The Forecasting Properties of Survey-Based Wage-Growth Expectations

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Abstract

In this paper, we evaluate survey-based wage-growth expectations in Sweden. Results show that the expectations are neither unbiased nor efficient forecasts. Evaluating out-of-sample forecasting performance, we find that the survey participants generally perform worse than a constant forecast based on reasonable assumptions regarding the inflation target and productivity growth. Our findings indicate that caution should be exercised when relying on these data for policymaking.

JEL Classification: E52, J30

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Contents

1. Introduction

Wage growth is widely considered an important determinant for inflation. For example, in the expectations-augmented Phillips-curve model – which is a highly popular model of inflation in both theoretical and empirical work – it is often assumed that prices are set as a markup over productivity-adjusted labour costs. As pointed out by Mehra (1977, p. 1227), it is also intuitive that "*industry money wages via their effects upon industry product prices may have significant effects upon the consumer price index*". Given this importance of wage growth for inflation, and the forward-looking nature of monetary policy making, wage-growth expectations are of much interest to central banks. However, for a central bank to be able to conduct good monetary policy, it is important that it has access to wage expectations that are of high quality. In this paper, we therefore assess properties of an important measure of wage-growth expectations in Sweden.

More specifically, the survey-based wage-growth expectations provided by Prospera on behalf of Sveriges Riksbank are evaluated from a forecasting perspective. First, we conduct tests for bias and efficiency. Second, the predictive ability of the wage-growth expectations is investigated. Results suggest that the expectations are biased and not efficient. In addition, the forecast precision of the survey-based wage-growth expectations tends to be lower than that associated with a forecast that at all points in time says that wage growth will be 3.5 percent.

The remainder of this paper is organised as follows: Data are described in Section 2. In Section 3, the empirical analysis is conducted and the results are discussed. Section 4 concludes.

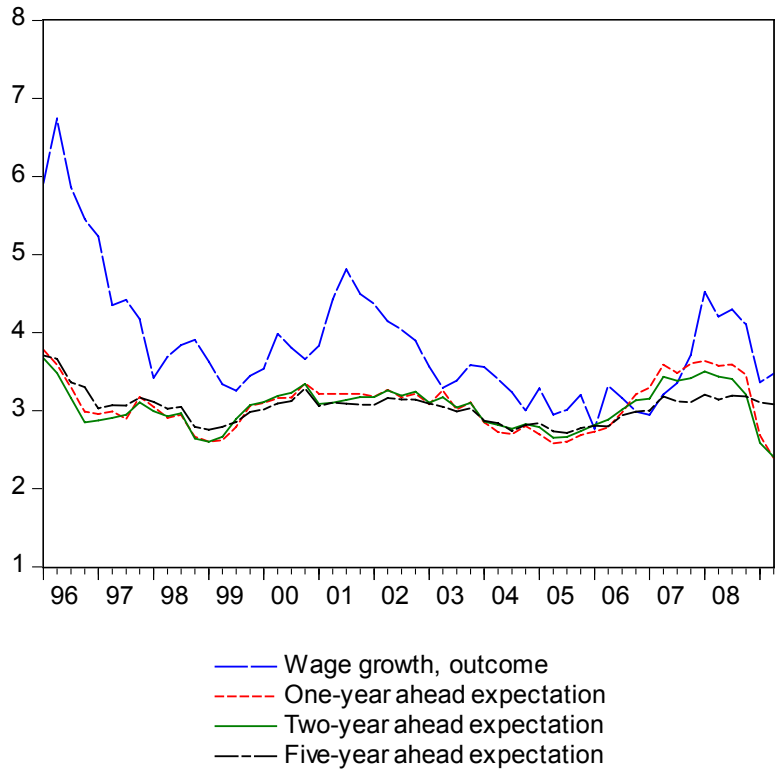
2. Data

Data on twelve-month-ended wage growth from 1996Q1 to 2009Q2 are given in Figure 1.[1] In the same figure, one-, two- and five-year ahead overall mean wage-growth expectations from the Prospera survey are shown. The survey is conducted each quarter – all series hence consists of 54 observations.[2] In the survey, a large number of businesses and organisations are asked about their wage expectations. The results of the survey are aggregated in an overall measure and into four subcategories: employee organisations, employer organisations, manufacturing companies and trade companies. Figures A1 to A3 in the Appendix show one-, two- and five-year mean wage-growth expectations by subcategory.

[1] The short term-wage statistics (total economy) from the National Mediation Office is used as the measure of the wage.

[2] While the survey is conducted four times per year, the interval is not fixed. We discuss this issue further below when relevant.

Figure 1. Wage growth and overall wage-growth expectations.



Note: The dates for the expectations refer to when they were collected.

It can be seen from Figure 1 and Figures A1 to A3 that wage-growth expectations appear to vary over time with the actual wage-growth and as would be expected, the expectations vary less the longer the horizon. It is also seems reasonably clear that expectations under-predict actual wage growth. We next investigate the empirical properties of the survey-based wage-growth expectations to – among other things – see whether there exists a significant bias in the expectations.

3. Empirical analysis

Our empirical analysis of the survey-based wage-growth expectations are divided into two parts. First, tests for unbiasedness and efficiency are conducted. Such tests are fairly common in the literature aiming to evaluate expectations; see, for example, Egginton (1999), Thomas (1999), Mehra (2002) and Baghestani (2008). Second, the predictive ability of the wage-growth expectations is contrasted with those of a simple alternative, namely a constant forecast. We believe that the comparison of forecast accuracy – while not as commonly conducted in the literature as tests for bias and efficiency – is very interesting since it can be used to assess the properties of the expectations from another angle. For example, if the forecast precision of the expectations is lower than that of

a simple alternative, one has to question how the expectations are formed – or measured – even if they pass tests for unbiasedness and efficiency.

3.1 Unbiasedness and efficiency

Table 1 reports the mean errors (ME) associated with the overall forecast and the four subcategories. All of the MEs are located in the range 0.25 to 0.70, which must be considered fairly large. Having quantified the extent of the under-prediction, we ask whether this under-prediction constitutes a significant bias. This can be tested by running the regression

$$\Delta w_{t+h} - \Delta w^{e}_{t+h|t} = \lambda + \omega_t, \qquad (1)$$

where Δw_{t+h} and $\Delta w^{e}_{t+h|t}$ are wage growth and wage-growth expectations respectively and ω_t is a mean zero error term. The null hypothesis $H_0 : \lambda = 0$ is then tested using a standard *t*-test.[3] As can be seen from Table 1, it is concluded that all expectations except the five-year ahead expectation for employee organisations are biased.

Table 1. Results from tests of bias.
One-, two- and five-year ahead wage-growth expectations.

	ME
1 year	
Overall	0.62**
Employee	0.36**
Employer	0.43**
Manufacturing	0.67**
Trade	0.70**
2 years	
Overall	0.60**
Employee	0.35*
Employer	0.48**
Manufacturing	0.63**
Trade	0.68**
5 years	
Overall	0.53**
Employee	0.25
Employer	0.58**
Manufacturing	0.58**
Trade	0.56**

Note: ME is the mean error which is equal to $\hat{\lambda}$. ** and * indicate significance at the one and five percent level respectively. Regressions have 50, 46 and 34 observations at the one-, two- and five-year horizons.

[3] Newey-West standard errors are used to address the serial correlation in the residuals.

The finding that the survey expectations are biased does not come as a complete surprise though. The literature on survey expectations tends to find evidence against unbiasedness; see, for example, Croushore (1997), Roberts (1997) and Mankiw *et al.* (2003). It is somewhat disturbing that forecasts are biased though, for example since it constitutes a violation of rational expectations under the assumption of a symmetric quadratic loss function. However, since we in reality never know the loss function of the forecasters, we do not make such a claim here.[4] Instead we simply note that this result should be considered a warning sign regarding the rationality of the formation of expectations.

We next turn to the issue of efficient use of macroeconomic data when forming wage-growth expectations. Standard models suggest that the unemployment rate should be useful when predicting wage growth. A straightforward test of efficient use of data can therefore be based on the regression

$$\Delta w_{t+h} - \Delta w^{e}_{t+h|t} = \beta_0 + \beta_1 u_{t-1} + \beta_2 u_{t-2} + \beta_3 u_{t-3} + \beta_4 u_{t-4} + \nu_t, \qquad (2)$$

where u_t is the unemployment rate at time *t*. The null hypothesis $H_0 : \beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$ is tested using a standard *F*-test. Results are given in Table 2 and show that the wage-growth expectations for all categories at all horizons do not sufficiently take into account the unemployment rate when formed. Regarding the interpretation of our results, it can be noted that while bias – as noted above – is not necessarily a sign of lack of rationality, inefficient use of data is incompatible with rational expectations.

[4] Recall that biased forecasts can be rational, for example if the forecasters have asymmetric loss functions; see Elliott *et al*. (2008).

Table 2. Results from estimation of equation (2).
One-, two- and five-year ahead wage-growth expectations.

	F
1 year	
Overall	5.67**
Employee	4.07**
Employer	5.21**
Manufacturing	4.64**
Trade	6.66**
2 years	
Overall	4.42**
Employee	4.72**
Employer	4.48**
Manufacturing	3.89**
Trade	4.70**
5 years	
Overall	7.51**
Employee	7.90**
Employer	6.79**
Manufacturing	7.41**
Trade	7.23**

Note: Entries are the test statistics from the F-test of all slope coefficients in equation (2) being zero. ** and * indicate significance at the one and five percent level respectively. Regressions have 50, 46 and 34 observations at the one-, two- and five-year horizons.

3.2 Forecast accuracy

As the last step in our assessment of the wage-growth expectations, we finally compare the forecasting precision of the Prospera survey expectations with that of a simple alternative forecast. The alternative forecast is a constant forecast of 3.5 percent, based on the assumption that nominal wages in equilibrium should grow by the sum of Sveriges Riksbank's inflation target and productivity growth. While the inflation target is clearly stated as two percent CPI inflation, a productivity growth of 1.5 percent per year is admittedly a more controversial assumption. However, this number can easily be motivated as a reasonable, also in real time; see, for example, Pehkonen (1995) for an empirical study supporting the assumption. The results in Table 3 show that the constant forecast performs best at all horizons, except for the one-year horizon where employee organisations have a lower RMSE.

Table 3. RMSEs from different forecasts.

	1 year	2 years	5 years
Constant	0.568	0.491	0.551
Overall	0.747	0.806	0.733
Employee	0.533	0.643	0.594
Employer	0.653	0.749	0.777
Manufacturing	0.789	0.833	0.780
Trade	0.829	0.873	0.743

Note: 50, 46 and 34 forecasts are evaluated at the one-, two- and five-year horizons respectively.

Considering the forecast accuracy of different subcategories of respondents, Table 3 shows that employee organisations have a lower RMSE at all horizons than other subcategories. The fact that employee organisations are good at forecasting wage growth can probably be partly explained by the fact that wages in Sweden are largely determined in negotiations between employer organisations and employee organisations.[5] It could thus be presumed that labour-market parties may have some unique knowledge about the future growth of wages and thus are better forecasters than other agents in the economy. This is to some extent confirmed since also employer organisations have lower RMSEs than other categories – employee organisations excluded – at the one- and two-year horizons. Still, the employee organisations stand out as substantially better than the other categories. It is interesting to note that this is consistent with the theoretical framework of Blanchard and Summers (1986) in which unions decide upon the wage and firms on employment.

In order to assess whether the difference in forecasting precision is significant, we employ a Diebold-Mariano test (Diebold and Mariano, 1995) under the assumption of a quadratic loss function. We test he null hypothesis that the forecasting accuracy of the subcategory in question is equal to that of employee organisations. Results are provided in Table 4 and show that the null hypothesis of equal forecasting accuracy is rejected in all cases at the five percent level. We hence conclude that the forecasting accuracy of employee organisations is significantly higher than that of the other subcategories.

[5] Through the 1960s, 1970s and early 1980s, Sweden was dominated by highly centralised and stable forms of wage negotiations. Since 1983 all negotiations are conducted at the industry and sector level.

Table 4. Results from Diebold-Mariano test.

	1 year	2 years	5 years
Overall	-4.26**	-3.16**	-2.42*
Employer	-2.72**	-2.13*	-2.45**
Manufacturing	-4.46**	-3.27**	-2.53**
Trade	-4.33**	-3.49**	-2.66**

Note: The null hypothesis is that the forecasting accuracy of the subcategory in question is equal to that of employee organisations. ** and * indicate significance at the one and five percent level respectively. 50, 46 and 34 observations are used at the one-, two- and five-year horizons respectively.

4. Conclusions

In this paper, we have evaluated survey-based wage-growth expectations in Sweden. Results show that the expectations are neither unbiased nor efficient forecasts. Evaluating out-of-sample forecasting performance, we find that the participants in the Prospera survey generally perform worse than a constant forecast which combines an inflation target of two percent with a productivity growth rate of 1.5 percent.

The fact that survey-based expectations studied in this paper have some questionable properties is by no means highly surprising and could, for example, be due to expectations being adaptive rather than rational. It is, however, also possible that the established shortcomings are found because the data provide imperfect measures of the true wage-growth expectations. Survey-based measures of expectations are commonly criticised since the respondents have small incentives to give well thought answers; see, for example, Wolfers and Leigh (2002) and Gürkaynak and Wolfers (2005). It is troublesome to policymakers and forecasters who rely on these expectations as input in their analysis if it is indeed the case that the Prospera survey fails to record the true wage-growth expectations in Sweden. Being aware of the potential shortcomings of the data is an important first step though and by taking the results presented in this paper into account, the worst pitfalls can hopefully be avoided.

Appendix

Figure A1. One-year ahead wage-growth expectations.

Figure A2. Two-year ahead wage-growth expectations.

Figure A3. Five-year ahead wage-growth expectations.

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