30	0.39	0.63	0.95
Capacity Utilization (Total Industry)	**0.08**	0.10	0.13	0.14	0.39	0.57	0.66	0.81	**0.01**	**0.01**	**0.00**	**0.08**
Capacity Utilization (Manufacturing)	**0.10**	0.11	0.13	0.11	0.45	0.67	0.81	0.91	**0.01**	**0.00**	**0.00**	**0.00**

Notes : 1Q, 1Y and 2Y refer to the revision to the variable after 1 quarter, 1 year and 2 years, respectively. Final refers to the final revision and we simply repeat the results from previous tables.

Table A.5 - Analysis of NIPA Revisions for Each Quarter

(a) Mean

	Q1	Q2	Q3	Q4	Final
Annual Growth Variables					
Nominal Output	**0.34**	**0.33**	**0.32**	**0.25**	**0.31**
Real Output	0.18	0.19	0.19	0.12	0.17
Inflation (Output Deflator)	**0.13**	**0.11**	**0.11**	**0.12**	**0.12**
Quarterly Growth Variables					
Nominal Output	**0.71**	**0.56**	0.12	**0.50**	**0.47**
Real Output	**0.70**	0.17	-0.18	0.11	**0.26**
Inflation (Output Deflator)	-0.02	0.42	**0.28**	**0.37**	**0.20**

(b) Standard Deviation

	Q1	Q2	Q3	Q4	Final
Annual Growth Variables					
Nominal Output	0.78	0.76	0.97	0.68	0.79
Real Output	0.77	0.77	0.86	0.75	0.78
Inflation (Output Deflator)	0.45	0.29	0.36	0.39	0.37
Quarterly Growth Variables					
Nominal Output	1.94	1.75	1.53	1.62	1.71
Real Output	1.12	1.75	1.50	1.62	1.72
Inflation (Output Deflator)	1.56	0.71	0.74	0.77	0.85

(c) Wald Test *p* -value (News Hypothesis)

	Q1	Q2	Q3	Q4	Final
Annual Growth Variables					
Nominal Output	**0.00**	**0.02**	0.13	**0.09**	**0.00**
Real Output	0.40	0.20	0.30	0.60	0.21
Inflation (Output Deflator)	0.20	**0.06**	0.14	**0.04**	**0.03**
Quarterly Growth Variables					
Nominal Output	**0.08**	**0.08**	0.13	**0.02**	**0.01**
Real Output	**0.09**	0.25	0.52	0.51	**0.09**
Inflation (Output Deflator)	0.76	0.45	**0.06**	**0.00**	**0.00**

Table A.6 - Results for the Components of Output

	N	Mean	Noise / Signal	R^2	RMSE1/ RMSE4	CW p-value
Annual Growth Variables						
Output	150	0.17	0.31	0.13	0.92	0.46
Consumption	137	0.14	0.35	0.21	0.87	0.37
Durables Consumption	137	**0.50**	0.21	0.16	0.87	0.13
Non-Durables Consumption	137	0.15	0.52	0.33	0.80	**0.00**
Services Consumption	137	0.04	0.78	0.28	0.85	**0.38**
Business Fixed Investment	137	**-0.66**	0.34	0.19	0.87	0.57
Residential Investment	137	0.55	0.20	0.21	0.88	*0.79*
Government Purchases	137	0.08	0.41	0.20	0.89	*0.38*
Exports	137	**1.33**	0.33	0.25	0.72	**0.01**
Imports	137	0.14	0.34	0.12	0.94	0.18
Quarterly Growth Variables						
Output	150	**0.26**	0.49	0.10	0.94	0.35
Consumption	137	0.15	0.52	0.31	0.83	**0.00**
Durables Consumption	137	0.55	0.37	0.29	0.84	**0.00**
Non-Durables Consumption	137	0.27	0.75	0.39	0.77	**0.00**
Services Consumption	137	-0.05	0.87	0.23	0.88	**0.19**
Business Fixed Investment	137	0.03	0.52	0.10	0.95	**0.04**
Residential Investment	137	0.54	0.45	0.12	0.94	0.96
Government Purchases	137	-0.11	0.69	0.37	0.79	**0.01**
Exports	137	**2.19**	0.59	0.19	0.82	**0.00**
Imports	137	0.82	0.69	0.25	0.86	**0.06**

Notes : All variables are real. R^2 refers to the R^2 of the regression for the model 1 chosen by AIC. Boldface in the mean and relative RMSE columns show statistical significance at 10% using the appropriate test. Italics in the last column reflect the CW statistic is negative and boldface denotes a p-value less than 10%.