RESEARCH RAP
Special Report

Revisions to Nonfarm Payroll Employment: 1964 to 2011*

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Summary

Over recent months, the Bureau of Labor Statistics (BLS) has revised upward its initial estimates of the monthly change in nonfarm payroll employment. Similar positive revisions occurred to the initial estimates for September 2010 through February 2011. Moreover, upward revisions to initial estimates also occurred in the immediate months following the most recent NBER business-cycle trough of June 2009. This pattern of positive revisions suggests that the BLS might be having trouble pinning down initial estimates of job gains in the early stages of an expansion. It also cautions us against placing too much weight on very early, sometimes unreliable estimates of macroeconomic data.

In this note, I report on the behavior of payroll employment revisions at similar points of past business cycles. I use the Philadelphia Fed's real-time data set for macroeconomists to analyze revisions to initial estimates for nonfarm payroll employment over the period November 1964 to September 2011. The key findings are:

- Initial estimates of job gains are biased downward by nearly 18,000 jobs. That is, over the entire sample period, the average revision to the initial estimate of monthly job gains is 18,000 jobs, when the revision is measured from the initial estimate to the estimate that the BLS releases two months later.
- Notably, I find no evidence of bias due to periods of business-cycle expansion as a whole. However, I do estimate a statistically significant positive bias over the most recent expansion:

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Over the period from July 2009 to September 2011, the average revision to the initial estimate of job gains is 36,000 jobs per month.

- I find a small positive (but statistically significant) association between the *revision* to job gains and the *level* of job gains.

Methodology

I use the Philadelphia Fed's real-time data set for macroeconomists to analyze the revisions to the BLS's initial estimates of the month-over-month change in nonfarm payroll employment.[1] The data set records the monthly historical levels of employment (E) , as that history was reported by the BLS in its monthly report on the labor market. The BLS's reports on the employment situation include an initial estimate of employment for the previous month. They also include any revisions to the prior months. I compute monthly job gains as the month-over-month change in the level of nonfarm payroll employment, $E_t - E_{t-1}$.

I focus on the cumulative revision that the BLS reports two months after it releases its initial estimate. This two-month cumulative revision to monthly job gains is

$$\text{Rev}_t \equiv (E_t - E_{t-1})_{\textit{Two Months}\ \text{Later}} - (E_t - E_{t-1})_{\textit{Initial}},$$

where $(E_t - E_{t-1})_{\textit{Initial}}$ denotes the BLS's initial estimate of job gains and $(E_t - E_{t-1})_{\textit{Two Months}\ \text{Later}}$ denotes the revised estimate, as the BLS reports it two months later. For example, in October the BLS reported job gains of 103,000 for September. Two months later, the BLS revised its estimate to 210,000. The revision to job gains after two months is 210,000 minus 103,000, or 107,000 jobs (Table 1).

Figure 1 shows the revisions over the period November 1964 to September 2011. The revisions can be quite large and, in some cases, persistent. Clear sequences of positive revisions follow the business-cycle troughs of November 1970 and June 2009. However, it is difficult to characterize the revisions in the months following the remaining troughs.

I quantify the behavior of employment revisions by estimating the sequence of regressions shown below:

[1] The data that I used in this paper and real-time data for additional variables from the Philadelphia Fed's real-time data set for macroeconomists can be found at: www.philadelphiafed.org/research-and-data/real-time-center/real-time-data/.

(1) $\text{Rev}_t = \beta + e_t$

(2) $\text{Rev}_t = \beta + \delta D_t + e_t$

(3) $\text{Rev}_t = \beta + \delta_1 D70M11_t + \delta_2 D75M3_t + \delta_3 D82M11_t + \delta_4 D91M3_t + \delta_5 D01M11_t + \delta_6 D09M6_t + e_t$

(4) $\text{Rev}_t = \beta + \gamma(E_t - E_{t-1})_{Latest} + e_t$

(5) $\text{Rev}_t = \beta + \gamma(E_t - E_{t-1})_{Latest}$
$+ \delta_1 D70M11_t + \delta_2 D75M3_t + \delta_3 D82M11_t + \delta_4 D91M3_t + \delta_5 D01M11_t + \delta_6 D09M6_t + e_t$

The first regression relates the revision (*Rev*) to a constant (β) and a regression residual (e_t). The constant measures the average revision. The second regression adds a zero-one dummy variable (D_t) to the model. The dummy variable takes the value of unity when the observation on the revision falls into a period of recovery from a recession trough. Notice that the coefficient on the dummy variable (δ) measures the differential effect of a recovery on the revision. I benchmark the period of a recovery to the number of months (29) since the most recent trough in June 2009. Figure 2 shows the evolution of the dummy variable (red line) and the periods of NBER-dated recessions (shaded areas).

The third regression replaces the dummy variable for all recoveries with a distinct dummy variable for each recovery. The recovery periods are those associated with the NBER's troughs of: November 1970, March 1975, November 1982, March 1991, November 2001, and June 2009. Notice that I omit the brief recovery period following the trough of July 1980. The coefficients attached to the recovery-specific dummy variables measure the marginal effect on the average revision of the corresponding recovery.

The fourth regression measures the effect of the change in employment $(E_t - E_{t-1})$ on the revision. I measure the change in employment with the observations of the latest vintage available in the real-time data set (December 2011). The fifth regression allows the change in employment and the recovery-specific dummy variables to affect the revision. Figures 3 and 4 show scatter diagrams of the revisions (y-axis) and the corresponding changes in payroll employment (x-axis). I show the observations for all months (red dots). I also isolate the points that fall into months of recovery, as defined above (green dots). The scatter diagrams

suggest a positive association between revisions and the changes in payroll employment. The association holds over the full sample period (Figure 3) as well as over the period beginning with 1990 (Figure 4). Note, in particular, that the largest negative revisions are often associated with job losses.

Empirical Findings

Table 2 presents the results from estimating regressions (1) to (5). On average, revisions to the change in payrolls are positive and statistically significant over the period from 1964 to 2011 (column 1). The average revision is nearly 18,000 jobs per month. However, note that this estimate masks some underlying variation in average revisions over time. Figure 5 shows the results when I compute estimates of the mean revision using a rolling 60-month window of observations. The mean revision is almost always greater than zero and nearly always statistically significant. (The horizontal blue shading indicates the 90 percent confidence interval around the mean.) The estimates of the mean revision range from a low of -15,000 jobs per month (June 1982 to May 1987) to a high of 53,000 jobs per month (October 1969 to September 1974). The most recent estimates show mean revisions near zero. This result reflects, in part, large negative revisions during the latest recession and nearly offsetting positive revisions during the subsequent recovery.

Over the entire sample period, there is little effect on the mean revision from recoveries as a whole: The estimated coefficient on the business-cycle recovery dummy variable (D_t) is positive (5.621) but not statistically significant (column 2). This result confirms the initial impressions that one gets from examining the revisions shown in Figure 1.

As noted earlier, some recoveries have been associated with positive revisions to payroll employment. I find a positive and statistically significant effect on mean revisions in the recoveries following the troughs of November 1970 and June 2009 (column 3). In the months following the November 1970 trough, the revisions averaged 54,000 jobs per month.[2] Following the June 2009 trough, the revisions averaged nearly 36,000 jobs per month.

Revisions tend to the upward side when job gains $(E_t - E_{t-1})$ themselves are positive. The effect is statistically significant but small (column 4). Notably, when I combine the recovery-specific dummy variables and the employment change in one regression, the results are qualitatively unchanged (column 5).

[2] I derive this estimate and the next one by adding the coefficient on the relevant dummy variable to the constant.

Table 1. Recent Month-Over-Month Changes in Nonfarm Payroll Employment: Initial Release, Two Subsequent Releases, and the Revision, Thousands of Jobs

Observation	Initial Release	Second Release	Third Release	Revision
2009:07	-247	-276	-304	-57
2009:08	-216	-201	-154	62
2009:09	-263	-219	-139	124
2009:10	-190	-111	-127	63
2009:11	-11	4	64	75
2009:12	-85	-150	-109	-24
2010:01	-20	-26	14	34
2010:02	-36	-14	39	75
2010:03	162	230	208	46
2010:04	290	290	313	23
2010:05	431	433	432	1
2010:06	-125	-221	-175	-50
2010:07	-131	-54	-66	65
2010:08	-54	-57	-1	53
2010:09	-95	-41	-24	71
2010:10	151	172	210	59
2010:11	39	71	93	54
2010:12	103	121	152	49
2011:01	36	63	68	32
2011:02	192	194	235	43
2011:03	216	221	194	-22
2011:04	244	232	217	-27
2011:05	54	25	53	-1
2011:06	18	46	20	2
2011:07	117	85	127	10
2011:08	0	57	104	104
2011:09	103	158	210	107
2011:10	80	100		
2011:11	120			

Table Notes. The table shows the values for the month-over-month change in nonfarm payroll employment over the period since the June 2009 trough. The data are expressed in thousands of jobs. The column labeled Initial shows the Bureau of Labor Statistics' initial release for the month. The following two columns (labeled Second and Third) show the values that the BLS released one and two months after it released the initial estimate. The last column (labeled Revision) shows the difference between the third release and the initial release.

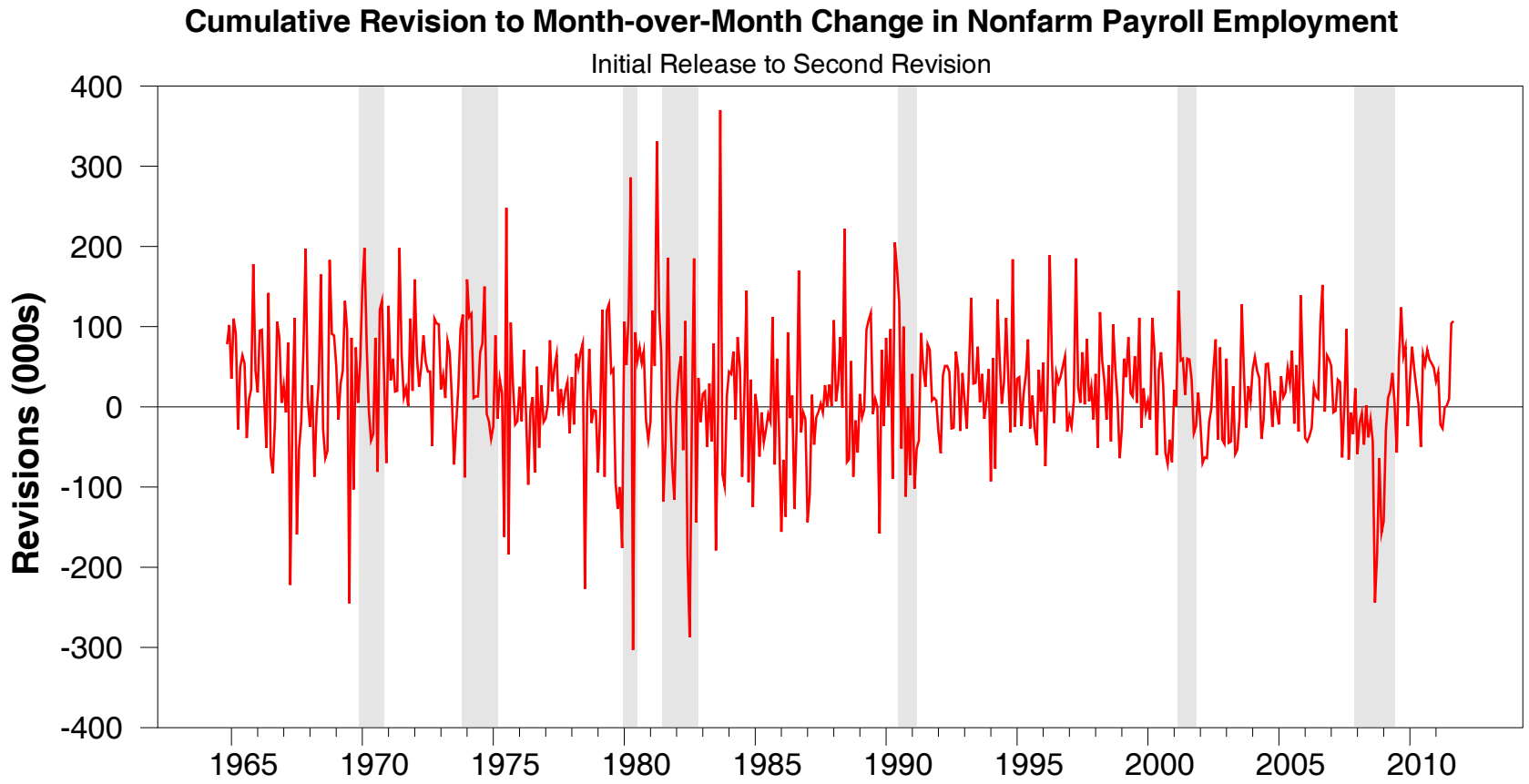
Table 2. Regression Results for Revisions to the Change in Nonfarm Payroll Employment, 1964 - 2011

Dependent Variable: $\text{Rev}_t \equiv (E_t - E_{t-1})_{\textit{Two Months Later}} - (E_t - E_{t-1})_{\textit{Initial}}$

	(1)	(2)	(3)	(4)	(5)
Constant	17.771	16.054	16.054	6.307	4.216
	(4.310)	(3.236)	(3.236)	(1.241)	(0.756)
D_t		5.621			
		(0.713)			
$D70M11_t$			38.050		29.883
			(6.220)		(4.881)
$D75M3_t$			-10.330		-19.747
			(-1.433)		(-3.276)
$D82M11_t$			-10.881		-26.329
			(-1.415)		(-4.271)
$D91M3_t$			10.636		13.925
			(1.749)		(2.152)
$D01M11_t$			-12.674		-1.333
			(-1.168)		(-0.156)
$D09M6_t$			19.909		28.211
			(3.197)		(3.177)
$E_t - E_{t-1}$				0.089	0.096
				(5.107)	(5.071)

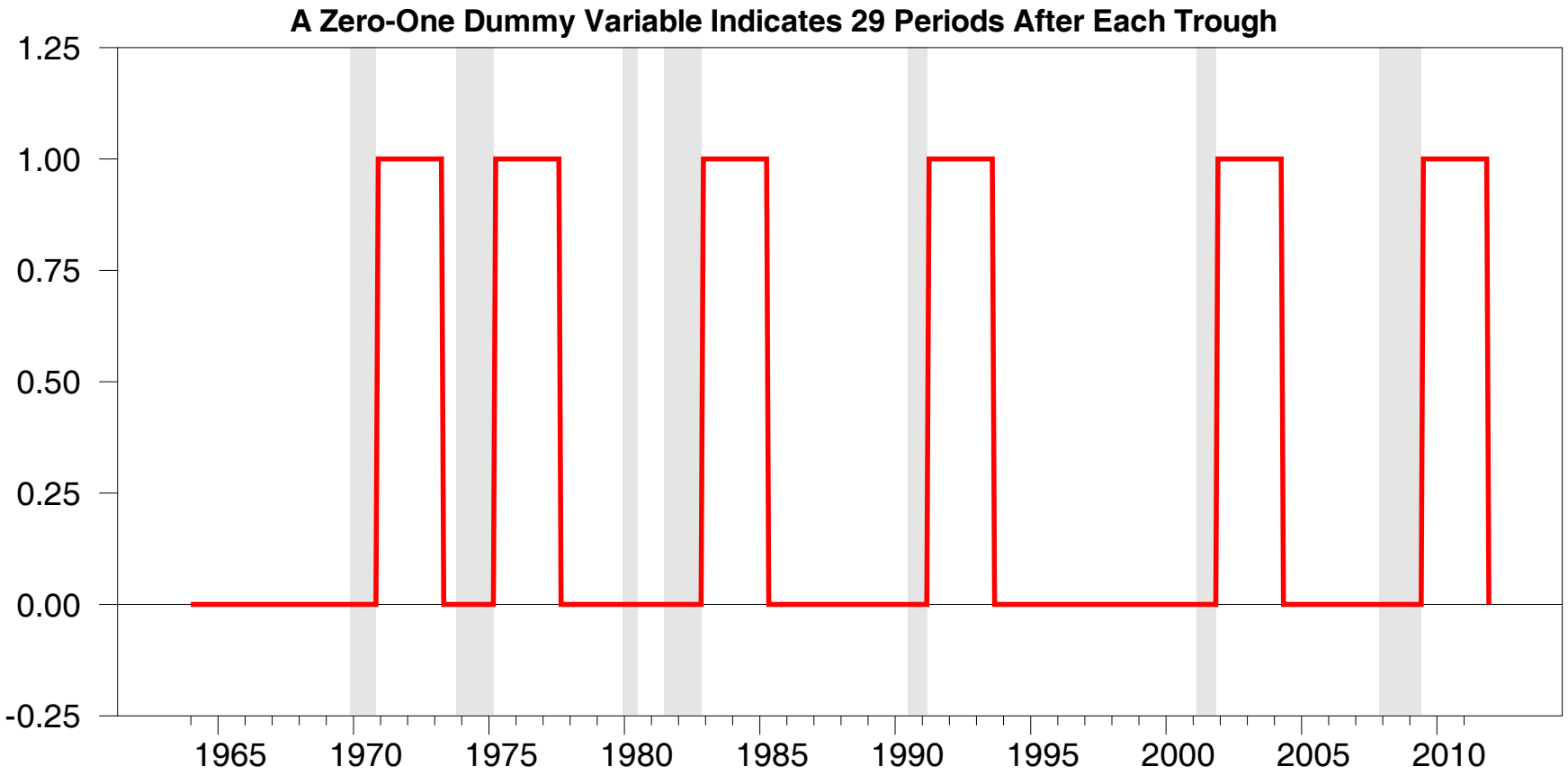
Table Notes. The table reports the results from estimating equations (1) to (5). The dependent variable is the cumulative revision to the change in nonfarm payroll employment from the initial release to the release two months later. The sample period is 1964:11 to 2011:9. The number in parentheses is the HAC t-statistic, derived using the Newey-West estimator with a truncation lag of 24 months. Qualitatively similar results obtain for truncation lags of 0, 12, and 36. (Pretesting results for conditional heteroscedasticity and serial correlation in the regression residuals indicate the presence of both.) The variables beginning with the letter D are zero-one dummy variables that take the value unity when the observation falls into a period of NBER expansion, as defined in the text. The variable $E_t - E_{t-1}$ is the month-over-month change in nonfarm payroll employment, measured using the data as they appeared in December 2011. The change in nonfarm payroll employment and the revision to the change are expressed in thousands of jobs. All data come from the Philadelphia Fed's real-time data set for macroeconomists.

Figure 1.



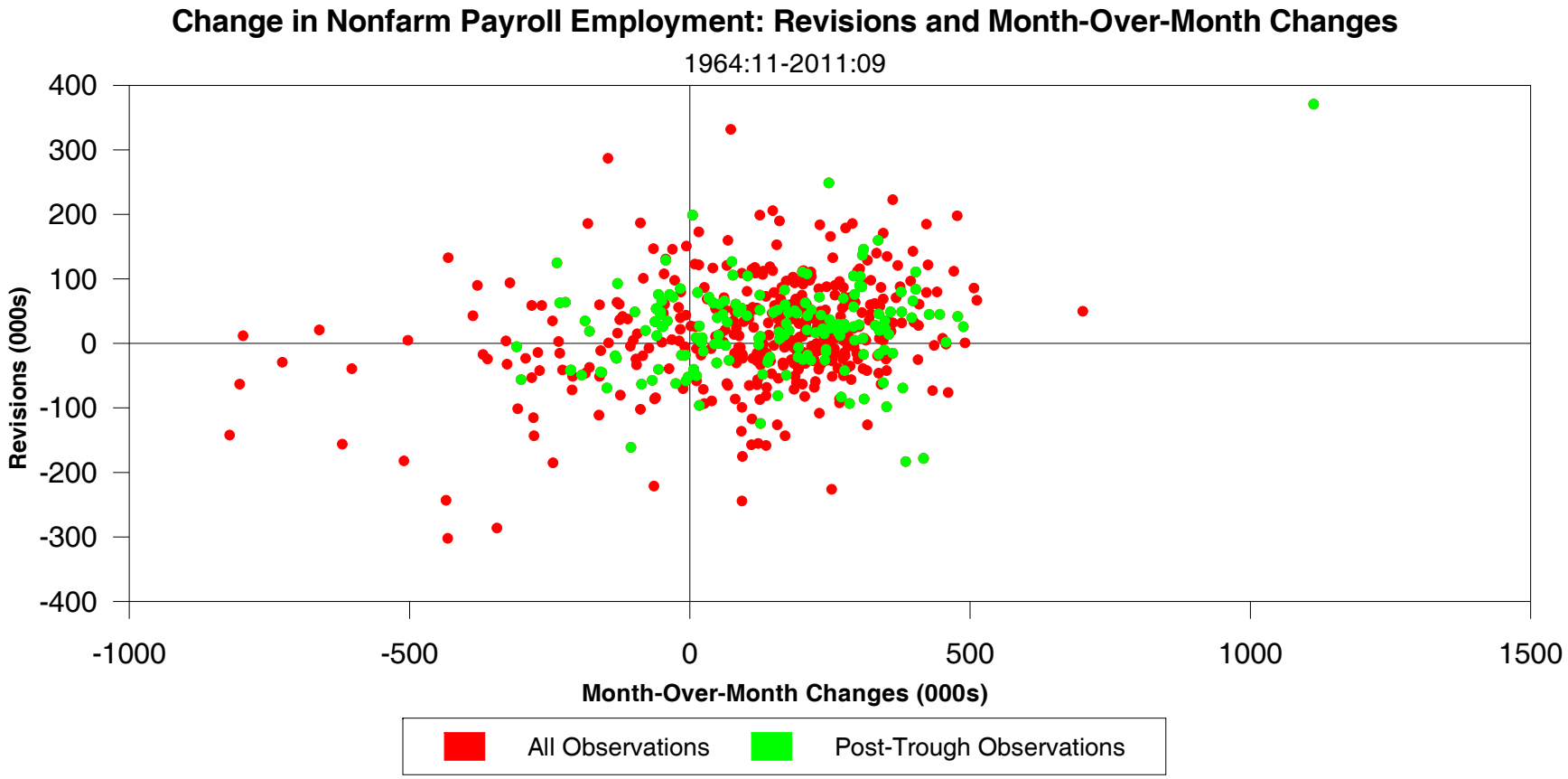
The figure shows revisions to job gains, in thousands of jobs. Shading indicates recessions.

Figure 2.



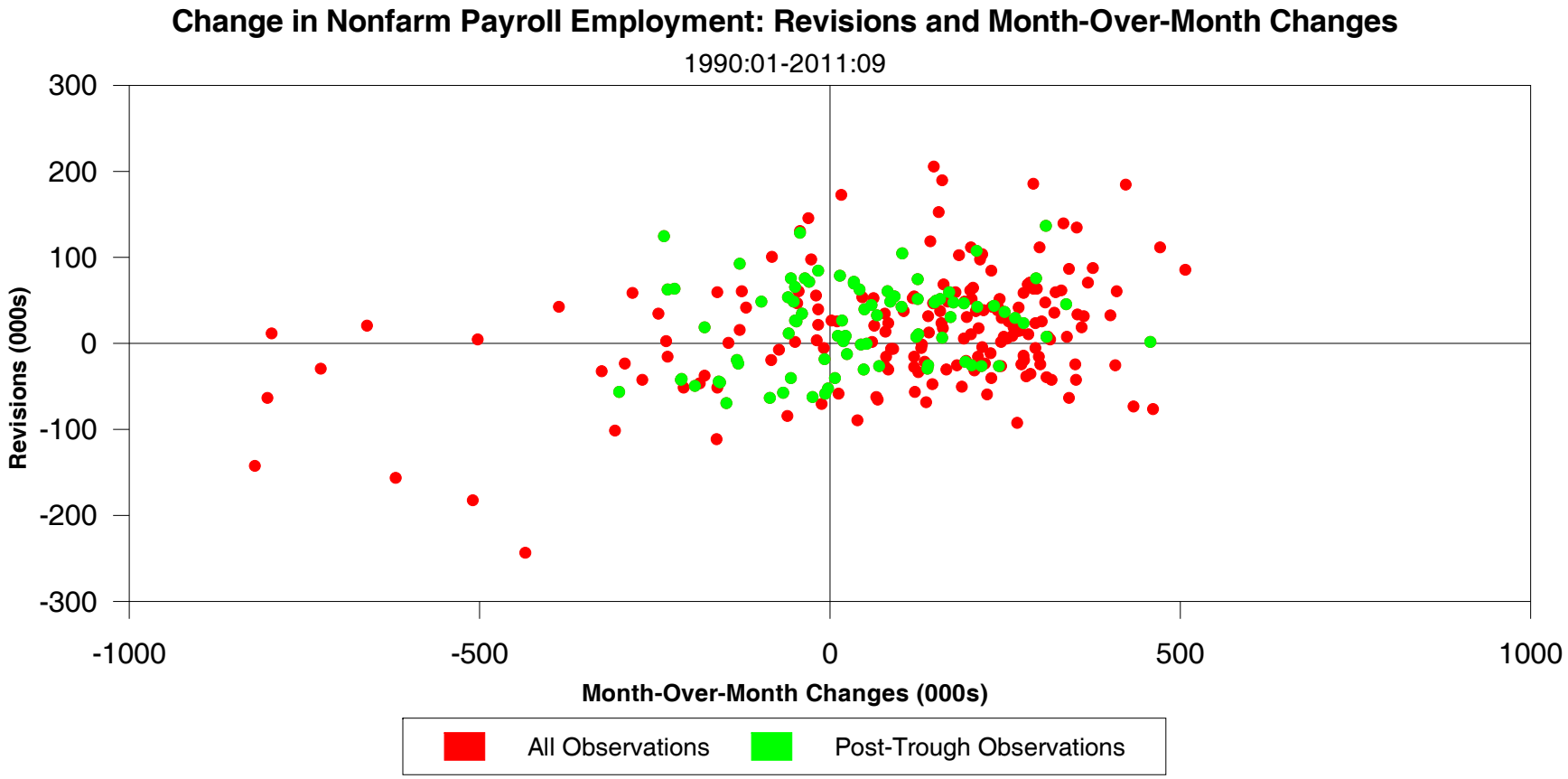
Shading indicates recessions. The red line shows the zero-one dummy variable. The trough in July 1980 is omitted.

Figure 3.



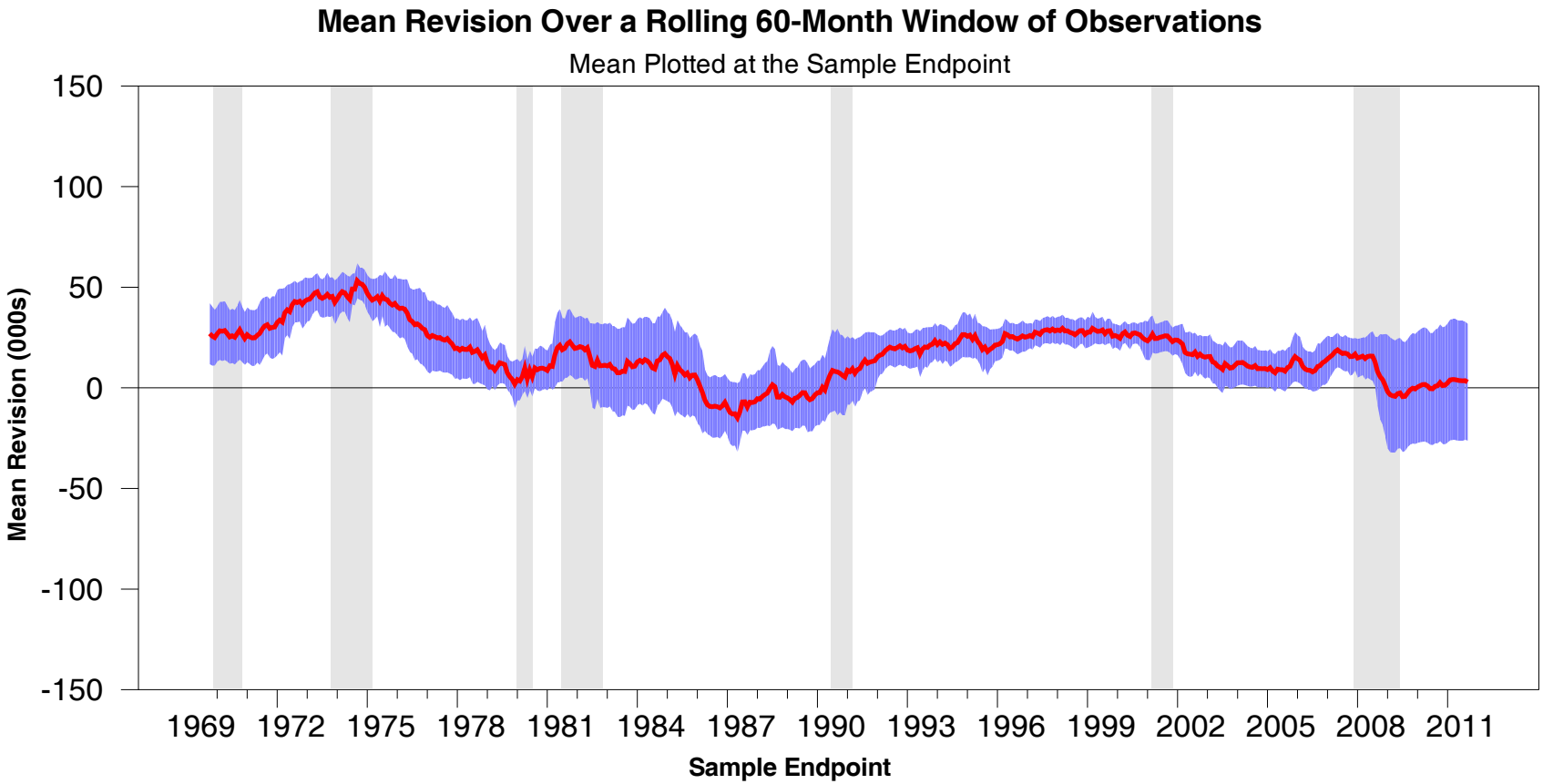
The graph shows the cumulative revision after two months (y-axis) and the latest-vintage change in payroll employment (x-axis).

Figure 4.



The graph shows the cumulative revision after two months (y-axis) and the latest-vintage change in payroll employment (x-axis).

Figure 5.



The graph shows the mean revision and the corresponding 90 percent confidence interval. Shading indicates recessions.