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SURVEY EXPECTATIONS VS. RATIONAL EXPECTATIONS IN THE ESTIMATION OF A DYNAMIC MODEL: DEMAND FOR LABOR IN FINNISH MANUFACTURING*

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Abstract

Rational expectations of the errors-in-variables type and expectations series quantified from qualitative business survey data are compared in the estimation of a dynamic labor demand model for the Finnish manufacturing. Replacing future expected values of variables by realizations creates a serially correlated error structure in a rational expectations model. It is shown that when survey expectations are used, this kind of serially correlated error does not appear. Therefore the estimation of the model is simpler. Also the estimation results show that serial correlation is much less severe when survey expectations are used. Rational expectations lead to slightly higher estimates of the partial adjustment coefficient and the short-run elasticities of labor demand with respect to output and real wage than survey expectations.

1. Introduction

Empirical applications of dynamic models with expectations of future variables have typically used some variant of rational expectations or replaced the expectational variables by proxies. An alternative,which is suggested by Kaufman and Woglom (1983), among others, is to use survey data on actual expectations. The purpose of this paper is to estimate a labor demand function for Finnish manufacturing using both business survey data and rational expectations. It is shown that with survey data the estimation is much simpler.

The model is formulated as two-step optimization problem, where the optimal employment is determined from a static profit maximization problem and then the firm minimizes the expected value of the discounted adjustment and disequilibrium costs. The first-order condition of the optimization problem, the Euler equation, includes the next period's employment as an explanatory variable.

Since full estimation of a rational expectations model is often quite cumbersome, simplified methods have been developed, which, however, retain some basic features of rationality. The errors-in-variables estimators are instrumental variables estimators of the model, when the expected variables have been replaced by realized values. This facilitates direct estimation of the Euler equation, but it is well known that replacing of future expectations by future realized values creates a serially correlated error structure in the model. Alternative consistent estimation methods for these models have been developed. In contrast, when survey data are used for the expectations of future variables in the Euler equation, no serially correlated error is created and consistent estimation is possible using simpler methods than in the case of rational expectations.

In this paper we use the "limited information" rational expectations procedure, i.e. direct estimation of the Euler equation, because of its computational simplicity and also because we need not specify in detail the process that generates the exogenous variables. A drawback compared to the "full information" methods is that the estimation is less efficient since the parameter restrictions between the solution of the model and the process that generates the forcing variables are not imposed.1) On the other hand, solving the rational expectations model requires the assumption that the choice variables do not Granger cause the explanatory variables. In our model the optimal employment is a function of output, which is, of course, not exogenous, since it is linked to employment through the production function. In any case, recent work by West (1986) suggests that the limited information approach is only marginally less efficient than the full information approach.

It should also be noted that survey expectations are probably best suited for the limited information approach, which require only a one period ahead expectation of the choice variable. In fact, already Tinsley (1970) and Craine (1971) suggested the use of business survey data in the estimation of Euler equations. Alternatively, the solution of the optimal path of the choice variable would be a function of all future values of all the exogenous variables. This kind of information is, however, not available from surveys. One possible solution, suggested by Wren-Lewis and Warner (1985), is to model the process that generates the survey expectations and to use this to obtain several periods ahead expectations.

We shall proceed as follows. Section 2 presents the basic model, Section 3 discusses estimation under rational expectations and Section 4 estimation under survey expectations. In Section 5 the estimation results are presented and Section 6 concludes the paper.

2. The model

We start with a static profit maximization problem. The production function is taken to be a CES function[2)]

$$\bar{Q} = \gamma(\phi\bar{N}^{-\rho} + (1-\phi)\bar{K}^{-\rho})^{-\nu/\rho} \tag{1}$$

where $\bar{Q}$ is net output, $\bar{N}$ is employment and $\bar{K}$ is capital input. We assume that because of foreign competition the domestic producers in the aggregate can be treated as price takers. From the first-order condition for a profit maximum we can solve for optimal N (we use variables without bar to denote natural logarithms of the original variables)

$$N^* = s(1-\phi)\nu \quad - \ln\gamma(1-s)/\nu - sW + (s + ((1-s)/\nu))Q \tag{2}$$

where $s = 1/(1+\rho)$ is the elasticity of substitution and W is log of real wage. The equation will be used in the form

$$N^* = \text{constant} - sW + gQ\,. \tag{3}$$

To make the model dynamic, we introduce cost of adjustment and optimization over time. It has been common to assume separate quadratic cost of adjustment and a quadratic cost of being out of equilibrium (e.g. Sims (1974), Kennan (1979), Nickell (1986)). The expected discounted present value of these costs is

$$C_t = E_{t-1} \sum_{j=0}^{\infty} R^j (c_1(N_{t+j} - N^*_{t+j})^2 + c_2(N_{t+j} - N_{t+j-1})^2) . \quad (4)$$

Note that the above formulation is different from e.g. Sargent (1981) in that in his work dynamic profit maximization with quadratic cost of adjustment is directly introduced. Using that approach would make it necessary to assume a simpler form for the production function, e.g. quadratic, to obtain linear estimation equations.

We assume that the decision on N_t is based on information available at time t-1. One may justify this by the assumption that the choice of N_t is made at the beginning of period t. Hence W_t is unknown at the time the decision is made. On the other hand, Q_t is endogenous due to the production function constraint: choice of N_t and K_t determines Q_t. One might, however, say that if there is some stochastic element in the production function, the choice of N_t and K_t does not completely determine Q_t and hence it is not known at time t-1. When N_t is chosen, it becomes nonstochastic and hence $E_{t-1}N_t = N_t$. However, it may be more realistic to assume that, as in Kennan (1979), N_t varies due to unforeseen factors and is therefore not completely known until the end of period t.

The solution of this kind of models is familiar and is presented here very briefly. Differentiating (4) with respect to N_t yields the first-order condition

$$c(E_{t-1}N_t - E_{t-1}N_t^*) + E_{t-1}N_t - N_{t-1} - R(E_{t-1}N_{t+1} - E_{t-1}N_t) = 0 \tag{5}$$

where $c = c_1/c_2$ reflects the relative size of the two types of costs. In addition, we obtain transversality conditions. As shown e.g. by Kennan (1979), the optimal path of N_t satisfies the partial adjustment equation

$$N_t - N_{t-1} = a(N_t^{**} - N_{t-1}) \tag{6}$$

where N_t^{**} is a long-run target employment defined as $N_t^{**} = (1 - \lambda R) \sum_{j=0}^{\infty} \lambda^j R^j E_{t-1} N_{t+}^*$ a is the partial adjustment coefficient, $a = 1 - \lambda$, and λ is the smaller root of the quadratic form $(1-D(1+c+R)/R + D^2/R)N_{t+1}$; D is a lag operator, $DN_t = N_{t-1}$. It can be shown that $0 < \lambda < 1$ and $a = 1 - \{1+c+R- \sqrt{(1+c+R)^2-4R}\}/2R$.

This model implies, first of all, that under static expectations, i.e. $E_{t-1}N_{t+j}^* = N_t^*$, the long-run target is $N_t^{**} = N_t$ and the partial adjustment equation (6) is the same as in static models (e.g. Phipps (1975)). Second, if there are no costs of adjustment, i.e. $c_2 = 0$, there is instantaneous adjustment of employment: $a = 1$. Since changing the labor input is costless, the firm can always choose the optimal amount of labor.

If the process that generates the variables Q and W is specified, one could solve for N_t^{**} and hence for N_t in terms of past values of Q and W. This requires the assumption that N does not Granger cause Q or W (Hansen and Sargent (1980)). However, as noted above, Q cannot be treated as an exogenous variable in the model. Also estimation of the model is easier if we estimate the Euler equation directly, although there is a loss of efficiency since the parameter restrictions between the model and the process that generates the exogenous variables are ignored (see e.g. Hansen and Sargent (1982), Wickens (1986)).

Recent research has clarified the conditions under which the limited information approach is relatively efficient. West (1986) shows in a labor demand model of the type used by Sargent (1978) and Hansen and Sargent (1980) that given some plausible parameter values and with no specification error, the limited information estimation is only marginally asymptotically inefficient compared to a full information estimation. On the other hand, Nijman and Palm (1985) argue that in the case of expectations on endogenous variables, replacing the expectation by realized values and using instrumental variables may be quite asymptotically inefficient compared to a proxy variables estimator where the process of the forcing variables is first estimated. Their examples, however, are not based on an optimization model and the parameter values used in the examples need not be economically relevant in the present context.

We solve (5) for $E_{t-1}N_t$:

$$E_{t-1}N_t = (c/(1+c+R))E_{t-1}N_t^* + (1/(1+c+R))N_{t-1} + (R/(1+c+R))E_{t-1}N_{t+1} \tag{7}$$

which we write, using (3), as

$$E_{t-1}N_t = d_0 + d_1E_{t-1}Q_t + d_2E_{t-1}W_t + d_3N_{t-1} + d_4E_{t-1}N_{t+1} \,. \tag{8}$$

If we obtain proxies for the expectations variables, equation (8) can be estimated and from the estimated parameters it is possible to recover the parameters of interest c,R,s,g and a. It is possible to backdate (8) one period and to solve for $E_{t-2}N_t$. We have kept N_{t+1} in the equation so that the alternative expectations models below have the same form.

In the empirical analysis we have fixed R, which allows combining terms in (8). In addition, since quarterly data was used, seasonality and possible nonstationarity in the variables was taken into account by taking four quarter differences of all variables. Nelson and Plosser (1982) argue that many economic variables are difference stationary rather than trend stationary. Therefore variables should not be defined as deviations from a trend, which is common in the empirical work on rational expectations models. The resulting equation is

$$E_{t-1}n_t = d_1E_{t-1}q_t + d_2E_{t-1}w_t + d_3(n_{t-1} + RE_{t-1}n_{t+1}) . \qquad (9)$$

Lower case letters n, q and w denote the log-differenced variables.

Next, proxies for the variables are considered. Let $n_t = E_{t-1}n_t + u_t$, $q_t = E_{t-1}q_t + e_{1t}$ and $w_t = E_{t-1}w_t + e_{2t}$, where e_{1t} and e_{2t} are forecast errors and u_t is an error term that arises from unforeseen changes in n_t after it is chosen. This leads to equation

$$n_t = d_1q_t + d_2w_t + d_3(n_{t-1} + RE_{t-1}n_{t+1}) + \varepsilon_t \qquad (10)$$

where $\varepsilon_t = u_t - d_1e_{1t} - d_2e_{2t}$. The error component u_t does not require the use of a special estimation technique, since it is the error in the dependent variable. However, variables q_t and w_t are correlated with the error terms e_{1t} and e_{2t}, respectively, and hence the equation should be estimated using instrumental variables. Note that use of instrumental variables would also alleviate the bias caused by simultaneity between employment and output. This still leaves specification of $E_{t-1}n_{t+1}$, which we discuss in the following two sections.

3. Limited information rational expectations of future variables

When estimating the model under rational expectations, we use the errors-in-variables approach also for the future expected employment. This means replacing future expectations by realizations, which creates a serially correlated error term in the model.

Let $n_{t+1} = E_{t-1}n_{t+1} + v_{t+1}$ where v_{t+1} is a forecast error. Inserting this in equation (10) yields

$$n_t = d_1q_t + d_2w_t + d_3(n_{t-1} + Rn_{t+1}) + \varepsilon_t^r \tag{11}$$

where $\varepsilon_t^r = u_t - d_1e_{1t} - d_2e_{2t} - d_3v_{t+1} = \varepsilon_t - d_3v_{t+1}$. The new error ε_t^r is obviously serially correlated, i.e. $E\varepsilon_t^r\varepsilon_{t-1}^r \neq 0$. We have $E\varepsilon_tv_t \neq 0$, since forecast errors at time t may be correlated with events at time t. Further, forecast error v_t is likely to be autocorrelated, i.e. $Ev_tv_{t+1} \neq 0$, since when forecast for period t+1 is formed, the forecast error at t is not yet known. In this case the forecast horizon exceeds the sampling interval (see Cumby, Huizinga and Obstfeld (1983)). The latter correlation would be eliminated if the information set included also period t variables.

It is well known that estimation of (11) with instrumental variables (the instruments being e.g. lagged values of the variables) yields consistent, but inefficient estimates. The standard errors obtained from usual instrumental variables estimation are, however, inconsistent. If efficiency is pursued, the standard ways of correcting for serial correlation lead to inconsistent estimates. The error term of the model can be expressed in a form where it has a moving average structure, the components of which are functions of past forecast errors. Therefore the filtered error term would be correlated with the instruments that include lagged values of the variables. To avoid this, consistent estimation methods have been suggested. We use the method suggested by Fair (1984), which differs from the formulation of Cumby et al. (1983) in the way the correlation matrix is formed. The latter would involve estimation of a vector autoregressive process to estimate the covariance matrix. Given the relatively small number of observations in the empirical application, this would not be feasible.

The model is first estimated using instrumental variables. Since the information set includes variables up to t-1 and n_{t-1} is included in the equation, lagged values $q_{t-1}, q_{t-2}, \ldots, w_{t-1}, w_{t-2}, \ldots, n_{t-2}, \ldots$ can be used as instruments. Let Z_t be a row vector of instruments at time t and denote $y = (n_1, \ldots, n_T)'$, $X_t = (q_t, w_t, n_{t-1} + Rn_{t+1})$, $X = (X_1', \ldots, X_T')'$, $Z = (Z_1', \ldots, Z_T')'$ and $d = (d_1, d_2, d_3)'$. Then the instrumental variables estimator $d_{IV} = (X'Z(Z'Z)^{-1}Z'X)^{-1}X'Z(X'Z)^{-1}Z'y$ and the corresponding residuals are consistent. A consistent covariance matrix is formed as follows. Let $\hat{\varepsilon}_t^r$ be the estimated errors. Then we form the matrix $G = g_0G_0 + g_1\ G_1 + g_1G_1' + \ldots$ where $g_i = \sum_{t=i+1}^{T} \hat{\varepsilon}_t^r \hat{\varepsilon}_{t-i}^r / (T-i)$ and

$G_i = \sum_{t=i+1}^{T} Z_t'Z_{t-i}/(T-i)$. Then a consistent covariance matrix of the estimates is $H = (X'ZG^{-1}Z'X)^{-1}$, which one can use together with estimates d_{IV}. A preferable estimator, which is consistent and efficient, is the two-step instrumental variables estimator $d_{TSIV} = (X'ZG^{-1}Z'X)^{-1}X'ZG^{-1}Z'y$, with covariance matrix H. If we additionally assumed that the error term ε_t has an autocorrelated element, this could be explicitly taken into account (see Cumby et al. (1983), Fair (1984)), but the instrument set would have to be moved backwards correspondingly.

4. Survey expectations of future variables

If one has available survey data on expectations, the estimation of the model is simplified. Assume that this data is in the form of expected percentage changes (or log difference) in N_t from t to t+1 and that when this expectation is formed the value of N_t or the other period t variables are not yet known. Denote the expectation by M_{t+1}, i.e. $E_{t-1}N_{t+1} = M_{t+1} + E_{t-1}N_t$. For current period variables the errors-in-variables approach is used. The expected four-quarter change in N_t is

$$E_{t-1}n_{t+1} = E_{t-1}N_{t+1} - N_{t-1} = M_{t+1} + N_t - N_{t-3} - u_t \equiv m_{t+1} - u_t, \quad (12)$$

which is inserted in (10). This yields equation

$$n_t = d_1q_t + d_2w_t + d_3(n_{t-1} + Rm_{t+1}) + \varepsilon_t^s \quad (13)$$

where $\varepsilon_t^s = \varepsilon_t - d_3Ru_t = (1-d_3R)u_t - d_1e_{1t} - d_2e_{2t}$. This error term does not include future forecast errors and therefore does not cause a serially correlated error structure in the model.

Most survey information is in the form of qualitative answers (increase, no change, decrease). Further, often only the aggregate proportions of answers are available. Below we quantify the qualitative proportions data assuming that the shares of different answers can treated as probabilities and that the answers follow a logistic distribution. This gives a fairly good approximation to the normal distribution, which is more commonly used in quantifying survey data (e.g. Carlson and Parkin (1975), Knöbl (1974)). Let α_t and β_t denote the proportions, and hence the probabilities, of the "increase" and "decrease" answers, respectively. The quantified expected percentage change in employment is $M_{t+1} = \delta(A_t + B_t)/(B_t - A_t)$, where $A_t = \ln(1 - \alpha_t) - \ln\alpha_t$, $B_t = \ln\beta_t - \ln(1 - \beta_t)$ and δ is the indifference limen, i.e. the range of the "no change" category (see Wren-Lewis (1985)). In the Finnish business survey, which is used below, the indifference limen is ± 2 %, i.e. $\delta \doteq .02$. In most other business surveys δ is not given, but has to be estimated.

Since the quantification scheme may be imperfect, an errors-in-variables estimation problem can be created.$^{3)}$ Also, as above, there is simultaneity between q and n. Hence use of instrumental variables is justified. Defining $X_t = (q_t, w_t, n_{t-1} + Rm_{t+1})$, the estimator d_{IV} given above applies. Compared to the rational expectations case, however, the covariance matrix of the instrumental variables estimator, $\hat{\sigma}^2(X'Z(Z'Z)^{-1}Z'X)^{-1}$ ($\hat{\sigma}^2$ is the residual variance), is consistent unless there is a serially correlated structural error in the model, i.e. unless ε_t is serially correlated.

In the Finnish business survey there is a question on whether the expected number of employees in three months will be larger, the same or smaller than at the time of answering. Since the surveys are conducted during the last month of each quarter, the firms do not yet have complete information on output, employment etc. during the whole quarter, although they know the values of these variables at the time of answering. We therefore treat the answers as approximations to $E_{t-1}N_{t+1} - E_{t-1}N_t$. The firms are asked to adjust their answers to seasonal variations, which may decrease the approximation error.

The difference between the true expectations of quarter to quarter change and our approximation based on last month of quarter to last month of next quarter changes gives rise to a further error in the variable, but not to serial correlation. The proxy differs from the true expectation, but this error need not be correlated with current period error term as in the case where one has an error between expectations and realizations. Note also that this is different from the case where rationality of survey answers is tested by regressing realizations on the survey expectations. There, if the expectations are based on information from the period before the time of answering, a moving average error may be created, since the forecast error at t+1 is likely to be correlated with the error at t (see Brown and Maital (1981)).

5. Estimation results

We estimated the model using quarterly data from Finnish manufacturing in 1976.1-1985.4. The sources of data and description of the variables are given in the Appendix.

The empirical analysis showed that the estimate of the discount factor R tended to be unreasonably low, implying very high discount rates. When R was fixed a priori, the results were insensitive to variations in the discount rate in the range 0 to .1. The empirical results below are for the case $R = 1$, i.e. no discounting.

Pagan (1985) has argued that adjustment models like (4) should be made trend neutral by subtracting a trend term p_t from $N_t - N_{t-1}$. If trend growth is constant, p, the Euler equation includes a constant term $(1 - R)p$. Pagan criticizes in this respect the use of zero discounting, which eliminates the constant. Since we have differentiated the equation, the constant would be eliminated even if we had not assumed $R = 1$.

Table 1 presents the results obtained assuming rational expectations. The instruments used were q and w lagged 1,2,3 and 4 quarters and n lagged 2,3 and 4 quarters. Five lags were included when calculating the covariance matrix H. Use of the two-step instrumental variables method (TSIV) does not change the results much. The parameters a, g and s are less sensitive to the estimation method than c. Approximate standard errors for these recovered parameters were obtained using a Taylor series approximation.

The Box-Ljung (1978) statistic to test for residual autocorrelation in the residuals shows 4th degree serial correlation at the 5 % significance level. Also inspection of the autocorrelation, partial autocorrelation and extended autocorrelation functions (see Liu and Hudak (1983)) showed the possibility of an AR(4) or MA(4) process in the residuals. As noted above, it would be possible to incorporate an autocorrelated error in the model. However, using an AR(4) process would require moving the instrument set back to start from t-5. This would reduce the number of observations and the variables lagged so much might no longer be good instruments. Therefore we have not tried to filter out the remaining residual correlation.

The results obtained using survey expectations are in Table 2. The Ljung-Box statistic indicates no serial correlation in the residuals; this was also supported by the inspection of the autocorrelation, partial autocorrelation and extended autocorrelation functions of the residuals. Therefore, at least in this example the use of survey expectations gives a definite advantage over rational expectations.

As a comparison, we estimated the model assuming static expectations of future values of the variables. Instrumental variables estimation resulted in values 2.628, .276, .367 and .692 for c,a,g and s, respectively. The most notable difference compared to Tables 1 and 2 is the small value of a.

As to the economic interpretation of the results, the speed of adjustment a is fairly high, approximately .8 with rational and .7 with survey expectations. This difference is due to the difference in the estimate of c. When expectations are assumed to be static, we get a much slower adjustment of labor input. The reason for the high adjustment speed may be that in the estimation period changes in the labor input may have been large for other reasons, like technical change. We tried to take this into account by adding a time trend in the production function. In the estimation equations this appeared as a constant. However, the time trend turned out to be highly correlated with the real wage variable. To reduce multicollinearity we left the variable out of the model.

The output elasticity of employment, g, is close to .4 in all cases. This is the long-run elasticity; the short-run elasticity is d_1, which is approximately .3 for rational and .2 for survey expectations. These values imply short-run increasing returns to labor input, which is consistent with most other labor demand studies.

The elasticity of substitution between capital and labor, s, is over .7 both with rational and survey expectations, but slightly lower with static expectations. The short-run elasticity, $-d_2$, is almost .6 when rational expectations are assumed and .3 when survey expectations are used. The estimates of s are not significantly different from 1 so that the possibility of a Cobb-Douglas technology cannot be ruled out.

The results show that assuming a priori that expectations are rational, the adjustment speed is faster and the short-run elasticities of labor demand with respect to output and real wage were higher than when information on the actual expectations of the firms were used.

6. Conclusions

We have shown how one can simplify the estimation of dynamic optimization models by using survey expectations in the estimation of the Euler equation. Also the empirical application showed that serial correlation of the residuals was stronger when the erros-in-variables approach to rational expectations was used.

Further uses of survey data could include extending the basic adjustment model to include interaction of disequilibrium and adjustment costs (Nickell (1985)) or introduction of trend neutrality through intercept correction, dynamic order extension or target correction (Pagan (1985)). Each case would result in a specific combination of future expected values of the choice variable and the explanatory variables in the Euler equation. These expectations could be replaced by the quantified survey expectations.

Another interesting extension would be modelling the joint determination of capital and labor input with possibly interrelated adjustment costs. This would require also the expected future value of the capital input. The Finnish survey includes a question only on annual expected changes in investment. This time interval is different from the one used in the question on expected labor input and may therefore be difficult to incorporate in the model.

Table 1: Estimation of the model using rational expectations

Estimated parameters	IV	TSIV	std
d_1	.268	.255	.095
d_2	-.584	-.567	.224
d_3	.128	.167	.122
Recovered parameters			
c	5.839	4.002	4.374
a	.870	.828	.133
g	.360	.383	.045
s	.785	.785	.628
$\hat{\sigma}$	.0177	.0174	
Q1	.3	.0	
Q4	9.8*	11.0*	
T	30	30	

Note:		
	IV	instrumental variables estimates
	TSIV	two-step instrumental variables estimates
	std	standard errors
	$\hat{\sigma}$	residual standard error
	Qi	Ljung-Box statistic for testing ith order autocorrelation in the residuals; distributed as χ^2 with i d.f.; * significant at 5 % level
	T	efficient number of observations

Table 2: Estimation of the model using survey expectations

Estimated parameters	IV	std
d_1	.199	.084
d_2	-.339	.176
d_3	.266	.114
Recovered parameters		
c	1.756	1.611
a	.712	.146
g	.426	.144
s	.726	.691
$\hat{\sigma}$	.0163	
Q1	.6	
Q4	4.4	
T	31	

Note: see Table 1.

Footnotes

1) When a full information method is used, limited information estimation can still be justified as a preliminary step for analyzing the type of solution of the model; see Wickens (1986).

2) See Phipps (1975) for an example of a labor demand function derived from a CES production function assuming static expectations.

3) If δ had to be estimated, an additional source of error would appear; see Wren-Lewis and Warner (1985) and Wren-Lewis (1985) for a discussion of the methods of estimating δ.

Appendix: Description and sources of data

Output:	Index of production in manufacturing; quarterly figures averaged from monthly figures. Source: Statistical Yearbook of Finland.
Labor input:	Number of employees in manufacturing; figures for 1976 estimated from figures for industry (mining and manufacturing) using 1977 share of manufacturing in industry employment. Source: Labour Force Survey.
Real wage:	Wage and salary index in industry divided by producers' price index for manufacturing. Source: Statistical Yearbook of Finland.
Expectations:	Aggregate shares of qualitative answers to question on expected number of employees in three months; answers weighted by firms' number of employees. Source: Confederation of Finnish Industries, Suhdannebarometri.

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