ISSN 1503-299X

WORKING PAPER SERIES

No. 20/2002

WAGES AND SUBJECTIVE ASSESSMENTS OF REGIONAL LABOUR MARKET PRESSURE

Fredrik Carlsen
Kåre Johansen

Department of Economics

Norwegian University of Science and Technology
N-7491 Trondheim, Norway
www.svt.ntnu.no/iso/wp/wp.htm

Wages and subjective assessments of regional labour market pressure

This version: April 2002

Fredrik Carlsen[1], Kåre Johansen[2]

Both authors: Department of Economics, Norwegian University of Science and Technology, Dragvoll, N-7491 Trondheim, Norway.
Fax: 47 73 59 69 54.
[1]e-mail: fredrik.carlsen@svt.ntnu.no
[2] Corresponding author; e-mail: kare.johansen@svt.ntnu.no

Abstract. We utilise a rich set of regional labour market variables to explain regional variation in Norwegian manufacturing wages. In particular, regional indicators of labour market pressure are computed from survey data in which respondents are asked to evaluate local job prospects. We find that average reported satisfaction with local job prospects and other survey-based indicators perform better in regional wage equations than traditional labour market variables, including the regional unemployment rate. Our results suggest that surveys may provide useful information about regional labour markets.

JEL classification: J31
Keywords: Regional wages; Labour market pressure; Survey data

1. Introduction

Theories of wage bargaining and efficiency wage theories predict that local wages are affected by local labour market conditions. Ceteris paribus, local wages should be an increasing function of local labour market pressure. It is not obvious, however, how the concept of labour market pressure should be implemented empirically. In this paper we utilise a rich set of regional labour market variables to explain regional variation in Norwegian manufacturing wages. In particular, we investigate whether or not survey-based information can be used to predict regional wages.

Following the seminal contributions by Blanchflower and Oswald (1990, 1994), a large empirical literature has examined the relation between regional wages and regional labour market conditions.[1] All studies use the regional unemployment rate to characterize the tightness of the regional labour market. Some studies also include regional variables describing labour force participation (Kennedy and Borland 2000), vacancies (Edin et al. 1994), long-term unemployment (Manning 1994, Winter-Ebmer 1996, Kennedy and Borland 2000) and labour market programmes (Edin et al. 1994, Pannenberg and Schwarze 1998, Raaum and Wulfsberg 2000).

These measures of labour market pressure are 'objective' in the sense that they are computed from data collected by outside observers, usually government agencies. An alternative approach would be to compute regional labour market variables from subjective assessments made by workers and employers. For instance, one could conduct surveys in which workers are asked to evaluate the prospects of obtaining alternative jobs and employers are asked to evaluate the prospects of recruiting workers. The responses could then be aggregated to regional labour market indicators.

We can think of several reasons why 'subjective' measures of labour market pressure based on survey data would perform well in wage equations. First, surveys provide direct information about the beliefs of the insiders, i.e. the agents who determine wages. Subjective

[1] Recent contributions include Edin et al. (1994), Manning (1994), Wagner (1994), Bratsberg and Turunen (1996), Winter-Ebmer (1996), Partridge and Rickman (1997), Wulfsberg (1997), Baltagi and Blien (1998), Janssens and Konings (1998), Pannenberg and Schwarze (1998), Turunen (1998), Baltagi et al. (2000), Dyrstad and Johansen (2000), Kennedy and Borland (2000) and Raaum and Wulfsberg (2000).

measures may therefore reflect characteristics of labour markets considered relevant by insiders but which may not be observable to outside observers.

Second, since subjective measures assign weights to different aspects of labour markets according to the beliefs of insiders, changes in the importance of factors relevant to wage determination will automatically be incorporated. Third, insiders sometimes make mistakes. For instance, employers may incorrectly believe that job prospects of a particular type of workers have improved and therefore make generous wage offers to these workers. In such cases, subjective measures, although wrong in an absolute sense, may predict wages accurately whereas objective measures will clearly fail.

Another advantage of survey-based labour market variables is that surveys can be conducted at short notice and targeted at labour market segments of particular interest to policy makers. On the other hand, survey data also involve methodological problems. Interpersonal comparison of subjective perceptions may not be meaningful, and aggregation from individual responses requires cardinality of the measurement scale.

In this paper, we show that survey-based indicators of regional labour market pressure successfully predict regional variations in manufacturing hourly wages in Norway. The study uses six waves (1993-98) of an annual survey conducted by the Norwegian Gallup Institute (NGI) in which respondents report how satisfied they are with job prospects in their resident municipality and the surroundings. The survey data set comprises about 75.000 respondents. Regional measures of employment opportunities computed from the data set, such as mean satisfaction reported by respondents in a given county and year, have a positive and significant impact on manufacturing hourly wages, also when controlling for the regional unemployment rate and other objective measures of regional labour market pressure. Our results thus suggest that analyses of wage determination should use survey-based measures of labour market conditions in addition to traditional labour market variables.

Many economists are sceptical to survey-based measures of well-being, such as reported satisfaction with various aspects of life. However, in recent years, economists have used survey-based measures of well-being to investigate a range of topics, including the costs of unemployment and inflation (Clark and Oswald 1994, Winkelmann and Winkelmann 1998, Blanchflower and Oswald 2000, Di Telia et al. 2001), the value of direct democracy (Frey

and Stutzer 2000), the importance of absolute versus relative income (Clark and Oswald 1996), the relation between poverty and demographic factors (Ravallion and Lokshin 1999), the determinants of job separations and quits (Clark 2001) and the optimal supply of health care resources (Carlsen and Grytten 2000). These and other contributions have established that responses to questions about well-being from life as a whole or well-being associated with particular areas of life are not random numbers, but correlated with objective events and actions. For instance, reported life satisfaction is systematically related to demographic factors, physical and mental health, job loss and family disrupture, job satisfaction is negatively correlated with turnover and absenteeism, satisfaction with community attributes is systematically related to migration decisions and satisfaction with local public services is systematically correlated with local public spending. The results reported in this paper contribute to this literature by showing that subjective assessments of labour markets are systematically related to wage pressure.

The paper is organized as follows. Section 2 presents the survey data set. In section 3, we report a test of whether interpersonal comparison of subjective assessments of job prospects is meaningful. We estimate regressions explaining reported satisfaction as a function of personal attributes of the respondent and objective measures of regional labour market pressure. The results clearly indicate that interpersonal comparison of responses is meaningful: reported satisfaction with job prospects is systematically related to relevant personal attributes, such as education level and labour market status, as well as several objective measures of regional labour market pressure, including the regional unemployment rate.

In section 4, we conduct a panel data analysis of manufacturing hourly wages in Norway with objective measures of regional labour market pressure as regressors. Section 5 addresses some methodological issues pertaining to aggregation from individual responses to regional variables. In section 6, we estimate wage equations using as explanatory variables both survey-based and objective measures of regional labour market pressure. Section 7 offers concluding remarks.

2. Description of survey data

Since 1993, the NGI has conducted annual surveys where respondents are asked to evaluate a range of local amenities such as the climate and the quality of local public services. The questionnaire also includes a question about the regional labour market. Each year, a random sample of 20-50.000 persons older than 15 are contacted and about 50% agree to participate and return the questionnaire. Small municipalities are overrepresented in order to obtain responses from as many municipalities as possible.

This study employs data from the first six (1993-98) surveys. In these surveys, a total of 97.016 persons returned the questionnaire of which 74.309 (76.6%) answered the question about the labour market. The question is:

> *How satisfied/dissatisfied are you with the prospects of getting a job or a new job in the municipality (including the surroundings)?*

Presumably, respondents interpret the question as referring to the possibility of obtaining a job which does not require a change of residence if they are unemployed, and obtaining a new job which does not require a change of residence if they are employed. We believe the question reflects aspects of the regional labour market which are very relevant to workers when bargaining with employers. Unfortunately, no question about the employers' prospects of recruiting new workers is included in the questionnaire.

Respondents are asked to indicate a discrete number from 1 to 6. The questionnaire explains that 6 corresponds to 'very satisfied' and 1 to 'very dissatisfied'.

- Table 1 about here -

Table 1 describes the distribution of reported satisfaction levels. There is considerably variation between respondents. The two medium alternatives, 3 and 4, have the highest response frequencies, but as many as 29% of the respondents give 1 or 2 as their answer, and 25% report 5 or 6. The mean score is 3.40.

3. Determinants of reported satisfaction

In this section, we examine the relation between reported satisfaction with job prospects, personal characteristics of the respondent and objective measures of regional labour market pressure. As the question about the respondent's labour market status was changed in 1995, the analysis in this section employs data from the four surveys 1995-98. The standard entitlement age to public pensions in Norway is 67, and young people seldom enter the job market before high school has been completed, which is usually at the age of 19. Our sample therefore consists of the 47.759 respondents aged 20-66 who answered the question about local labour markets and provided complete information about personal characteristics (age, gender, education level and labour market status).

- Table 2 about here -

Table 2 presents five measures of labour market pressure that have been employed in analyses of local wages, and for which regional data are available in Norway. The data sources are the national Labour Market Agency and Statistics Norway. Since the question refers to the respondent's municipality and the 'surroundings', we compute the variables both at the municipal level and at the county level.[2] For reasons of confidentiality, information about long-term unemployment is published at the county level only. Information about vacancies at the municipal level is not available earlier than 1995.

Total unemployment includes people registered as unemployed (open unemployment) and participants of labour market programmes. The two variables 'accommodation ratio' and 'long-term ratio' characterize the relative importance of the three components of total unemployment: short-term open unemployment, long-term open unemployment and labour market programmes.

Two measures of vacancies are available: annual inflow of vacant jobs and average stock of unfilled jobs.[3] The two variables are strongly correlated and produce very similar results in the following analysis. We present results for the flow variable only.

[2] There are 435 municipalities (439 before 1994) and 19 counties. Average population size in 1998 was, respectively, 10.150 and 232.500.

[3] It is mandatory for employers to notify vacancies to the national Labour Market Agency. Registered vacancies are therefore probably a good proxy for actual vacancies.

Since reported satisfaction is a discrete variable, an ordered probit model is estimated:

$$Satisfaction_{jit} = \begin{cases} 6 \quad if \quad Satisfaction^{*}_{jit} \geq \mu_5 \\ 5 \quad if \quad \mu_5 > Satisfaction^{*}_{jit} \geq \mu_4 \\ . \\ . \\ 1 \quad if \quad Satisfaction^{*}_{jit} < \mu_1 \end{cases}$$

$$\text{Satisfaction}^{*}_{jit} = \alpha_{0t} + \mathbf{Person_{jit}}\,\alpha_1 + \mathbf{Labour_{it}}\,\alpha_2 + \mathbf{City_i}\,\alpha_3 + \varepsilon_{jit}.$$

$\text{Satisfaction}_{jit}$ is the satisfaction level reported by respondent j in municipality i and year t, $\text{Satisfaction}^{*}_{jit}$ is the corresponding latent variable, $\mathbf{Person_{jit}}$ is a vector of personal characteristics, $\mathbf{Labour_{it}}$ is a vector of regional labour market variables and $\mathbf{City_i}$ is a vector of city size dummies included to control for the size and diversity of the regional labour market. Year effects, α_{0t}, are included to control for unobservable factors common to the regional labour markets. μ_1 - μ_5 are cut-off points to be estimated.

If unobservable factors are correlated among respondents from the same regional labour market, estimated standard errors may be biased (Moulton, 1990). In the following, we use a robust estimator of variance which allows for municipal random effects:

$$\varepsilon_{jit} = \varepsilon_i + \xi_{jit},$$

where ε_i and ξ_{jit} are assumed to be normally, identically and independently distributed.[4]

- Table 3 about here -

Table 3 presents six ordered probit regressions. The labour market variables are registered at the municipal level in the first three columns and at the county level in the last three columns. All labour market variables are included in regressions 3.1 and 3.4, whereas regressions 3.2 and 3.5 include only labour market variables which are significant at the 5% level.

[4] Comparison of ordered probit regressions with and without municipal random effects suggests that standard errors are downward biased by a factor of 5-6 when municipal random effects are excluded.

In regressions 3.3 and 3.6, we have included a proxy variable for the respondent's general disposition to make favourable judgements. Research by psychologists has established that reported life satisfaction depends on personality traits such as extraversion, neuroticism and self-esteem (Diener et al. 1999). The proxy variable for personality traits is computed from another question in the questionnaire. We have chosen to use the question about the climate as the response rate is high and several climate variables are available at the municipal level. Our proxy for unobservable personality traits is the generalized residual from an ordered probit regression explaining reported satisfaction with the climate as a function of personal characteristics and climate variables.[5]

As is evident from Table 3, the generalized residual has a positive and very significant impact on reported satisfaction with job prospects, implying that people who are satisfied with the climate are, ceteris paribus, also satisfied with job prospects. However, the estimated coefficients and standard errors of the other regressors are not much affected when the personality trait variable is included.

We first comment on the personal characteristics. The effects of age and gender are weak. There is some evidence of a U-shaped relation between reported satisfaction and age; people aged 50-54 seem to be most pessimistic in regard to their job prospects.

In contrast, education level and labour market statuses are important for perceived job prospects. The coefficient of the dummy for college degree is positive (≈ 0.3) with a t-statistic in excess of 10, whereas the coefficient of the dummy for being unemployed is negative (≈ -0.8) with a t-statistic of about 20. The interval between cut-off points is about 0.7, implying that, ceteris paribus, having a college degree raises reported satisfaction with the local labour market by approximately half a unit, and being employed rather than unemployed raises reported satisfaction by more than one unit.

Consider next the regional labour market variables. Both total unemployment and the vacancy rate have the expected effects on reported satisfaction (negative and positive, respectively) and are significant in all equations with t-statistics that exceed 4. The estimated effects are

[5] We use the generalized residual (Gourieroux et al., 1987) as the residual is not observed when actual satisfaction (as opposed to reported satisfaction) is a latent variable.

strongest when the variables are measured at the county level, this is particularly so for the vacancy rate. The parameter estimates of equation 3.6 imply that the county unemployment rate must fall by about 10 percentage points or about 6 standard deviations to compensate for being unemployed. Thus, being unemployed in a county with 2% unemployment brings the same job prospects as being employed in a county with 12% unemployment, other things equal. The corresponding required increase in the vacancy rate is 0.23 (≈ 4.5 standard deviations). A decrease in county unemployment of 2 standard deviations produces an improvement in job prospects which corresponds approximately to the effect of obtaining a college degree (relative to not having completed high school). The corresponding required increase in the county vacancy rate is 1.5 standard deviations.

The effect of the accommodation ratio is small and insignificant (municipal level results) or negative and significant (county level results). In either case, we can conclude that open unemployment is not a sufficient measure of perceived labour market pressure. This result is consistent with Scandinavian studies that find a negative effect of labour market programmes on wage pressure (Edin et al. 1994, Raaum and Wulfsberg 2000).

The negative coefficient of the long-term ratio is inconsistent with the popular notion (see, e.g. Layard et al. 1991) that long-term unemployment reduces wage pressure less than short-term unemployment. At least in Norway, people consider job prospects to be gloomy in areas where a large share of the unemployed have been out of job for more than one year, other things equal. The participation rate has the expected positive impact on reported satisfaction. The coefficient is significant at the 5 % level when the variable is registered at the municipal level and otherwise insignificant.

The size and diversity of the regional labour market are clearly important to perceived job prospects. The effect is particularly strong for the capital, Oslo: the perceived job prospects of an unemployed person who has not completed high school and lives in Oslo is approximately the same as that of an employed person with a college degree living in the countryside. The decrease in the county unemployment rate required to compensate a move from Oslo to rural areas is more than 10 percentage points. The corresponding decrease in county unemployment required to compensate a move from a large city (size > 50.000) to rural areas is also large (7-9 percentage points).

- Table 4 about here -

Table 4 presents ordered probit regressions for demographic groups as well as for each of the four surveys; for brevity, we present results for municipal labour market variables only and do not report parameter estimates for age and gender variables.

Although the main conclusions are very robust, there are some interesting differences between subsamples. The unemployment rate seems to be most important to 'weak' groups - those without a college degree and the unemployed - and less important to 'strong' groups - people with a college degree and people who have a job. The participation rate exhibits the opposite pattern: the estimated effect of the participation rate is strongest for the employed and people with a college degree. These findings probably reflect that people without a job and the less educated face relatively strong job competition from the unemployed, whereas people with a job and the most educated primarily compete with those who have a job. Our results are consistent with US studies which find that the unemployment elasticity of pay is higher for the less educated (Blanchflower and Oswald 1994, Turunen 1998).

As could be expected, regional unemployment and regional long-term unemployment are more important when national unemployment is high (1995) than during a boom (1997-98); the opposite is the case for the participation rate. Personal unemployment has the strongest impact on job prospects for the most educated and during a boom; both results probably reflect selection effects. The estimated effect of the vacancy rate is stable across demographic groups; there is some evidence that inflow of jobs is most important during a boom.

The results reported in this section clearly suggest that interpersonal comparison of subjective assessments of regional labour markets is meaningful. Reported satisfaction with local job prospects is systematically related to relevant personal attributes, such as education level and labour market status, as well as with objective measures of regional labour market pressure. Moreover, variations between demographic groups and across the business cycle in the estimated effects of personal attributes and regional labour market variables on perceived job prospects are generally consistent with a priori expectations.

4. Estimating a regional wage equation

We now examine whether regional indicators of perceived job prospects can explain variation in regional wages. The analysis proceeds in three steps. In this section, we estimate a standard industry wage equation with the regional labour market variables listed in Table 2 as proxy variables for regional labour market pressure. In section 5, we compute a set of regional indicators of perceived job prospects from the survey data set. In section 6, we include both these variables and traditional regional labour market variables in wage equations.

The analysis is based on a balanced panel of annual time series for the municipalities computed from the manufacturing statistics data base of Statistics Norway. The data base has been employed by Dyrstad and Johansen (2000) to study how manufacturing wages respond to variation in industry profitability and regional unemployment during the time period 1973-88; details of the data construction can be found in their paper. Complete time series from 1991 to 1998 are available for 316 municipalities.

Our theoretical framework is a standard bargaining model, e.g. Hoel and Nymoen (1988) and Layard et al. (1991), where wages are given by profitability, regional labour market conditions and aggregate factors. The wage equation to be estimated is:

$$\log(\text{Wage})_{it} = \alpha_{0t} + \alpha_1 \log(\text{Wage})_{it-1} + \alpha_2 \log(\text{Value added})_{it} + \alpha_3 \log(1+\text{payroll tax})_{it} + \log(\mathbf{Labour})_{ct-1}\boldsymbol{\alpha_4} + \mathbf{City_i}\,\boldsymbol{\alpha_5} + \alpha_{0i} + \varepsilon_{it},$$

where subscripts i, c and t refer to, respectively, municipality, county and year. Wage_{it} is hourly manufacturing wage costs, including payroll taxes, Value added_{it} is manufacturing value added at factor prices per working hour, $\mathbf{Labour_{ct}}$ is a vector of the regional labour market variables listed in Table 2, $\mathbf{City_i}$ is a vector of city size dummies, α_{0t} is a set of time dummies included to control for any effects of aggregate factors common to all municipalities, α_{0i} is a set of time invariant municipal specific effects, and ε_{it} is a random disturbance assumed to be identically and independently distributed. Preliminary analyses suggest that the regional labour market variables perform best when lagged one period, registered at the county level and entered in logs rather than in levels; to conserve space, we do not report regressions with other specifications.

Since the wage equation includes lagged dependent variable and municipal fixed effects, within-groups estimators are biased. Furthermore, regional labour market variables should be regarded as potentially endogenous because employment decisions of firms depend on wages. Value added per working hour should be considered potentially endogenous for the same reason, whereas payroll taxes are potentially endogenous because policy makers differentiate tax rates according to regional labour market conditions.

To obtain consistent estimates, we apply a system GMM estimator suggested by Arellano and Bover (1995) and Blundell and Bond (1998). The GMM system estimator uses both equations in first-differences in which municipal effects are eliminated and equations in levels. Endogenous variables lagged two or more years are valid instruments in the differenced equations if there is no serial correlation in the random disturbances. The levels equations require instruments which are orthogonal to the municipal effects. As shown in Blundell and Bond (1998), first-differences of variables may be uncorrelated with the municipal effects even if the levels are correlated with the effects. We use all explanatory variables (except the city size dummies) lagged two and three years as instruments in the differenced equations, and one lag of first-differences as instruments in the levels equations.

Table 5 presents wage equations with alternative combinations of the regional labour market variables. In all equations, the diagnostic tests indicate that the instruments are valid: the Arellano and Bond (1991) test of serial correlation suggests that the error terms are white noise, and the orthogonality restrictions are accepted by the Sargan test. To check that the Sargan test has sufficient power, we have also estimated the wage equations with the explanatory variables lagged one year as additional instruments. The test now overwhelmingly rejects instrument validity (as it should).

- Table 5 about here –

The estimated effects of the regional labour market variables conform well with the analysis presented in the preceding section. Total unemployment, the participation rate and the vacancy rate have the expected effects on regional wages and are statistically significant when entered alone. The participation rate is significant also when entered together with the two other variables, total unemployment is significant when entered with the vacancy rate, and the

vacancy rate is significant when entered with the participation rate. The coefficient of the accommodation rate is statistically insignificant, suggesting that total unemployment is a better measure of labour market pressure than open unemployment. As noted above, this result is consistent with other Scandinavian studies of wage formation. We find a negative but small and insignificant effect of long-term unemployment on wages. When total unemployment is entered alone (equation 5.2), the estimated long run unemployment elasticity of wages (-0.088) is close to the preferred estimate reported by Blanchflower and Oswald (1994) for Norway but well below the estimates of Dyrstad and Johansen (2000) and Raaum and Wulfsberg (2000).

We close this section by commenting briefly on some of the other explanatory variables. We find a positive and significant impact of value added on wages. The estimated long run insider weight is 0.14-0.16, which is higher than the estimates reported by Wulfsberg (1997) and by Holmlund and Zetterberg (1991) for Norway, but fairly consistent with the findings of Dyrstad and Johansen (2000). Consistent with the results reported in the preceding section, we find that wages are significantly higher in large cities than in rural areas. Ceteris paribus, manufacturing hourly wages are about 15% higher in Oslo than in rural areas.

5. Survey-based regional indicators

In this section, we address some methodological issues pertaining to aggregation of individual responses to the regional level and compute a set of regional indicators of perceived job prospects, denoted 'regional satisfaction variables', from the survey data set. Consistent with the results reported in the preceding section, we find that regional satisfaction variables perform best in wage equations when registered at the county level. We therefore do not present regional satisfaction variables registered at the municipal level.

- Table 6 about here -

A natural measure of perceived job prospects in a given county and year is average satisfaction reported by respondents in that county and year ('mean satisfaction'). Table 6 reports summary statistics and correlations with some of the other regional labour market variables. As could be expected from the analysis presented in section 3, mean satisfaction is

strongly negatively correlated with total unemployment, and strongly positively correlated with the participation rate and the vacancy rate. Mean satisfaction and the other variables are, however, far from perfectly correlated, indicating that regional satisfaction variables may provide interesting information about regional labour markets not captured by traditional labour market variables.

There are at least three reasons why mean satisfaction should be considered potentially endogenous. First, the argument presented for traditional regional labour market variables in the preceding section also applies to regional satisfaction variables: job prospects depend on the employment decisions of firms, which in turn depend on wages.

Second, the results reported in Table 3 suggest that average reported satisfaction with job prospects will tend to be low in regions with a high share of unskilled workers (because of the positive effect of education level on reported satisfaction). Our wage variable, which is the average wage rate of all workers, will also tend to be low in such regions. Lack of data about individual workers may therefore create a spurious correlation between wages and mean satisfaction.

We attempt to handle this problem by creating a new regional satisfaction variable ('adjusted mean satisfaction') which does not mix up variation in job market prospects with variation in the composition of respondents. An OLS regression is estimated explaining reported satisfaction as a function of personal attributes of the respondents, including education level, and county x year dummy variables. The coefficients of the dummy variables can be interpreted as mean satisfaction for given personal attributes. [6] We emphasize that this approach does not necessarily eliminate the endogeneity problem because unobservable personal attributes may affect both adjusted mean satisfaction and the wage level. However, a comparison of how the two satisfaction variables perform in the wage equations gives a rough indication of the importance of the problem.

Population mobility is a third source of simultaneity bias. Regions with high population mobility will tend to have a favourable match between the skills supplied by workers and the skills demanded by firms. These regions have therefore, ceteris paribus, both high wages and

[6] We consider an employed male aged 30-34 who has completed high school.

good employment opportunities for workers. This endogeneity problem is not straightforward to handle because a person's willingness to move cannot be directly observed.

To examine the practical importance of population mobility as a source of simultaneity bias, we compute a regional satisfaction variable from a subsample of respondents expected to be less mobile than the total population of respondents. It is well known from studies of population mobility that recent movers have higher propensity to relocate than the rest of the population (Greenwood 1997). The survey data set includes information about whether a person moved to his/her present resident municipality during the last four years. By removing persons who has stayed less than four years in the municipality, we obtain a subsample of respondents where firm-worker matching due to migration presumably is less important than in the total sample of respondents. Our third regional satisfaction variable ('mean satisfaction, stayers') is mean satisfaction with job prospects reported by non-movers.

The three variables – mean satisfaction, adjusted mean satisfaction and mean satisfaction, stayers – are highly correlated (correlations ≥ 0.98, see Table 6). The high correlations suggest that neither lack of data about individual workers nor population mobility are important sources of simultaneity bias. However, as a robustness check, we will include all variables in wage equations. Due to the first source of simultaneity bias (the interdependence of wages and employment opportunities), all regional satisfaction variables will be instrumented.

The next issue we consider is the measurement scale. The three satisfaction variables require the response categories to be equally spaced in the sense that the subjective distance between 1 and 2 is identical to that between 2 and 3, etc. An alternative measure, which may be more robust to variation in the subjective distance between response categories, is the share of respondents who rank job prospects above a given threshold, for instance the median response category (= 3). Another approach is to divide the scale into more than two intervals and compute the share of respondents of each interval.

Both approaches are considered. We estimate wage equations with the share of respondents reporting satisfaction above 3 ('satisfaction456'), as regressor, as well as wage equations with the share of respondents reporting 5 or 6 ('satisfaction56') and the share of respondents

reporting 3 or 4 (’satisfaction34’) as regressors. Satisfaction456 and satisfaction56 are both highly correlated with the other regional satisfaction variables (Table 6).

Since we study manufacturing wages, it would seem natural to compute regional satisfaction variables from the subsample of respondents who work in the manufacturing sector. However, lack of information about the occupation of respondents precludes this option. The survey data set has one question about whether the respondent receives ’income from work’. Our last satisfaction variable (’mean satisfaction, workers’) is mean satisfaction reported by the subsample of respondents who gave an affirmative answer to the question.

6. Wage equations with regional satisfaction variables

Tables 7-8 present wage equations with regional satisfaction variables. For brevity, the coefficients of the lagged dependent variable, industry variables and city size dummies are not reported; the estimated effects of these variables are not much affected relative to those reported in Table 5. Whereas the other regional labour market variables perform best when lagged one year and entered in logs, the regional satisfaction variables perform best when lagged one year and entered in levels. All regional labour market variables, including regional satisfaction variables, are instrumented; the set of instruments include regional satisfaction variables and other regional labour market variables lagged two and three years. In all equations, the diagnostic tests indicate that the instruments are valid.

- Table 7 about here -

Table 7 presents wage equations with mean satisfaction. When other regional labour market variables are excluded (equation 7.1), mean satisfaction has a positive and significant effect on wages with t-statistic close to 4. The long run estimate is 0.051, implying that an increase in mean satisfaction by one unit (about 2 standard deviations) will increase manufacturing hourly wages by 5.1%.

The rest of the columns of Table 7 present wage equations with mean satisfaction and various combinations of other regional labour market variables. Mean satisfaction clearly performs better than traditional labour market variables: whereas total unemployment, the participation

rate and the vacancy rate all become statistically insignificant in every equation, the estimated effect of mean satisfaction is positive in every equation and significant at the 5% level when either the participation rate or the vacancy rate are excluded, or when only one of the other regional labour market variables are included. All equations reported in Table 7 have also been estimated on two subsamples, 1994-96 and 1996-98. The estimated effects based on data for the two subsamples are very similar, and mean satisfaction performs as least as well as the other regional labour market variables on both subsamples.

- Table 8 about here -

Table 8 replicates the equations of Table 7 for each of the other regional satisfaction variables. The results reported in Table 7 appear to be very robust. The estimated effects of adjusted mean satisfaction and mean satisfaction, stayers, are almost identical to the corresponding estimates of (unadjusted) mean satisfaction. Also, the estimates of satisfaction456 and satisfaction56 are fully consistent with the effects of mean satisfaction in the sense that an increase by one standard deviation will produce very similar wage growth.

For every satisfaction variable we have computed (except satisfaction34), the variable has a positive and statistically significant impact on wages when other labour market variables are excluded. Whereas total unemployment, the participation rate and the vacancy rate are always insignificant, the satisfaction variables are significant in most equations. When a satisfaction variable is included with either total unemployment, the participation rate or the vacancy rate, the satisfaction variable always performs best. We can therefore conclude that our main result is very robust: survey-based regional indicators of labour market pressure perform better than traditional labour market variables in explaining regional variations in manufacturing wages in Norway.

7. Conclusion

Policy makers collect data about regional labour markets for several reasons. Regional labour market variables are employed to predict wage changes and population movements. Regional labour market variables also provide information about trends in regional disparities.

In this paper, we develop a set of regional labour market indicators from surveys in which respondents evaluate local job prospects. Our results, based on Norwegian data, indicate that survey-based indicators may improve analyses of wage pressure: we find that average reported satisfaction with local job prospects as well as other survey-based indicators of regional labour market pressure perform better than traditional regional labour market variables, including the regional unemployment rate, in regional wage equations. We address a number of methodological issues, and the results turn out to be very robust. These findings suggest that policy makers may want to use surveys as a supplement to traditional sources of information about regional labour markets. Whether surveys also have a potential for improving analyses of population movements and regional disparities remain issues for future research.

Acknowledgements

We would like to thank Jonas Agell, Torberg Falch, Knut Røed, Oddbjørn Raaum, Jean Pierre Urbain, participants at the 2001 Norwegian seminar on Labour Economics at Inderøy and colleagues at the Department for helpful comments and suggestions. The usual caveats apply.

References

Arellano M, Bond S (1991) Some tests of specification for panel data: monte-carlo evidence and an application to employment equations, Review of Economic Studies 58:277-297.

Arellano M, Bover O (1995) Another look at the instrumental-variable estimation of error-component models, Journal of Econometrics 68:29-52.

Baltagi B H, Blien U (1998) The German wage curve: evidence from the IAB employment sample, Economics Letters 61:135-142.

Baltagi B H, Blien U, Wolf K (2000) The East German wage curve 1993-1998, Economics Letters 69:25-31.

Blanchflower D, Oswald A (1990) The wage curve, Scandinavian Journal of Economics 92: 215-235.

Blanchflower D, Oswald A (1994) The wage curve. MIT Press, Cambridge MA.

Blanchflower D, Oswald A (2000) Well-being over time in Britain and the USA, NBER Working Paper 7487.

Blundell R, and Bond S (1998) Initial conditions and moment restrictions in dynamic panel data models, Journal of Econometrics 87:115-143.

Bratsberg B, Turunen J (1996) Wage curve evidence from panel data, Economics Letters 51: 345-353.

Carlsen F, Grytten J (2000) Consumer satisfaction and supplier induced demand, Journal of Health Economics 19:731-753.

Clark A (2001) What really matters in a job? Hedonic measurement using quit data, Labour Economics 8:223-242.

Clark A, Oswald A (1994) Unhappiness and unemployment, Economic Journal 104:648-659.

Clark A, Oswald A (1996) Satisfaction and comparison income, Journal of Public Economics 32:331-353.

Diener E, Eunkook M, Lucas R, Smith H (1999) Subjective well-being: three decades of progress, Psychological Bulletin 125:276-302.

Di Telia R, MacCulloch R, Oswald A (2001) Preferences over inflation and unemployment: evidence from surveys of happiness, American Economic Review 91:335-341.

Dyrstad J, Johansen K (2000) Regional wage responses to unemployment and profitability: empirical evidence from Norwegian manufacturing industries, Oxford Bulletin of Economics and Statistics 62:101-117.

Edin P, Holmlund B, Östros T (1994) Wage behaviour and labour market programmes in Sweden: evidence from microdata, in: Tachibanaki T (ed) Labour market and economic performance: Europe, Japan and the USA. MacMillan, Basingstoke, 33-55.

Frey B, Stutzer A (2000) Happiness, economy and institutions, Economic Journal 110:918-938.

Gourieroux C, Montford A, Renault E, Trognon A (1987) Generalized residuals, Journal of Econometrics 34:5-32.

Greenwood M (1997) Internal migration in developed countries, in: Rosenzweig M, O Stark (eds.), Handbook of Population and Family Economics, Amsterdam: North-Holland.

Hoel M, Nymoen R (1988) Wage formation in Norwegian manufacturing. An empirical application of a theoretical bargaining model, European Economic Review 32:977-998.

Holmlund B, J Zetterberg (1991) Insider effects in wage determination: evidence from five countries, European Economic Review 35:1009-1034.

Janssens S, Konings J (1998) One more wage curve: the case of Belgium, Economics Letters 60:223-227.

Kennedy S, Borland J (2000) A wage curve for Australia? Oxford Economic Papers 52:774-803.

Layard R, Nickell S, Jackman R (1991) Unemployment. Macroeconomic Performance and the Labour Market. Oxford University Press, Oxford.

Manning N (1994) Are higher long-term unemployment rates associated with lower earnings? Oxford Bulletin of Economics and Statistics 56:383-397.

Moulton B (1990) An illustration of a pitfall in estimating the effects of aggregate variables on micro units, Review of Econometrics and Statistics 72:334-338.

Pannenberg M, Schwarze J (1998) Labor market slack and the wage curve, Economics Letters 58:351-354.

Partridge M, Rickman D (1997) Has the wage curve nullified the Harris-Todaro model? Economics Letters 54:277-282.

Raaum O, Wulfsberg F (2000) Unemployment, labour market programmes and wages in Norway, Working Paper, The Frisch Centre, Oslo.

Ravallion M, Lokshin M (1999) Subjective economic welfare, Working Paper, Development Research Group, World Bank.

Sargan J (1958) The estimation of economic relationships using instrumental variables, Econometrica 26:393-415.

Turunen J (1998) Disaggregated wage curves in the United Sates: evidence from panel data of young workers, Applied Economics 30:1665-1677.

Wagner J (1994) German wage curves, 1979-1990, Economics Letters 44:307-311.

Winkelmann L, Winkelmann R (1998) Why are the unemployed so unhappy? Evidence from panel data, Economica 65:1-15.

Winter-Ebmer R (1996) Wage curve, unemployment duration and compensating differentials, Labour Economics 3:425-434.

Wulfsberg F (1997) An application of wage bargaining models to Norwegian panel data, Oxford Economic Papers 49:419-440.

Table 1. Distribution of reported satisfaction

Response categories	1	2	3	4	5	6	Total
Number of respondents	9.866	11.899	17.105	16.731	11.687	7.021	74.309
% of respondents	13.3	16.0	23.0	22.5	15.7	9.4	100

Table 2. Description of regional labour market variables

Variable	Description	Municipality level (2616 data points)		County level (114 data points)	
		Mean	St. dev	Mean	St. dev.
Unemployment variables					
Total unemployment	Sum of registered unemployed and labour market slots scaled by labour force	0.073	0.038	0.049	0.015
Long-term ratio	Long-term unemployed (duration ≥ 1 year) scaled by registered unemployed		na.	0.288	0.061
Accomodation ratio	Labour market slots scaled by sum of registered unemployed and labour market slots	0.306	0.096	0.286	0.061
Participation rate	Labour force scaled by population aged 16-66	0.644	0.056	0.670	0.028
Vacancy rate[a]	Annual inflow of vacancies scaled by labour force	0.167	0.080	0.172	0.050

Note:
[a]Information about vacancies at the municipality level is available from 1995 only.

Table 3. Ordered probit regressions - Left hand side variable is reported satisfaction

	Mean	(3.1)	(3.2)	(3.3)	(3.4)	(3.5)	(3.6)
Personal characteristics:							
Age 20-24		Reference category					
Age 25-29	0.112	0.017	0.017	0.009	0.013	0.013	0.005
		(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.029)
Age 30-34	0.146	0.021	0.021	0.009	0.021	0.020	0.008
		(0.025)	(0.025)	(0.025)	(0.026)	(0.026)	(0.025)
Age 35-39	0.150	0.029	0.029	0.023	0.031	0.030	0.024
		(0.027)	(0.027)	(0.025)	(0.026)	(0.026)	(0.026)
Age 40-44	0.141	-0.018	-0.018	-0.023	-0.018	-0.020	-0.025
		(0.026)	(0.026)	(0.025)	(0.026)	(0.026)	(0.025)
Age 45-49	0.125	-0.041	-0.041	-0.042	-0.042	-0.046	-0.047
		(0.024)	(0.025)	(0.024)	(0.025)	(0.024)	(0.024)
Age 50-54	0.119	-0.086	-0.086	-0.090	-0.086	-0.088	-0.092
		(0.026)	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)
Age 55-59	0.079	-0.033	-0.033	-0.037	-0.030	-0.032	-0.037
		(0.029)	(0.029)	(0.030)	(0.029)	(0.029)	(0.030)
Age 60-66	0.080	0.159	0.159	0.157	0.165	0.163	0.160
		(0.032)	(0.032)	(0.033)	(0.032)	(0.032)	(0.033)
Female	0.505	Reference category					
Male	0.495	0.007	0.007	0.009	0.003	0.003	0.005
		(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.014)
Not high school	0.162	Reference category					
High school	0.470	0.036	0.036	0.034	0.049	0.048	0.046
		(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
College	0.368	0.275	0.275	0.269	0.297	0.299	0.295
		(0.025)	(0.025)	(0.026)	(0.025)	(0.025)	(0.025)
Employed	0.818	Reference category					
Not in labour force	0.159	-0.182	-0.182	-0.176	-0.186	-0.188	-0.182
		(0.018)	(0.018)	(0.019)	(0.018)	(0.018)	(0.019)
Unemployed	0.023	-0.834	-0834	-0.837	-0.846	-0.846	-0.848
		(0.041)	(0.041)	(0.041)	(0.042)	(0.042)	(0.042)
Regional labour market variables:							
Unemployment variables:							
Total unemployment		-6.304	-6.304	-5.843	-8.101	-9.135	-8.950
		(0.873)	(0.873)	(0.887)	(1.693)	(1.525)	(1.528)
Long-term ratio		-1.422	-1.422	-1.484	-0.872		
		(0.466)	(0.465)	(0.472)	(0.511)		
Accommodation ratio		-0.002			-2.665	-2.777	-3.032
		(0.310)			(0.928)	(0.969)	(0.985)
Participation rate		1.860	1.860	2.212	1.296		
		(0.516)	(0.515)	(0.514)	(0.924)		
Vacancy rate		1.691	1.691	1.728	3.397	3.706	3.604
		(0.347)	(0.347)	(0.365)	(0.735)	(0.665)	(0.719)

City size dummies:							
< 5 000 (or rural area)	0.414	Reference category					
10 000 – 5 000	0.128	0.170	0.170	0.186	0.295	0.302	0.329
		(0.057)	(0.057)	(0.056)	(0.050)	(0.048)	(0.050)
25 000 – 10 000	0.116	0.278	0.278	0.274	0.366	0.353	0.361
		(0.078)	(0.079)	(0.073)	(0.067)	(0.066)	(0.065)
50 000 – 25 000	0.111	0.459	0.459	0.490	0.549	0.524	0.568
		(0.083)	(0.085)	(0.088)	(0.053)	(0.059)	(0.060)
> 50 000 (except Oslo)	0.176	0.544	0.544	0.590	0.684	0.684	0.745
		(0.077)	(0.076)	(0.076)	(0.081)	(0.082)	(0.087)
Oslo	0.055	1.225	1.225	1.265	1.012	0.888	0.944
		(0.099)	(0.099)	(0.102)	(0.127)	(0.077)	(0.081)
Personality trait variable:							
Generalized residual				0.155			0.146
				(0.010)			(0.010)
Estimated cut-off points:							
μ_1		-0.286	-0.286	-0.043	-1.137	-1.830	-1.910
μ_2		0.393	0.393	0.643	-0.465	-1.158	-1.232
μ_3		1.067	1.067	1.325	0.204	-0.489	-0.557
μ_4		1.766	1.766	2.033	0.898	0.205	0.145
μ_5		2.529	2.530	2.806	1.657	0.963	0.913
Log L		-78403	-78404	-76500	-78742	-78762	-76903
Log L at zero		-83087	-83087	-81564	-83087	-83087	-81564
Number of respondents		47759	47759	46897	47759	47759	46897

Notes:
(i) Standard errors corrected for municipal random effects in parentheses.
(ii) Share of long-term unemployed is measured at the county level. The other regional labour market variables are measured at the municipal level in (3.1)-(3.3) and at the county level in (3.4)-(3.6).
(iii) All equations include time dummies.

Table 4. Results for subsamples of respondents

	Age 19-44	Age 45-66	Female	Male	Not high school	High school	College
Personal characteristics:							
Not high school	Reference category						
High school	0.091	-0.009	0.048	0.029			
	(0.024)	(0.020)	(0.020)	(0.021)			
College	0.298	0.270	0.438	0.111			
	(0.034)	(0.029)	(0.026)	(0.035)			
Employed	Reference category						
Not in labour force	-0.198	-0.151	-0.148	-0.199	-0.160	-0.130	-0.255
	(0.025)	(0.022)	(0.023)	(0.025)	(0.031)	(0.027)	(0.034)
Unemployed	-0.837	-0.824	-0.777	-0.887	-0.710	-0.807	-1.022
	(0.050)	(0.058)	(0.047)	(0.062)	(0.071)	(0.050)	(0.089)
Regional labour market variables:							
Unemployment variables							
Total unemployment	-6.203	-5.239	-5.667	-6.040	-6.915	-7.192	-3.346
	(0.959)	(0.944)	(0.884)	(1.021)	(1.150)	(1.062)	(1.039)
Long-term ratio	-1.278	-1.860	-1.105	-1.871	-1.645	-1.617	-1.140
	(0.499)	(0.502)	(0.448)	(0.519)	(0.571)	(0.531)	(0.534)
Participation rate	2.069	2.480	2.204	2.283	2.418	1.829	2.933
	(0.528)	(0.556)	(0.445)	(0.649)	(0.626)	(0.598)	(0.490)
Vacancy rate	1.862	1.536	1.603	1.867	1.790	1.991	1.418
	(0.388)	(0.353)	(0.333)	(0.417)	(0.405)	(0.378)	(0.407)
City size dummies:							
< 5.000 (or rural area)	Reference category						
10 000 - 5 000	0.178	0.203	0.187	0.185	0.144	0.235	0.151
	(0.059)	(0.057)	(0.049)	(0.069)	(0.075)	(0.064)	(0.055)
25 000 - 10.000	0.178	0.266	0.268	0.286	0.223	0.332	0.238
	(0.059)	(0.075)	(0.071)	(0.079)	(0.100)	(0.085)	(0.060)
50.000 - 25.000	0.283	0.475	0.460	0.525	0.367	0.545	0.502
	(0.073)	(0.089)	(0.079)	(0.103)	(0.088)	(0.090)	(0.100)
> 50.000 (except Oslo)	0.632	0.523	0.594	0.588	0.392	0.618	0.622
	(0.082)	(0.077)	(0.070)	(0.087)	(0.073)	(0.076)	(0.080)
Oslo	1.346	1.110	1.192	1.348	0.901	1.220	1.340
	(0.107)	(0.103)	(1.000)	(0.113)	(0.123)	(0.106)	(0.118)

	Employed	Not in labour force	Unemployed	1995	1996	1997	1998
Personal characteristics:							
Not high school			Reference category				
High school	0.031	0.062	-0.029	0.090	0.035	0.0005	0.035
	(0.017)	(0.038)	(0.080)	(0.033)	(0.031)	(0.033)	(0.025)
College	0.275	0.248	0.041	0.362	0.365	0.230	0.186
	(0.040)	(0.041)	(0.113)	(0.045)	(0.034)	(0.037)	(0.039)
Employed					Reference category		
Not in labour force				-0.234	-0.268	-0.150	-0.099
				(0.034)	(0.036)	(0.031)	(0.024)
Unemployed				-0.660	-0.953	-0.909	-0.794
				(0.069)	(0.058)	(0.077)	(0.082)
Regional labour market variables:							
Unemployment variables:							
Total unemployment	-5.554	-6.830	-10.294	-7.598	-6.469	-3.941	-4.781
	(0.915)	(1.086)	(1.797)	(0.931)	(0.909)	(1.905)	(1.340)
Long-term ratio	-1.532	-1.241		-2.916	-2.949		
	(0.484)	(0.557)		(0.490)	(0.548)		
Accommodation ratio					-1.214		
					(0.397)		
Participation rate	2.224	2.308		1.524	1.701	2.339	2.169
	(0.536)	(0.557)		(0.534)	(0.506)	(0.941)	(0.625)
Vacancy rate	1.741	1.655	2.285	1.252	0.829	1.878	1.816
	(0.376)	(0.401)	(0.612)	(0.475)	(0.375)	(0.577)	(0.338)
City size dummies:							
< 5.000 (or rural area)			Reference category				
10 000 - 5 000	0.201	0.131	0.062	0.117	0.144	0.244	0.281
	(0.071)	(0.071)	(0.099)	(0.069)	(0.058)	(0.090)	(0.064)
25 000 - 10 000	0.286	0.201	0.439	0.030	0.242	0.129	0.414
	(0.071)	(0.098)	(0.144)	(0.075)	(0.061)	(0.113)	(0.067)
50 000 - 25 000	0.519	0.360	0.385	0.281	0.580	0.375	0.501
	(0.091)	(0.085)	(0.130)	(0.074)	(0.077)	(0.113)	(0.091)
> 50.000 (except Oslo)	0.611	0.514	0.465	0.406	0.505	0.580	0.815
	(0.080)	(0.076)	(0.146)	(0.070)	(0.082)	(0.071)	(0.087)
Oslo	1.322	1.032	0.715	1.266	1.516	1.100	1.263
	(0.104)	(0.122)	(0.110)	(0.108)	(0.109)	(0.074)	(0.071)

Notes:
(i) Standard errors corrected for municipal random effects in parentheses.
(ii) The regional labour market variables except the long-term ratio are measured at the muncipal level.
(iii) All equations include dummies for age and gender, the generalized residual and time dummies.

Table 5. Estimated wage equations - Left hand side variable is log (Wage)

	(5.1)	(5.2)	(5.3)	(5.4)	(5.5)	(5.6)	(5.7)	(5.8)
Industry variables:								
log (Wage (-1))	0.382	0.390	0.378	0.378	0.395	0.382	0.388	0.418
	(0.052)	(0.051)	(0.052)	(0.051)	(0.052)	(0.052)	(0.052)	(0.053)
log (Value added)	0.090	0.088	0.092	0.093	0.089	0.094	0.098	0.090
	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.023)	(0.022)
Regional labour market variables:								
log (1+payroll tax)	0.582	0.465	0.633	0.451	0.576	0.666	0.493	0.786
	(0.200)	(0.117)	(0.166)	(0.118)	(0.159)	(0.132)	(0.110)	(0.127)
log (Total unemployment(-1))	-0.045	-0.054	-0.015	-0.034	-0.044			
	(0.018)	(0.016)	(0.023)	(0.019)	(0.018)			
log (Long-term ratio(-1))	-0.024							
	(0.026)							
log (Accommodation ratio(-1))	-0.059							
	(0.041)							
log (Participation rate(-1))			0.259	0.229		0.280	0.321	
			(0.124)	(0.118)		(0.096)	(0.096)	
log (Vacancy rate(-1))			0.031		0.024	0.036		0.046
			(0.019)		(0.018)	(0.017)		(0.016)
City size dummies:								
< 5 000 (or rural areas)	Reference category							
10 000 – 5 000	0.039	0.040	0.036	0.038	0.039	0.036	0.035	0.035
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
25 000 – 10 000	0.058	0.058	0.055	0.059	0.057	0.054	0.053	0.052
	(0.013)	(0.013)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.013)
50 000 – 25 000	0.062	0.063	0.058	0.062	0.060	0.056	0.057	0.052
	(0.014)	(0.014)	(0.013)	(0.014)	(0.014)	(0.013)	(0.013)	(0.013)
> 50 000 (except Oslo)	0.099	0.103	0.090	0.095	0.100	0.087	0.087	0.089
	(0.024)	(0.024)	(0.024)	(0.025)	(0.023)	(0.024)	(0.026)	(0.024)
Oslo	0.173	0.173	0.143	0.163	0.157	0.135	0.150	0.130
	(0.019)	(0.019)	(0.023)	(0.020)	(0.022)	(0.022)	(0.020)	(0.022)
Long run estimates:								
log (Value added)	0.146	0.145	0.149	0.150	0.147	0.153	0.159	0.153
	(0.036)	(0.036)	(0.035)	(0.036)	(0.036)	(0.036)	(0.037)	(0.039)
log (1+payroll tax)	0.943	0.762	1.018	0.725	0.952	1.078	0.805	1.352
	(0.299)	(0.169)	(0.246)	(0.169)	(0.243)	(0.193)	(0.156)	(0.192)
log (Total unemployment)	-0.072	-0.088	-0.024	-0.055	-0.072			
	(0.031)	(0.027)	(0.037)	(0.031)	(0.031)			
log (Long-term ratio)	-0.038							
	(0.042)							
log (Accommodation ratio)	-0.095							
	(0.065)							
log (Participation rate)			0.416	0.369		0.453	0.524	
			(0.199)	(0.190)		(0.158)	(0.161)	
log (Vacancy rate)			0.050		0.040	0.059		0.079
			(0.031)		(0.031)	(0.028)		(0.030)

Diagnostics:

Sigma %	7.868	7.827	7.826	7.859	7.785	7.798	7.806	7.678
AR(1)	-8.961	-9.020	-8.943	-9.001	-8.969	-8.921	-8.960	-8.911
AR(2)	-0.588	-0.488	-0.481	-0.488	-0.461	-0.454	-0.418	-0.386
Sargan (p-value)	0.404	0.458	0.428	0.495	0.377	0.390	0.442	0.244

Notes:

(i) Estimates with one-step robust standard errors in parentheses. Estimation method is GMM-SYS, see Blundell and Bond (1998).

(ii) The regional labour market variables are measured at the county level.

(iii) All variables except city size dummies are treated as endogenous and instrumented.

(iv) All equations include time dummies.

(v) Sigma is estimated standard error, AR(i) is the Arellano and Bond (1991) test for serial correlation of order i based on the transformed residuals, Sargan is the Sargan (1958) test for instrumental validity.

(vi) Sample period is 1994-1998, number of municipalities is 316.

Table 6. Description of regional satisfaction variables

Variable	Description	County level (114 data points)	
		Mean	St. dev
Mean satisfaction	Average reported satisfaction	3.262	0.536
Adjusted mean satisfaction	Average reported satisfaction adjusted for personal attributes	3.171	0.509
Mean satisfaction, stayers	Average reported satisfaction by residents who have lived at least 4 years in the municipality	3.212	0.572
Satisfaction456	Share of respondents reporting satisfaction ≥ 4	0.436	0.155
Satisfaction56	Share of respondents reporting satisfaction ≥ 5	0.221	0.130
Satisfaction34	Share of respondents reporting satisfaction = 3 or satisfaction = 4	0.453	0.060
Mean satisfaction, workers	Average reported satisfaction, workers only	3.185	0.507

Correlations

	Mean satisfaction	Total unemployment	Participation rate		
Total unemployment	-0.673				
Participation rate	0.634	-0.578			
Vacancy rate	0.591	-0.463	0.166		
	Mean satisfaction	Adjusted mean satisfaction	Mean satisfaction, stayers	Satisfaction456	Satisfaction56
Adjusted mean satisfaction	0.999				
Mean satisfaction, stayers	0.983	0.980			
Satisfaction456	0.994	0.994	0.974		
Satisfaction56	0.970	0.968	0.939	0.963	
Mean satisfaction, workers	0.991	0.992	0.966	0.988	0.968

Table 7. Wage equations with regional satisfaction and other regional labour market variables - Left hand side variable is log (Wage)

	(7.1)	(7.2)	(7.3)	(7.4)	(7.5)	(7.6)	(7.7)	(7.8)
Mean Satisfaction (-1)	0.031	0.016	0.021	0.024	0.017	0.025	0.024	0.028
	(0.008)	(0.012)	(0.011)	(0.011)	(0.012)	(0.010)	(0.010)	(0.010)
log (Total unemployment(-1))		-0.002	-0.010	-0.015		-0.019		
		(0.023)	(0.021)	(0.021)		(0.020)		
log (Participation rate(-1))		0.173	0.115		0.168		0.133	
		(0.139)	(0.123)		(0.124)		(0.117)	
log (Vacancy rate(-1))		0.019		0.006	0.018			0.008
		(0.020)		(0.019)	(0.020)			(0.019)
Long run estimates:								
Mean Satisfaction	0.051	0.025	0.035	0.039	0.027	0.040	0.039	0.046
	(0.014)	(0.020)	(0.018)	(0.018)	(0.020)	(0.017)	(0.016)	(0.016)
log (Total unemployment)		-0.003	-0.017	-0.025		-0.031		
		(0.037)	(0.034)	(0.034)		(0.032)		
log (Participation rate)		0.279	0.186		0.269		0.216	
		(0.223)	(0.199)		(0.201)		(0.189)	
log (Vacancy rate)		0.031		0.009	0.030			0.014
		(0.033)		(0.031)	(0.032)			(0.032)
Diagnostics:								
Sigma %	7.754	7.817	7.817	7.794	7.812	7.786	7.805	7.773
AR(1)	-8.891	-8.881	-8.928	-8.894	-8.873	-8.925	-8.914	-8.865
AR(2)	-0.429	-0.477	-0.464	-0.474	-0.474	-0.455	-0.454	-0.462
Sargan (p-value)	0.447	0.476	0.476	0.475	0.416	0.486	0.435	0.442

Notes:

(i) Estimates with one-step robust standard errors in parentheses. Estimation method is GMM-SYS, see Blundell and Bond (1998).

(ii) Regional satisfaction variables and other regional labour market variables are measured at the county level.

(iii) All equations include log (Wage(-1)), log (Value added), log (1+payroll tax), 5 city size dummies and time dummies.

(iv) All variables except city size dummies are treated as endogenous and instrumented.

(v) Sample period is 1994-98, number of municipalities is 316.

Table 8. Wage equations with alternative regional satisfaction variables
- Left hand side variable is log (Wage)

	(8.1)	(8.2)	(8.3)	(8.4)	(8.5)	(8.6)	(8.7)	(8.8)
Adjusted mean satisfaction (-1)	0.031	0.017	0.017	0.025	0.018	0.025	0.025	0.029
	(0.008)	(0.010)	(0.013)	(0.012)	(0.012)	(0.011)	(0.010)	(0.010)
log (Total unemployment(-1))		-0.001	-0.009	-0.015		-0.019		
		(0.023)	(0.021)	(0.021)		(0.020)		
log (Participation rate(-1))		0.169	0.117		0.165		0.136	
		(0.137)	(0.122)		(0.121)		(0.115)	
log (Vacancy rate (-1))		0.018		0.005	0.018			0.008
		(0.020)		(0.019)	(0.020)			(0.019)
Sargan (p-value)	0.384	0.438	0.417	0.380	0.478	0.407	0.373	0.397
	(8.9)	(8.10)	(8.11)	(8.12)	(8.13)	(8.14)	(8.15)	(8.16)
Mean satisfaction, stayers (-1)	0.030	0.013	0.020	0.024	0.014	0.024	0.022	0.027
	(0.008)	(0.013)	(0.012)	(0.012)	(0.012)	(0.011)	(0.010)	(0.010)
log (Total unemployment (-1))		0.001	-0.009	-0.013		-0.018		
		(0.024)	(0.022)	(0.021)		(0.020)		
log (Participation rate(-1))		0.215	0.150		0.204		0.167	
		(0.141)	(0.126)		(0.126)		(0.119)	
log (Vacancy rate(-1))		0.022		0.006	0.020			0.010
		(0.021)		(0.019)	(0.021)			(0.020)
Sargan (p-value)	0.524	0.362	0.402	0.381	0.485	0.418	0.525	0.484
	(8.17)	(8.18)	(8.19)	(8.20)	(8.21)	(8.22)	(8.23)	(8.24)
Satisfaction456(-1)	0.106	0.070	0.088	0.095	0.064	0.094	0.086	0.097
	(0.027)	(0.041)	(0.038)	(0.037)	(0.040)	(0.035)	(0.033)	(0.032)
log (Total unemployment(-1))		0.007	-0.033	-0.006		-0.011		
		(0.024)	(0.022)	(0.021)		(0.020)		
log (Participation rate(-1))		0.160	0.091		0.161		0.119	
		(0.137)	(0.122)		(0.121)		(0.115)	
log (Vacancy rate(-1))		0.015		0.003	0.014			0.008
		(0.020)		(0.018)	(0.019)			(0.019)
Sargan (p-value)	0.492	0.377	0.442	0.372	0.406	0.444	0.475	0.469
	(8.25)	(8.26)	(8.27)	(8.28)	(8.29)	(8.30)	(8.31)	(8.32)
Satisfaction34(-1)	0.033							
	(0.051)							
Satisfaction56(-1)	0.137	0.077	0.097	0.104	0.081	0.111	0.109	0.122
	(0.035)	(0.047)	(0.045)	(0.044)	(0.046)	(0.043)	(0.042)	(0.042)
log (Total unemployment(-1))		-0.004	-0.013	-0.019		-0.022		
		(0.024)	(0.021)	(0.020)		(0.019)		
log (Participation rate(-1))		0.162	0.124		0.163		0.145	
		(0.131)	(0.121)		(0.115)		(0.112)	
log (Vacancy rate(-1))		0.021		0.010	0.022			0.015
		(0.019)		(0.018)	(0.018)			(0.018)
Sargan (p-value)	0.421	0.451	0.514	0.445	0.492	0.509	0.540	0.444

	(8.33)	(8.34)	(8.35)	(8.36)	(8.37)	(8.38)	(8.39)	(8.40)
Mean Satisfaction, workers (-1)	0.028	0.010	0.017	0.019	0.011	0.021	0.019	0.023
	(0.008)	(0.011)	(0.010)	(0.010)	(0.012)	(0.010)	(0.010)	(0.009)
log (Total unemployment(-1))		-0.001	-0.012	-0.018		-0.022		
		(0.034)	(0.020)	(0.020)		(0.019)		
log (Participation rate(-1))		0.219	0.147		0.208		0.176	
		(0.141)	(0.125)		(0.123)		(0.117)	
log (Vacancy rate (-1))		0.028		0.012	0.026			0.017
		(0.020)		(0.018)	(0.019)			(0.019)
Sargan (p-value)	0.341	0.365	0.350	0.353	0.331	0.339	0.311	0.341

Notes. See notes to table 7