Firm profitability and individual pay: Evidence from matched employer-employee data

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Abstract

In this study we use matched employer-employee panel data to analyse whether white-collar workers' salaries are influenced by the employing firm’s profitability in the Finnish metal and electro-technical industry 1995-2001. A major novelty is the use of several different wage specifications as a dependent variable and combining this with the use of two alternative profitability measures in turn. We start from a simple base salary and move on gradually to cover ever more extensive salary concepts up to the point when even overtime payments and bonus payments based on explicit company-wide profit-sharing schemes are included in the estimated wage concept. According to the study even base salaries seem to vary with the employer firm’s profitability. Performance-based payments double the estimated profit sharing effects. It seems that the residual-like wage drift component cannot be explained within the perfectly competitive labour market framework. Non-competitive labour market theories, such as the implicit contract and efficiency wage models, may offer a more plausible theoretical basis for the non-structural part of the overall wage drift. Our results show that the significance of shared rents for the magnitude of white collar workers' overall earnings in the Finnish metal and electro-technical industry is at least of the same size as that indicated by previous Nordic and Western-European estimates. Instead comparison with findings from the US - especially those based on instrumented profits - indicates that rent sharing plays a smaller role in Finland (as well as elsewhere in Western Europe).

JEL Classification: C23, J31, J33.

Keywords: rent sharing, employer-employee data, wage drift

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1 Introduction

As old as economics as an independent science is the question what factors and forces determine individual wages in the labour market. One central issue in this respect concerns the role of a firm in wage setting. Here the ambiguity can be encapsulated in an auxiliary question, namely, whether firms act as price takers (i.e. wage-takers) merely paying labour the same that all the other firms pay, or alternatively, whether it is rather the case that different firms may remunerate productively homogenous workers differently solely due to differences in their firm-specific attributes. The latter alternative indicates firm-specific pay policies and firms having an active role in wage determination. Of course, if this is the case, then it should be also empirically verifiable. Or the other way round, if firms possess no decision power over wage setting then none of the firm-specific characteristics should enter significantly in a corresponding wage equation.

One of the main characteristics essential for any enterprise’s life is its economic success which determines both its employment as well as, in the end, whether the firm will exist in the future. Economic success can be measured by various profitability indicators which all are firm-specific by their nature. Therefore, the question whether firm profitability, a major backbone of any firm, enters significantly in the wage equation of a certain group of firms is not only of economic interest for these particular firms but it is also a direct empirical proof for these firms not merely being price takers vis-à-vis the wages they pay.

The question whether the employer firm’s profits affect the wages it pays forms the main subject of the current study. We investigate the potential relationship between individual wages and firm-level real profits asking if employees’ real wages respond to their employer firm’s per capita profits? However, when thinking about the potential relation between firm profitability and wages - being called ”the rent sharing hypothesis” in the literature - it needs to be borne in mind that not only a Walrasian perfectly competitive labour market but even a labour market characterised by highly aggregated collective wage bargaining system is able to produce an outcome where single firms in practice act as price-takers with respect to wages they pay.

Therefore we consciously avoid the view of a highly simplified textbook labour market model according to which a collective negotiations system is inconsistent with the competition mechanism. Instead, our interest being focused on the Finnish labour market, we know that even though the basic
framework is the highly centralised collective wage negotiations system it is combined with a wage drift portion added over and above the collectively determined wage increases. Furthermore, the order of importance of various driving forces behind the wage drift phenomenon being still empirically unsolved, it is also possible that wage drift actually mirrors the "competitive side" of wage determination even in the labour market characterised by collective wage negotiations.\(^1\) Thus, in this study we are not making claims about whether the Finnish labour market can be characterised totally non-competitive or not. What we do claim, instead, is that if we find support for the rent sharing hypothesis then a single firms’ role is not merely that of a price taker even though the final balancing between collective negotiations versus competitive forces is left for future research.\(^2\)

By the side of these theoretical aspects connected with competitiveness of the labour market there are, at least, two purely practical reasons for making the relation between firm profits and wages of economic and political interest. Firstly, for a single enterprise the relation is a highly practical issue since for it life is balancing between revenues and production costs both subject to continuous alteration. Thus at a firm level the question of how to deal with these changing pecuniary factors is crucial. Basically, profits are defined as the difference of revenues and costs. This means that as revenues change a firm have an unambiguous need to readjust both its production level and its production costs in order to preserve a certain level of profitability per a unit produced. Therefore the cost of labour, an integral factor of production, and the way it is being determined is of a central interest for any firm.

Secondly, at an economy level, and especially for a small open economy as Finland the question of how to protect domestic enterprises against exogenous profitability shocks originating from abroad is of foremost interest making the prices of domestic production factors of the essence. Especially, since labour is a major domestic factor of production and its price is determined to a large degree within the country, it is natural to pay attention to

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\(^1\) This view gains further strength by the fact that in Finland the collective wage increases form the minimum increase only. That is, there is no "roof" for the wage increases a single firm may pay. Therefore as long as the collective increases remain modest there is a natural case even for competitive forces to affect the level of total wage increases.

\(^2\) Naturally, in a collective wage negotiations system firms possess collectively - through an employer union - a certain amount of decision power over the wage level. Our research concerns instead whether they as individual firms are able and willing to adjust their labour cost with respect to the firm-specific ability to pay?
wages and salaries as means of adjustment to foreign profitability shocks. On the other hand, inflationary pressures may arise through the wage-price spiral mechanism making it essential to be aware of all the factors affecting wage inflation. Therefore, after the introduction of the common currency - euro - brought to an effective end the policy of recurrent intentional devaluations of the domestic currency as a means of adjustment against foreign shocks, there has arisen a lengthy discussion within the euro area, inclusively in Finland, about wage rigidities and whether labour costs should be more flexible in order to protect more effectively domestic firm’s economic lucrativeness and, consequently, their employment during economic downturns.

Moving on to the practical details of the study, the estimation data is collected from amongst the Finnish central industrial employer organisation TT’s member enterprises operating in the metal and electrotechnical industry and the observations consist of white-collar employees during the six-year period 1995-2001.3

Firm profits are measured with two alternative measures. The first measure is real operating profits per employee excluding revenues from sales of tangible capital goods. Operating profits, however, may suffer from a - sort of - calculatory endogeneity problem because there is a linear negative relationship between the size of a firm’s operating profits and its total labour costs. This means that operating profits, at the enterprise level, depend on the same factor, wages, that we, at the employee level, try to explain. Therefore we need to test the robustness of estimated operating profits effects. This can be done by using some other profitability measure being not as prone to suffer from the same kind of endogeneity bias. Our choice for this alternative profitability measure is real value added per employee and it is chosen simply because the concept of value added is, by definition, revenues minus production costs except for personal costs being included in these and therefore a firm’s total labour costs do not affect the size of its value added in contrast to the size of its operating profits.

In addition to this, there is even a more theoretical motivation for using value added as an explanatory variable in a rent sharing model. Namely, on the theoretical side rent sharing focuses on one fundamental question of how to define the ”pie” to be divided between the firm and its employees?

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3The sample covers in effect TT’s all member firms with at least 30 employees. A part of minor member enterprises includes as well. Thus, the size and panel character of the data in hand enables us to take even advantage of advanced panel data methods.
From this perspective, actually, "pre-wage" value added can be thought to form even a more proper measure for firm profitability and performance than "post-wage" operating profits are likely to do.

Our empirical analysis starts with a multivariate wage model including only observed effects. After that we move on to test robustness of the first-hand findings. The model specifications will be modified to control for unobserved employee- and firm-specific effects. Thus we will test the robustness of the observed correlation (or alternatively, non-correlation) between individual wages and firm profitability by analysing carefully whether our first-hand results remain intact as we add statistical fine controls. In addition to controlling for observed and unobserved firm- and employee-specific effects, we will, in due course, consider also effects of lagged profits on wages and discuss further the problem of endogeneity w.r.t profits.

A major novelty is a much more detailed treatment of different wage specifications as in previous studies. The approach is to repeat each analysis for a number of different wage concepts in turn starting from the monthly base wage and, after having gradually added new components, ending up with a one containing, in addition to base salary, benefits in kind, supplements for shift and Sunday work, performance-related payments, over-time earnings and (for the years 1998-2001) direct profit-related payments. In this way we try to find out whether rent sharing is equally important at the base wage level, or alternatively, whether it arises only after different bonus elements and over-time supplements are included.

Especially, our approach offers new insights into the wage drift phenomenon. Namely, if it is empirically verified that even base wages respond to changes in firm profits, then this adds to our knowledge about the forces

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4Performance-related payments predominantly depend on how well employees manage to achieve predetermined operational targets (e.g. relating to productivity, delivery reliability and customer service) but they may also depend - though to a lesser degree - even on the company’s financial performance. Thus the classification between "performance-related" and "profit-related" bonuses is more of a gradual than mutually exclusive nature.

5The concept covers irregularly paid components depending, above all, on the company’s overall financial performance (e.g. turnover, operating profit, value added and return on capital). These consist of the two independent systems. Firstly, there are the payments within the frame of the personnel funds system but being paid directly to the personnel (in contrast to the profit-related payments being paid as shares to personnel funds and not being included in this study). Secondly, there are the direct profit-related payments being determined, more or less ad hoc, by the company’s top management or in a shareholder’s meeting.
behind the wage drift phenomenon. It explicitly shows that wage drift is not merely a structural phenomenon brought about by changes in the overall composition of labour force but instead even one and the same individual’s base wage follows to a certain extent her employer’s bad or good fortunes through time.\(^6\) In other words, firms already adjust to changes in their profitability by altering even base wages \textit{ex post} in contrast to being exclusively confined to explicit profit sharing schemes operating on a totally predetermined basis.

The structure of the paper is the following. We inspect first previous research on the rent-sharing and profit-sharing hypotheses. After that we discuss how the rent-sharing hypothesis can be rendered a theoretical basis both using the competitive as well as the non-competitive framework. Thus there exists a theoretical foundation for a positive relationship between individual wages and firm-level profits independently on whether the labour market is assumed competitive or non-competitive. The third chapter prepares for empirical analysis as we describe the used data. The fourth chapter consists of the empirical analysis. Finally, a concluding discussion follows.

2 Previous rent-sharing research and theoretical underpinnings

In a competitive labour market individual wages should reflect only a person’s marginal productivity. Thus, changing jobs to another more profitable firm should not affect a person’s wage as long as her/his productivity-determining characteristics and non-pecuniary working conditions remain unchanged. However, this hypothesis has long been questioned. An early exemplar of questioning the relevance of the competitive labour market model is found in Slichter (1950) who claimed that empirical evidence does not support the competitive approach with its one-price hypothesis as apparently homogenous workers are paid differently across industries. Using data on workers in US manufacturing he found that wages were correlated with various measures of the employer’s ability to pay. Later, with the emergence of

\(^6\)Usually wage drift, the difference between actual and bargained wages, is measured at aggregate level using mean wages. As a result of this approach, however, the changes in the aggregate wage level induced by changes in the overall composition of labour force (\textit{e.g.} rising educational level of workforce causing a rise of average wages) will be mixed with the wage increase of a ”qualitatively standardised” labour input.
more extensive data sources, a substantial number of empirical evidence has emerged that tends to strengthen Slichter’s early findings.

There have also emerged several theoretical models in which a positive relation between a firm’s profitability and individual wages appears. In theoretical literature the positive correlation between wages and firm profitability is usually thought to arise from an noncompetitive labour market set-up even though there are rent sharing models where labour market, at least in the long-run, is thought to be perfectly competitive.

Blanchflower et al. (1996) goes through the three possibly most favoured explanations developed for the rent-sharing hypothesis by giving an explicit form for each explanation in turn in a nut-shell but still with mathematical rigour. The first model is a bargaining model in which the firm and its employees bargain over wages and the negotiated wage depends, among others, on the firm’s profits. Each counterpart’s bargaining power decides its share of the “cake” and thus the magnitude of the rent sharing effect is positively related with workers’ bargaining power.

The second model represents a mix of short-run non-competitiveness and long-run perfect competitiveness so that the correlation between the firm’s profits and wages it pays arises from an short-run upward-sloping labour supply curve. The upward slope of the firm’s short-run labour supply curve is thought to stem from rigidities in migration of labour from other less profitable firms. Thus a positive demand shock, while increasing profits, causes simultaneously an outward shift in the demand curve for labour. Therefore, in the short run, the outward shifting labour demand curve takes the firm up the upward sloping labour supply curve with the result that the firm’s profits and wages rise together. Eventually, however, migration of workers into the now better-paying firm levels down the labour supply curve facing the firm and therefore, in this model, there is no long-run relation between wages and profits.

The third model is based on the theory of implicit contracts according to which wages are set to provide efficient ”insurance” against random shocks. If both the firm and its workers are risk-aversive they end up in sharing risks by an implicit contract which determines the way wages are adjusted when the firm faces a random demand or technology shock affecting its profitability. Thus in the case of a negative shock wages may even drop while a positive shock tending to raise firm profits leads also to a rise in wages.

Nickell (1999) discuss the relation between the basic collective bargaining models and rent sharing. He concludes that the rent sharing hypothesis can
be given a plausible theoretical basis with relative ease within the limits of the collective wage bargaining framework. He continues, however, that the robustness of rent sharing effects leaves a lot to be desired. For example, under the assumptions of Cobb-Douglas production and the constant product and labour demand elasticities there follows an outcome in which a positive shift in demand or in productivity leaves profits per employee unchanged and hence also wages remain unaffected. Indeed, in order to remain on the safe side and preserve the positive effect of firm profits on wages the elasticity of substitution between capital and labour should stay below unity.

Nickell even discusses some alternative explanations for the rent sharing hypothesis, such as, assuming the effort function to depend positively upon the employees’ share of firm profits in efficiency wage models\(^7\), or an explanation based simply on managers’ desire to ensure themselves “a quiet life” by passing a part of the firm’s profits or rents further on to their subordinates. However, as Nickell observes, the last explanation requires that managers are, to some extent, capable of operating out of range of direct shareholder control.

Finally, the challenge of an upward sloping labour supply curve to the competitive labour market model is elaborated much further in Manning (2003). He argues at length in his book that a very wide range of standard labour market phenomena is easily explained if one accepts the idea of monopsony as a usable tool for analysing labour markets. Manning emphasises, however, that monopsony needs to be dealt with in the sense of the supply of labour to an individual firm not being infinitely elastic instead of thinking in terms of there being only one single buyer of labour. In fact, the focal idea in Manning’s book is that once one shifts the focus on the labour supply curve faced by an individual firm, instead of thinking in terms of labour supply to the market as a whole, the idea of an upwards sloping labour supply curve follows quite easily.

For our study it is interesting to note that even though Manning (2003) argues that the standardly observed size-wage effect does not depend on the idea that larger firms would be more profitable and their employees more successful in extracting a share of the rents there still seems to exist a positive correlation between firm profits and employees’ wages. He goes even further

\(^7\)Danthine & Kurmann (2006) elaborate the idea further, giving it an explicit structural form in which effort depends in part on the firm’s output per employee. Thus the model gives a rationale for rent-sharing in the framework of efficiency wages.
by stating that profits per employee may correlate with individual wages even though the labour supply curve facing the firm would be completely flat and consequently labour supply would be infinitely elastic. According to Manning, however, an upward sloping labour supply curve tends to strengthen the already existing positive relationship between individual wages and the employer firm’s per capita profits.

When it comes to empirical studies, the earlier approach to analyse wage-profit effects was based on the use of aggregated industry or firm-level data in which both firm profitability and wages were included as industry- or firm-level averages. A major weakness of studies based on aggregated data is the loss of information on inter-employee variation in individual wages and, in the case of industry data, even on inter-employer variation in firm profits and average wages. It is evident that an ideal data set for research on rent-sharing is formed by combining employee-level information on wages and personal characteristics with firm-level information on profitability and other firm characteristics. Thus the recent development of large employee-firm data sources has enabled research to move on to new paths such as the modelling of observed and unobserved worker characteristics. Our approach in this paper will follow the last mentioned micro-econometric approach which offers the best and most extensive opportunities to study wage-profits effects in detail.

A major controversy over empirical results concerns whether the empirically often observed correlation between a firm’s lucrativeness and wages it pays really reflects the fact that firms do pay differently for equally productive workers or does the result only mean that we cannot control for all the important determinants of individuals’ wages. Thus, the empirical task is then to test whether the profit-pay effect still exists after having controlled for such alternative explanations as the effects of unobserved and observed worker, job and firm characteristics.


Finally, before entering the estimation stage, it needs to be complemented that our empirical approach is meant to be neutral vis-à-vis different theoretical models presented above. This means that the outspoken aim of our empirical analysis is to find whether individual wages depend -for one or another reason- on the employing firm’s lucrativeeness after controlling for the effects of other wage determining factors. In fact, not restricting our empirical analysis to fit merely one of several alternative explanations put forth above may actually add to robustness of the empirical results.

3 The Data

Before going in to the empirical estimations we present the research data in brief. We concentrate on the Finnish metal and electrotechnical industry firms’ white collar workers working on fulltime. We have specified “the metal and electrotechnical industry” to cover the monthly paid employees under the Finnish metal and electrotechnical industry’s collective contracts for monthly paid employees (the employer organisation TT’s code ’40’). All the firms in our data are organised and belong to the Finnish central industrial employer organisation TT. This means that all unorganised (predominantly minor) metal and electrotechnical industry firms are excluded from our analyses. A further restriction concerning the firm sample is that the subgroup of organised metal and electrotechnical industry firms having less than 30 employees is under-represented in our data since the data collecting instant TT does not require obligatory response from these minor member enterprises. For the part of larger enterprises, however, the data set covers all the organised metal industry firms.

To concentrate on one industrial sector only may raise questions, espe-
cially, as the rent sharing hypothesis was primarily born out from empirical observations concerning inter-industry wage differences among otherwise seemingly homogenous workers. It needs to be emphasised, however, that the rent sharing hypothesis does not require inter-industry analysis. Instead the main issue here is the question whether there exist a relationship between wages and profits at the firm level while the question of inter-industry wage differences is a minor issue in this respect. Furthermore, concentration on a more homogenous group of workers adds to the statistical reliability of the estimated rent sharing effects since many sources for heterogeneity have been controlled for from the start.

Another detail maybe needing explanation concerning the used data is the choice of the industry. There are three major reasons for concentrating exclusively on the metal and electrotechnical industry. Firstly, the metal and electrotechnical industry forms one of central industries in Finland. Secondly, it is also very open to international competition and therefore the need for the firms operating in the industry to adapt to changes in economic environment, and consequently, in profitability is essential. Thirdly, the quality of the employee data collected from the metal and electrotechnical firms is of guaranteed good quality.

Lastly, the decision to use monthly paid employees only may need a few words to explain also. There are two major reasons for this choice. Firstly, as already mentioned, concentration on monthly paid employees only and leaving hourly paid workers outside the scope of the study increases the possibility to isolate the effects of profits on pay more effectively from other wage determining factors. Secondly monthly paid employees, contrary to hourly paid employees, have usually a fairly fixed number of regular hours per month making it more easy to isolate the variation in wages due to changes in monthly hours (such as overtime hours) from other factors.

The analysed data set has been formed by linking three different data sources from the years 1995 to 2001. The two first data sources consist of two employee-level wage statistics: the Finnish Structure of Earnings Statistics of Statistics Finland and the white collar industrial employees’ wage statistics collected by TT. These two data sources contain information on wages, working hours and other employee-level items and on the employer firm’s items; such as information on firms’ employee numbers, industry etc. The third data source is the financial statement data collected by Statistics Finland containing enterprise-specific information, among others, metal and electrotechnical industry firms’ profitability. For each year 1995-2001 these
three extensive and on yearly basis collected data sources have first been linked together by using employees’ and enterprises’ identity codes and finally a longitudinal data set has been formed by combining the combined annual data sets together. All in all, this means that the data set forms a matched employer-employee data set including information on both firms and workers.

4 Empirical analysis

4.1 Multivariate models without controls for unobserved employee and firm effects

As said, we will run repeated estimations for each model specification using the same set of independent variables but altering the definition of the dependent wage variable. Thus, in successive estimations of each particular model the wage specification ranges from a simple base wage to the one comprising - in addition to basic wage - benefits in kind, supplements for shift and Sunday work and earnings for overtime hours, performance-related payments and (for the years 1998-2001) direct profit-related payments.

As the starting point for the empirical analysis we run first a static multivariate model containing only controls for observable effects:

\[
\ln w_{it} = \delta + \pi_{j(i,t)} \rho_0 + x'_{it} \beta + u'_i \eta + v'_{j(i,t)} \rho_1 + q'_{j(i,t),t} \rho_2 + p'_t \tau + \epsilon_{it}. \tag{1}
\]

where \(w_{it}\) is person \(i\)'s wage in period \(t\) and \(\pi_{j(i,t)}\) measures per capita profitability of firm \(j\) in which person \(i\) works during the period \(t\). Note that wage is defined as a logarithmic transformation. Since profits are in levels our empirical model specification is of semi-logarithmic form. Further the term \(x'_{it}\) is a transposed vector of observed time-varying individual characteristics (e.g. person’s age) and \(\beta\) is the corresponding coefficients vector. \(u'_i\) is a transposed vector of time-invariant individual characteristics (e.g. person’s sex). \(\eta\) is the vector of effects associated with the time-invariant individual characteristics. \(v'_{j(i,t)}\) is a transposed vector of time-invariant firm characteristics\(^{12}\) (e.g. industry) and \(\rho_1\) is the corresponding coefficients vector. \(q'_{j(i,t),t}\)

\(^{12}\)Not represented in our estimation specifications.
is a transpose vector of time-varying firm characteristics (e.g. capital intensity\textsuperscript{13}) and $\rho_2$ is the corresponding coefficients vector. $p^t_\prime$ is a transpose vector containing time-specific effects (e.g. indicators of business cycles and sectoral shocks, indices measuring collective wage increases or simply year dummies \textsuperscript{14}) and $\tau$ contains the corresponding coefficients. Finally, errors are specified with $\epsilon_{it}$.

But before going into regression models we look at descriptive statistics of salaries and profitability variables in table 1. After matching the monthly paid employees under the Finnish metal and electrotechnical industry’s collective contract for monthly paid employees with annual firm-level profit information the number of employees having the information of the employer firm’s profits (operating profits/value added) and thereby being estimable within the framework of model 1 amounted to 296625 (1995-2001) and 183920 (1998-2001). Since profit-related payments are available only from 1998 onwards we will present - even at the risk of added confusion - two different sets of key figures for the salary concepts 1, 2, 3 and 4. The first set refers to the full time range 1995-2001 (296625 observations) and the second set is calculated from the limited period of 1998-2001 (183920 observations).

Concerning mean salaries it can now be seen that performance-related payments make the major difference. When compared to the salary concept 2 (basic salary+benefits in kind+compensation for exceptional working time) the inclusion of performance-related payments (concept 3) increases mean salary by well over three to almost four percent depending on whether calculated from the overall period 1995-2001 or from the limited period 1998-2001. Instead the addition of profit-related payments on top of that (salary concept 5) leads to hardly any net increase in mean salary.\textsuperscript{15} The net effect of overtime payments is about one and half percentage points. However, as overtime payments are paid as compensation for increased labour input they need not be linked to rent sharing even if they were correlated with

\textsuperscript{13}This vector should actually include per capita profits $\pi_{j(t)}$ but as this forms our main object of interest the profits term is presented separately.

\textsuperscript{14}Our decision to include year dummies was determined by the fact that an essential part of wage increases in Finland regularly takes place through collectively negotiated wage increases. Apart from year dummies we experimented also with an index by Statistics Finland measuring collective wage increases and the regression results turned out to be similar to the ones based on year dummies. These results are available from the author on request.

\textsuperscript{15}Since profit-related payments are available only from 1998 onwards the comparison here refers to the mean salaries calculated from the limited period 1998-2001.
profitability. Of course, none of the observations above says anything about whether and into which degree even base salaries are affected by firm profits. Another interesting finding is that - independently how measured - profits are much more volatile than wages. While the coefficient of variation (standard deviation divided by mean) varies between 0.33-0.34 for salaries the same measure is 0.80 for real per-employee value added and rises up to 1.32 when profitability is measured with real annual per capita operating profits. The significant volatility of per capita profits means that rent sharing effects may in fact affect employees’ labour earnings much stronger than what regression model estimates might hint at first glance. We will consider this issue in more detail later on in this study.

In table 2 we see results of regressing monthly wages on annual per-employee profits (defined in terms of real operating profits, or alternatively, real value added) plus on an extensive set of employee and employer characteristics\textsuperscript{16}. In models 1a-6a the profitability variable refers to real per employee operating profits\textsuperscript{17} while in models 1b-6b firm’s profitability is measured by real per employee value added.

In regard to the dependent variable, models 1a and 1b represent a regression with base wage as dependent variable, in models 2a and 2b the base wage variable is augmented with benefits in kind and extra compensation for shift and Sunday work. In models 3a and 3b the wage variable is further augmented with performance-related payments. The wage specification in models 4a and 4b is that of the models 3a and 3b augmented with monthly overtime payments. Excluding over-time earnings but including instead profit-related payments (calculated per month) leads us to the wage specifications in models 5a and 5b. Finally, by adding over-time payments back to the pay concepts of models 5a and 5b we obtain our most extensive wage specification in models 6a and 6b.

In all models the dependent variable is in natural logarithms while the

\textsuperscript{16}Along with profitability all the models contain the following independent variables: employer firm’s real capital assets per employee; regular monthly working hours; age and its square; seniority within the current company and its square and cube; educational level (five categories); occupation (74 categories in accordance with TT’s own classification); and six year dummies for years 1996-2001. When the wage specification contains even overtime earnings (models 4a, 4b, 6a and 6b) monthly overtime hours are included amongst the explanatory variables.

\textsuperscript{17}Income due to sales of tangible capital goods is excluded from our definition of operating profits. Therefore this measure of ‘net’ operating profits plus personal costs equals value added.
independent profit variable is in levels enabling us to include even negative values in the analysis. All wage specifications are defined in real terms (1995 ¤) and as per month. Per capita profits are also in real terms (1995 1000 ¤) but, in contrast to monthly wages, profits are counted on yearly basis.

Firms’ profitability appears to have a significant positive effect on white-collar employees’ monthly salaries. The estimated wage elasticities with respect to per-head operating profits (models 1a-6a) range from 0.023 to 0.036. And the estimated wage elasticities with respect to per-head value added (models 1b-6b) range between 0.039 and 0.062. Estimated elasticities for base wage models 1a and 1b are 0.023 and 0.039 respectively.

Thus even base wages seem to vary with firms’ profitability. Inclusion of benefits in kind and working time supplements adds nothing to the estimated magnitude of shared rents. Instead performance-related based payments turn out to be of primary importance leading the elasticity to rise up to its practically highest estimated values, i.e. 0.036 and 0.060 for model 3a and 3b, respectively. The inclusion of over-time payments or even profit-related payments leads to no further change.

The divergent roles of performance-related payments vs. profit-related payments are especially interesting for the emergence and magnitude of shared rents. A clear-cut conclusion would be to think the company-level profitability is not a major determinant of an individual wage so that the sub-company level (individual/working unit/workplace etc.) performance dominates worker-specific wage determination instead. But the valid interpretation is not necessarily quite so unambiguous.

Firstly, and as mentioned earlier, information on profit-related payments is available only from 1998 onwards. The reason for this is that the data collector, Finnish central industrial employer organisation TT, did not require this information from its member enterprises earlier. However, it is conceivable that firms may have even earlier reported profit-related payments together with performance-related payments without making a clear distinction between the two concepts. In any case, from table 1 it appears that

\footnote{For a semi-logarithmic model the elasticity is calculated by multiplying the estimated coefficient of profitability effect by the average of per employee profits.}

\footnote{This optional reservation has also come up in our discussions with TT’s wage statistics experts. In particular, as it is often the case that the payments under the heading "performance-related" are actually being based on a combination of sub-company-level operational targets and - albeit to a lesser degree - overall company-level profitability. Therefore the line between "performance-related" and "profit-related" bonuses has the...}
during the years 1998-2001 profit-related payments raised the average salary per month by only 2.13 euros (2503.89 vs. 2506.02 euros) while the impact of performance-related payments during the same period was of a totally different magnitude raising the average salary by 94.30 euros per month (2409.59 vs. 2503.89 euros).

Another potential reason for the minor impact of profit-related payments on individual salaries is the delay in the payment of these kinds of profits related items. Typically, firms measure profits on a yearly basis and the actual decisions concerning the corresponding payments are made only after the accounting period has ended. This means that payments based explicitly on profitability are generally paid during the following year after they are actually earned. This means that even lagged profits should be included in estimations. Evidently, the omission of lagged profits leads to the omitted variable problem resulting in biased estimates even for the part of non-lagged rent sharing effects. Therefore the impact of profits related payments will be fully assessed only after having added lagged profits as independent variables to the estimated model. We will analyse the potential impact of lagged pay-profits effects in more detail later on in this study.

It is also noteworthy to observe that rent sharing effects seem to be larger in the case of value added than in the case of operational profits. This is exactly what can be expected if operational profits suffer from endogeneity. In this case the use of operational profits as a profitability measure leads to downward biased estimates of rent sharing coefficients.\(^{20}\) One way to try to detect potential endogeneity bias is to use value added as a parallel profitability measure.

Finally, in order to test the impact of estimation periods we ran auxiliary model estimations restricted to years 1998-2001 only using the wage concepts 3 and 4 as dependent variables.\(^{21}\) The estimated pay-profits effects from the latter period turned out to be similar to the ones estimated from the

\(^{20}\)Even though the sizes of rent sharing coefficient estimates remain fairly close to each other independently of the applied profitability measure the fact that real per capita added is much larger than real per capita operational profits on average means that the use of value added produces much larger rent sharing effects in absolute terms. In other words, there is a sort of scaling issue here so that operational profits not having larger estimated rent sharing coefficients compared to those of value added suggests that operational profits produce downward biased rent sharing coefficient estimates.

\(^{21}\)The estimates are accessible on request from the author.
overall period 1995-2001. Thus it seems that the relation between wages and profitability remained unchanged during the period 1998-2001 compared to the years 1995-1997 even though a significant increase in real per capita profits took place during the latter period (cf. table 3).

The results of table 2 bear well comparison with the magnitude of international rents effects estimates based on corresponding multivariate models. Looking first at Nordic labour markets Arai & Heyman (2001) and Arai (2003) using corresponding model specifications presented elasticities in the range of 0.009 to 0.015 for Swedish nonagricultural private sector employees in 1991 and 1995 when profits were measured as four to five years averages of current and lagged profits per employee. However, Arai & Heyman (2004) using data of Swedish private sector employees combined with simultaneous annual per employee profits for 2000 arrives at the elasticity value of 0.002 only. Using a corresponding model specification and data on the manufacturing sectors Margolis & Salvanes (2001) report an elasticity of 0.01 for Norway.

Looking at continental labour markets (often regarded as an intermediate form between the Nordic and the Anglo-American labour market models) Margolis & Salvanes (2001) report an elasticity of 0.002 for a French manufacturing sectors data using a multivariate model specification. Correspondingly, using matched employee-firm data of French manufacturing Fakhfakh & FitzRoy (2002) report elasticities from 0.014 up to 0.019 for basic hourly wage and between 0.03 and 0.04 for total hourly earnings when profits are measured with the average of preceding three year’s positive per-employee operating profits. When profitability is measured with the average of preceding three year’s positive per-employee value added the elasticities rise up to 0.07 and 0.12 for basic hourly wages and total hourly earnings, respectively.

Martins (2004) uses Portuguese matched employee-employer panel data for manufacturing sector 1993-95 and shows hourly wage elasticities w.r.t. profits per worker between -0.002 and 0.013 for multivariate models. However, after having added the wage bill per worker to ”net profits per worker” elasticities rise up to the range between 0.08 and 0.22. Martins concludes that small and even negative elasticities of the ”net profits per worker” measure may testify of the fact that profitability measures from which even labour costs are subtracted suffer from endogeneity resulting in downward biased rent sharing estimates (higher wages, ceteris paribus, translate into lower profits).

Finally, as an example of the more disaggregated Anglo-American labour
market system Blanchflower et al. (1996) estimate short-time elasticities ranging between 0.037 and 0.040 (weekly respectively hourly earnings) for full-year full-time worker data of U.S. manufacturing industry 1964-1986.

Regarding the estimated rent sharing effects from other countries above and comparing these with our own estimates a few remarks need to be made. Firstly, the studies show that magnitudes of rent sharing effects vary significantly from one study to another. Substantial variation in estimated results underlines even more the significance of defining the estimated model specifications as well as the included profitability and earnings variables in detail.

Secondly, the sample of employees and industrial sectors is crucial when thinking how representative the results are with respect to the whole private sector workforce. Therefore, of course, when comparing our estimates with estimates from international studies based usually on a more or less representative sample of the entire private sector (or at least manufacturing sector) employees one needs to keep in mind that our estimation sample consists solely of metal and electrotechnical industry white-collar employees and therefore it is not representative for the whole Finnish private sector nor even for the manufacturing sector alone. Furthermore, as the sample of white-collar workers represents the more educated part of the private sector workforce and simultaneously covers such modern high-tech industries as the electronics industry it can be assumed that the estimated rent sharing effects are not representative in terms of their magnitude either. In fact, they are likely to be more significant than elsewhere in the Finnish private sector (cf. Piekkola (1999)).

Thirdly, a mere fact of finding statistically significant wage-profits effects and, moreover, these being more or less of the same dimension as the estimated effects from previous studies does not, per se, imply that rent-sharing needs to have any major effect on the size of individual wages. In absolute terms, the size of the estimated wage-profit effects means simply that at the average level of per capita operational profits of 52591.37 euros an increase by 1000 euros in annual per capita operational profits leads to an increase in monthly wage by 1.00 to 1.68 euros depending on the wage definition.22 Correspondingly, a one percent rise in annual per capita value added starting from its average level of 89702.23 € leads to an increase in monthly salary by 1.01 to 1.75 euros.23 Of course, by themselves, these hardly form any

22 This is calculated as $\hat{\rho}_0 \times \bar{w}$ where $\hat{\rho}_0$ is the estimated rent sharing parameter and $\bar{w}$ is the mean monthly wage.
23 Corresponding values can be derived for France and Norway using the results of Mar-
exhaustive indicators for the potential significance of rent sharing *vis-à-vis* the size of monthly wages. Instead in order to clarify this issue we need to take a closer look on the average magnitude and volatility of profits.

One way to assess the importance of shared rents in this respect is to follow Margolis & Salvanes (2001) who compared the average contribution of pay-profits effects with the average wages net of this contribution. The idea of using this measure is that it shows directly how much higher wages are due to shared profits as compared to the case of no rent sharing taking place. After combining the estimated $\rho_0$-coefficient (*cf.* model 1) of table 2 with the per-capita profits of table 1 and adapting the measure by Margolis & Salvanes (2001) (hereafter referred as ”the Margolis-Salvanes measure”) to the semi-logarithmic model it can be seen in table 2 that when operating profits are used as profitability measure rent sharing raises wages by 2.32-3.68 % as compared to the average wages with no rent sharing effects present.\(^{24}\) If profitability is measured by value added the corresponding Margolis-Salvanes measures range between 4.03 and 6.37 %. Thus rent-sharing has clearly a non-ignorable effect on white-collar employees’ wages in the Finnish metal and electrotechnical industry.\(^{25}\)

The comparison above, however, pays no attention to the year-to-year volatility or inter-firm dispersion of profits which both are focal factors when evaluating the impact of rent sharing on wages. A closer look at annual profitability figures (see table 3) reveals that over the observed time span 1995-2001 the yearly average of real per employee operating profits more than tripled in the Finnish metal and electrotechnical industry and the yearly coefficients of variation (the ratio of the standard deviation of the real per employee operating profits to the mean of the same measure) varied between 84.1% (1997) and 150.9% (1999). These figures show that profitability changes substantially over time and there is significant inter-firm dispersion

\(^{24}\)In difference to Margolis & Salvanes (2001) we adapt their measure to semi-logarithmic models. The measure can now be defined as \(\exp(\hat{\rho}_0 \times \bar{\pi}) - 1\) where $\hat{\rho}_0$ is the estimate of profit-pay coefficient and $\bar{\pi}$ is the (arithmetic) mean per-employee profit. Note that the percentage refers now to the geometric average instead of the arithmetic one.

\(^{25}\)Margolis & Salvanes (2001), using a multivariate model, reported corresponding estimates of 0.21 % and 1.00 % for France and Norway, respectively. On the other hand, Oswald (1996) using estimation results of Abowd & Lemieux (1993) for Canada with instrumented profits ended up with a 28% wage premium created by rents as calculated from the mean wage after deducting the premium. Oswald (1996) admits, however, that there is likely to be measurement error in quasi-rents.
In this respect, a more interesting approach to assess the importance of shared rents as a component of total salary is to use a measure by Richard Lester (1952). Lester’s “range of pay” compares the spread of wages due to the dispersion of profits with the mean wage. The estimates of Lester’s measure in table 2 indicate that the four standard deviations’ dispersion (“range”) in per-employee operating profits led to a 12.1-19.1 percent spread in wages in proportion to the monthly paid employees’ mean wage in the Finnish metal and electrotechnical industry 1995-2001. And similar calculations based on real per-head value added instead led to a spread between 12.7 and 19.8. These estimates are significant even in international perspective. Calculating Lester’s range of pay values using cross-section multivariate estimations by Arai & Heyman (2001) for the Swedish private sector implies that the wage inequality due to the spread of profits ranged between 5.4-7.3 % and between 3.0-4.3 % of mean wages in 1991 and 1995 respectively. According to Blanchflower et al. (1996) the same measure applied to workers and firms in the U.S. manufacturing industry matched employee-firm sample gave the result that 12.2 % of the distribution of weekly earnings and 11.3 % of that of hourly wages is being originated in rent sharing. However, when using firm-level data and a dynamic model specification Blanchflower et al. (1996) ends up with a long-run Lester’s range estimate of 24 per cent.

Another measure designed to assess the magnitude of shared rents for total wages is presented by Oswald (1996). The idea is to analyse how large a share of the dispersion of wages is to be accounted for the dispersion in shared profits. When using operating profit as profitability measure it appears from table 2 that, depending on the wage concept, 8.8 to 13.6 percent of the standard deviation of salaries could be attributable for shared profits. When measuring profitability with value added Oswald’s measure goes

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26 Using four standard deviations of profits as the width of the distribution of profits.

27 Lester’s range of pay is calculated using the formula $\varepsilon_{w,\pi} \times \frac{4 \times \sigma_{\pi}}{\bar{\pi}}$ where $\varepsilon_{w,\pi}$ is the elasticity of wages ($w$) with respect to profits ($\pi$), $\sigma_{\pi}$ is the standard deviation of profits and $\bar{\pi}$ is the mean profit.

28 Due to the adapted semi-logarithmic model specification the larger wage-profit elasticities linked to value added than to operational profits are now counterbalanced by the larger averages of per capita value added.

29 For a log-linear model Oswald’s measure can be defined as $\rho_0 \frac{\sigma_{\pi} \times \pi}{\sigma_w}$, where $\rho_0$ is the coefficient of the profit-pay effect as estimated using a semi-logarithmic model like the equation 1 (wages defined as natural logarithms and profits as levels), $\sigma_{\pi}$ is the standard deviation of profits and $\sigma_w$ the standard deviation of wages.
from 9.2 percent up to 14.3 percent depending on the wage concept. In international comparison these values do not fall behind either. Using linear models Margolis & Salvanes (2001) presented Oswald’s measure estimates of 2.56\% for France and 9.88\% for Norway. Oswald (1996), however, mentions that previous research has produced shares ranging from 24\% to 70\% for the United States and from 4\% to 25\% for United Kingdom.

As a conclusion of the estimation results using the basic multivariate static regression model 1 as our benchmark case it seems that profits and firms’ ability to pay do play an undisputable role in monthly paid employees’ wage determination in the Finnish metal and electrotechnical industry. However, the analysis so far forms only a starting point for a more detailed analysis. The rest of the paper will deal with a couple of analytical extensions. We will first consider the potential omitted variable bias due to the absence of controls for unobserved time-invariant firm and employee effects. After that we will consider the question whether firm profitability affects wages exclusively during the same year or whether there are lagged effects too. In the latter case we will also compare the magnitude of lagged effects with the immediate ones.

4.2 Adding controls for unobserved firm and person characteristics and for lagged effects

Our static multivariate benchmark model estimations showed that profitability affects positively Finnish metal and electrotechnical industry salaries. Profits seem to affect even base wages and therefore the correlation of individual wages with the employer firm’s profitability cannot be attributed merely to changing labour inputs (e.g. overtime working hours) or straight performance- or profits related wage components. On the other hand, the inclusion of performance-related components magnifies substantially the observed pay-profits effects.

But the multivariate static model offer only a first scratch for a rent sharing analysis. Thus, the next issue is to analyse how robust the preliminary findings are when we adopt more detailed specifications. As a first step we still continue with a static model but modify our model specifications with a view to controlling unobserved time-invariant personal and firm effects.

The following model specification 2 contains now both observed and unobserved employee and firm effects:
\[
\ln w_{it} = \delta + \pi_{j(i,t)} \rho_0 + \mathbf{x}'_{it} \mathbf{\beta} + \alpha_i + u_i \eta + \phi_{j(i,t)} + \mathbf{v}'_{j(i,t)} \rho_1 + \mathbf{q}'_{j(i,t)} \rho_2 + \mathbf{p}'_t \tau + \epsilon_{it}.
\]

In the equation 2 above \(\alpha_i\) stands for the unobservable personal heterogeneity while \(\phi_{j(i,t)}\) captures the unobserved firm heterogeneity associated with person \(i\)'s employer firm \(j\) in period \(t\). The rest of the parameter and variable symbols is defined as in model 1.

A detailed model such as model 2 entails, however, serious practical difficulties when trying to estimate it. Using unrestricted OLS leads to huge design matrices which need to be inverted in order to reach least squares estimates for all the parameters of the model. Abowd et al. (1999) present statistical methods they call 'conditional' methods which offer approximative solutions to the computationally infeasible full least squares estimation of all the parameters of the model 2. Margolis & Salvanes (2001) and in Finland Piekkola & Kauhanen (2003) have followed that approach but since the key interest in our study is the profits-pay effect we will follow another route suggested by Abowd et al. (1999).

The solution is simply to estimate a first-differenced (cf. Abowd et al. (1999)) or, alternatively, as deviations from individual means specified version of model 2 restricting the calculation of first-differences or mean deviations to each separate firm-individual cell (each cell consisting of the observations of the same person \((i)\) as long as she/he stays in the same firm \((j)\) between the two subsequent years \((i.e. j(i,t)=j(i,t-1))\). We will follow the latter approach. Using deviations from individual means wipes out the individual effects while restricting the calculation of each individual mean to contain only observations in the service of the same employer wipes out firm-specific time-constant effects. Thus our approach offers a way to bypass the computational difficulties linked with the full least squares solution. On the other hand, however, this is achieved at the expense of being unable to estimate and identify explicitly time-invariant individual and firm effects \((i.e. \alpha_i\) and \(\phi_{j(i,t)}\)). Neither can we estimate any other time-invariant effects. But, despite these shortcomings we still achieve our three most important objectives both with the first-differenced or within-individual mean differenced versions of model 2 as long as each separate differencing or calculation of means is accomplished using only observations of the same worker staying in the same firm. First, we can implicitly control for all observed and unobserved time-constant individual and firm-specific effects. Second, observable
time-variant effects will be explicitly included and therefore also separately estimated in the model. And finally, we obtain a robust and consistent OLS estimate for the wage-profits effect.

Model specification 3 represents the mean-differenced version of the full model 2 and the deviations from means are calculated within each employee-employing firm \((i-j)\) combination.\(^{30}\) Note especially, that even the persons changing employer will remain in the estimation sample as long as the new employer firm is an estimation sample firm too. The individual-firm mean-differenced version is chosen instead of the first-differenced version because the deviations from means transformation preserves and makes use of a larger number of observations in the estimations (e.g. fitting the model in first differences ignores all the 1995 year’s observations). As noted before, the use of first- as well as mean-differenced transformations eliminates all time-constant effects from the model. Still, any time-constant effect is controlled for in the model specification 3 which means that the estimation bias of estimated parameters due to omission of time-invariant effects from the basic model 1 is now eliminated. Yet, of course, only the explicit inclusion of any other previously omitted time-variant effect can eliminate the corresponding bias.

\[
\ln w_{it} - (\ln w_i - \ln w) = \delta + \{\pi_{j(i,t)t} - (\bar{\pi}_{j(i,t)} - \bar{\pi})\} \rho_0 + \\
\{x_{it} - (\bar{x}_i - \bar{x})\}' \beta + \\
\{q_{j(i,t)} - (\bar{q}_{j(i,t)} - \bar{q})\}' \rho_2 + \\
\{p_t - (\bar{p}_i - \bar{p})\}' \tau + \\
\{\epsilon_{it} - (\bar{\epsilon}_i - \bar{\epsilon})\}
\]

(3)

In table 4 we see results of estimating multivariate mean-differenced re-

\(^{30}\)In the specification 3, actually, total sample means \((\ln w, \bar{\pi}, \bar{x}, \bar{q} \text{ and } \bar{\epsilon})\) are first subtracted from the corresponding firm-employee combinations means \((\ln w_{i}, \bar{\pi}_{j(i,t)} \bar{x_i}, \bar{q}_{j(i,t)} \text{ and } \bar{\epsilon}_i)\) and these differences then are subtracted from employee-level values. In this way even the constant term will be preserved in estimations. Note, however, that the estimated intercept coefficient encompasses now, in addition to the actual constant term, the total sample means of individual and firm-specific unobserved effects plus the effects of the total sample means of all time-constant observed firm and worker characteristics. Note furthermore that the specification 3 covers even unbalanced panels. For the case of time dummies belonging to the set of cross section-constant but time-variant variables \(\bar{p}'\) this implicates that their individual-specific means vary across individuals explaining the subindex of \(\bar{p}'\). The transformation, however, has no effect on the estimated \(\tau\) parameters.
gression models of type 3 above for the same six different wage specifications and the two per-head profitability measures as before (see table 2). Again, each wage concept generates statistically significant estimates of rent sharing coefficients. But when it comes to the consequences of controlling for unobserved time-invariant employee and firm characteristics the comparison between tables 2 and 4 shows that the controls lead to a significant decrease in all the different indicators measuring the economic significance of rent sharing except in those of the wage concept 5.

Looking at any of the four indicators (the wage-profits elasticity, Margolis-Salvanes measure, Lester’s range and Oswald’s measure) it can be seen that the most prominent decreases fall on the two most elementary wage concepts (models 1a, 1b, 2a and 2b) which show decreases by one quarter as compared to the corresponding indicators in table 2. This means that a significant part of the observed (partial) correlation between basic wages and profits disappears once we add controls for all the time-constant unobserved firm- and employee-specific effects. One possible explanation for this could be that higher basic wages are paid in more profitable firms in part simply because these employ more skilled and thus more productive workers.

While the aforementioned explanation leans closely on the idea of unobserved employee-specific effects there is another option inclining rather towards efficiency wage theories and unobserved firm-specific effects. Namely, if a firm chooses to pay more than the prevailing wage level in order to enhance its employees’ productivity this is likely to produce unobserved firm-specific effects potentially correlated both with profits and wages. Thus unless being controlled, these effects might produce upward bias in pay-profits effects which would explain the observed decrease in rent sharing coefficients. Of course, both these explanations may apply simultaneously the only prerequisite being that the unobserved effects are time-invariant.

A similar, though quantitatively smaller, pattern of decreasing profit coefficients is repeated even for the broader wage concepts 3 (containing performance-related payments) and 4 (even over-time earnings being included) after controlling for unobserved fixed effects. The wage concept 5 seems to be the most robust of all the wage definitions in this respect. It appears that even after controlling all unobserved time-invariant firm and employee effects on top of a wide set of time-variant effects the elasticity and the other estimates remain roughly intact. This shows up to the extent that once unobserved fixed effects are taken into account the wage concept 5 adduces the largest response *vis-à-vis* both the profitability measures. This
is no surprise, rather the contrary, but the outcome emerges only after having controlled both the employee- and firm-specific unobserved effects. The result emphasises, once more, the importance of detailed micro-econometric model specification.

Finally, when overtime earnings are added back (i.e. the wage concept 6) all the indicators drop even below those of the wage concepts 3 and 4. This might suggest that overtime earnings per an overtime hour are relatively unresponsive to fluctuations in profits (cf. table 1) which, combined with the semi-logarithmic model specification and the fact that the wage concepts 6a and 6b possess the largest averages of all the wage concepts, would then explain the decrease of wage-profit elasticities.

Again, Margolis-Salvanes measures show net effects of rent sharing on monthly salary as a percentual proportion of the average monthly salary without rent sharing. Now when operating profits are used as a profitability measure rent sharing raises wages by 1.72-3.43 % (cf. 2.32-3.68 % in table 2). If profitability is measured by value added the corresponding Margolis-Salvanes measures range between 3.01 and 5.89 % (4.03-6.37 % in table 2).31

As said, irrespective of a used profitability measure the largest wage-profit responses are now connected to the wage concept 5 which contains even the pay components related directly to the firm’s overall profitability. Still it needs to be emphasised that, in absolute terms, the profit-related components do not add much extra into the overall picture of rent sharing: for example, the Margolis-Salvanes measure estimates for salary concepts 3 and 4 are not significantly smaller. For the magnitude of shared rents the role of performance-related payments is still by far the most important (cf. the difference between wage concepts 2 and 3 using any of the indicators).

Thus it seems that there are unobserved worker and firm characteristics contributing positively to individual wages and therefore unless being controlled for they will produce upwards biased rent sharing estimates. An apparent reason for the rent sharing indicators of wage specification 5 to 31On the whole, these last-estimated margolis-Salvanes measures correspond fairly closely with estimates from international studies. Margolis & Salvanes (2001), using a multivariate model with instrumented per-employee profits and regressors consisting of a large set of observable firm and worker characteristics plus fixed worker and firm effects, reported estimates of 1.10 % and 0.61 % for France and Norway, respectively. A similar specification by Martins (2004) produced estimates of 0.66 % for instrumented real gross per-employee profits (i.e. operating profits) and 4.01 % for instrumented real net per-employee profits (i.e. value added).
remain the most constant amongst all the different wage specifications is 
that profit-related bonuses, by definition, do not not depend on unobserved 
individual-specific characteristics but instead relate explicitly to the employer 
firm’s overall profitability.

When it comes to the comparison of explanatory powers (goodness of fit) of various model specifications the comparison of the mean differenced model specifications with the basic multivariate specifications encompasses severe ambiguities and difficulties. At first sight, it could be thought that the $R^2$s of the basic model estimations (table 2) could be compared with the "within" $R^2$s of the firm-worker mean-deviated models (table 4). But this is not a viable option either since in the case of the basic models the dependent variable is defined in logarithmic levels while in the case firm-worker mean-differenced model specifications the dependent variable is defined as deviations from the differences between the firm-worker specific and the total sample means. Therefore one cannot straightforwardly compare the basic model R-squares with any of the three different R-squares of the mean-deviated models.

Instead comparison is possible between same kinds of "within" $R^2$s. Maybe the most interesting observation in this respect concerns the sharp drop in the within R-squares when the directly on profits based payments are added in to salaries (concepts 5 and 6). The reason might be connected with the fact that all lagged wage-profits effects have been excluded from our estimated models so far. Especially, as the decrease in R-squares happens to coincide with the inclusion of firm-level profitability related payments the final pecuniary amount of which cannot be determined by the firm before it knows its annual profit. Therefore, as an accounting period continues often past the end of the year, the observed decline in the wage-profits effects may simply be due to the fact that payments based on the firm’s overall profitability will not be paid during the same year they are actually earned but instead in the course of the following year. Thus in order to capture these effects lagged per-capita-profits need to be included in the estimation

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32 The "within" $R^2$s being estimated using deviations from the individual-firm specific means.

33 If the estimated mean differenced model were simply $(y_{it} - \bar{y}_i) = (x'_{it} - \bar{x}_i')\beta + (\epsilon_{it} - \bar{\epsilon}_i)$ then the three different "within" $R^2$s could be defined more formally as follows. $R^2$ within would refer to the prediction equation $(\hat{y}_{it} - \bar{y}_i) = (x'_{it} - \bar{x}_i')\hat{\beta}$; $R^2$ between to the "prediction" equation $\hat{y}_{it} = \bar{\delta} + \bar{x}'_i\hat{\beta}$; and $R^2$ overall to the "prediction" equation $\hat{y}_{it} = \delta + x'_{it}\hat{\beta}$. 

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models. We will return to this issue in the latter part of the study.

Finally, the use of value added as an alternative profitability measure generated again without exception larger estimated rent sharing effects than those based on operational profits. This observation weakens the potential endogeneity problem as value added is likely to be more immune to potential downward endogeneity bias in rent sharing estimates than operational profits.

As a conclusion, the most interesting results can be summed up. Firstly, even after taking into account the unobserved time-constant individual and firm heterogeneity the evidence of rent sharing remains feasible. Secondly, performance-related payments emerge still as the most important factors for the magnitude of shared rents. Thirdly, compared to basic wages, the company-level profitability related payments appear now proportionally more responsive to changes in firm profitability. Fourthly, for the part of the basic wage concepts of models 1a-2a and 1b-2b it seems that a large part of the initially observed rent sharing effects arising from the basic models estimations was actually due to higher basic wage employees being in possession of more well paid individual characteristics or simply working in higher paying firms or occupations. Finally, the use of value added as an alternative profitability measure lends again further credence to the observed results as being more robust to endogeneity bias.

Up to now we have concentrated entirely on simultaneous pay-profits effects. Still, it is quite easy to think various mechanisms through which rent sharing may have delayed effects so that changes in pay need not necessarily take place instantly during the same year the firm’s profitability changes. Therefore we conclude the empirical analyses by asking whether the wages depend solely on current profits or are there effects that are due to previous years’ profitability? The answer to the question is started to seek by adding a one-period lagged per employee profits term \( \pi_{j(i,t)-1} \) into the mean-differenced estimation model 3. The model specification is consequently now:

\[
\ln w_{it} - (\ln w_i - \ln w) = \delta + \{\pi_{j(i,t)t} - (\bar{\pi}_{j(i,t)} - \bar{\pi})\} \rho_0 + \\
\{\pi_{j(i,t)t-1} - (\bar{\pi}_{j(i,t)} - \bar{\pi})\} \rho_1 + \\
\{x_{it} - (\bar{x}_i - \bar{x})\}'\beta + \\
\{q_{j(i,t)t} - (\bar{q}_{j(i,t)} - \bar{q})\}'\rho_2 + \\
\{\epsilon_{it} - (\bar{\epsilon}_i - \bar{\epsilon})\}
\]

(4)
The model specification 4 represents the familiar distributed lag model: firm \( j \)’s per capita profits have now also lagged effect(s) on person \( i \)’s wage but there is no lagged dependent variable on the right side of the estimation equation. Otherwise the notation is identical to that of equation 3. Note that we are now primarily interested of long-run relations and the combined long-run effect of current and one year lagged profits can be modelled as \( \rho = \rho_0 + \rho_1 \).

In table 5 we see OLS estimation results of mean-differenced distributed lag wage models with controls for observed and unobserved employee and individual effects as well as for current and one period lagged pay-profit effects. Except for one-year lagged profitability effects, in all other respects the specifications are identical to static multivariate models of table 4 above.

All estimated current period (\( \hat{\rho}_0 \)) and one-year lagged (\( \hat{\rho}_1 \)) pay-profit effects are statistically significant at 0.1% significance level in each of the twelve models. When comparing the long run effect estimates (\( = \hat{\rho}_0 + \hat{\rho}_1 \)) of table 5 with the sole current period effect estimates (\( \hat{\rho}_0 \)) of table 4 these do not differ much from each other for the part of basic wage specifications (1a, 1b, 2a and 2b). Instead in the case of models 3a, 3b, 4a, 4b, 5a and 5b the distributed lag models produced 3.1 to 13.5 per cent larger (long term) pay-profit estimates compared to the sole current period estimates. The biggest change by 13.5 % concerns wage concept 3.

In table 5 even the monthly base salary shows a clear dependence on the firm’s lucrativeness. The addition of benefits in kind or supplements for shift and Sunday work does not alter the estimated effects. Instead, and in line with the previous static multivariate models findings, the inclusion of performance-related payments leads to the doubling of long-run pay-profits effects. Instead augmenting wage specification 3 with monthly over-time earnings or explicit company-level profits related payments does not affect the size of long-run profits-effects on pay. An interesting outcome is also that wage specification 5 generates now the strongest estimated one-year lagged effects. This supports the view mentioned before that profitability-related payments are not necessarily always being paid within the same year as they are actually earned.

Even though the inclusion of lagged profits proved to be fully justified it does not alter the “big picture” of previous findings; salaries seem still to vary in line with firm profitability independently of whether this is measured with operating profits or with value added. Thus the findings derived from the static models previously achieve further support from the distributed
lag pay-profit models estimations. These dynamic models estimations offer, however, a more detailed view of rent sharing and the process through which profits may affect an employee’s total labour earnings as well as its separate components.

The conclusions remain fairly similar when looking at pay-profit elasticities. Again, models 3a, 3b, 4a, and 4b produce elasticities that are proportionally from 8-9 up to 13-14 percent larger than the ones based on the static mean-deviated models. The rest of the models produce elasticities closer to those of table 4. The same conclusion holds for the other rent sharing indicators (Margolis-Salvanes measure, Lester’s range of pay, the Oswald’s measure). A distributed lag model’s explanatory power is never higher than that of the corresponding multivariate model with no lagged profits. This may relate to the fact that the use of a distributed lag multivariate model leads to a much smaller estimation sample than the one used in the static multivariate models estimations and consequently the outlier observations achieve a larger weight.

In order to assess the importance of shared rents for the magnitude of average wages we consider again the estimates of the Margolis-Salvanes measure. Now the per-capita profits of table 1 are combined with the sum of the current and one-period lagged pay-profits coefficients \(= \hat{\rho}_0 + \hat{\rho}_1\). When operating profits are used as a ability-to-pay measure the corresponding Margolis-Salvanes estimates show that after two years the total net effect of shared rents has led to an 1.77-3.68 % increase in wages as compared to the average wages without rent sharing. If profitability is measured by value added the corresponding Margolis-Salvanes measures rise up to the range of 3.10-6.51 %. Thus even after controlling unobserved employee and firm effects rent sharing preserves a clear and non-ignorable long-run effect on the white-collar employees’ salaries whereas the inclusion of lagged profits, for its part, emphasises the special responsiveness of wage concept 3 and thereby also of performance-related payments to changes in lagged profits. The economic significance of the estimated rent sharing effects will be emphasised even more when recalling our preceding assumption about operating profits being likely to suffer from a negative endogeneity bias, thus making value added potentially a more reliable basis for profit sharing estimates.

As before, explanatory power comparisons between models are restricted to the intra-group comparisons of different “within” \(R^2\)s. There is again a sharp drop in the within R-squares when profit-related payments are added to salaries (concepts 5 and 6). This same result repeating itself even after
the inclusion of lagged profits indicates that it is not caused by profit-related payments being paid the following year they are actually earned. Apparently, there is still unobserved time-variable inter-firm heterogeneity in the prevailing pay practises of profit-related payments which we are not able to capture in our regression models.

All in all, the parallel findings from the static and dynamic distributed lag multivariate models suggest that the existence of rent sharing cannot be disproved simply by explaining it to be due to misspecified estimation models or omitted observed and unobserved firm and employee effects. Besides, the observation that the measurement of profitability with value added generates regularly substantially larger pay-profits effects than using operating profits instead is interesting in two respects. Firstly, the findings supporting the rent sharing hypothesis irrespective of which of the two alternative profitability measures was used offers a direct proof of the robustness of the estimated rent sharing effects. Secondly, in contrast to operating profits and as was explained before, value added is not as likely to suffer from the same kind of calculatory endogeneity bias. And therefore estimation results supporting the existence of shared rents when using value added as a profitability measure offer further reliability for our results.

5 Conclusions

We have analysed the question of whether monthly paid employees’ salaries depend on the employer firm’s profitability in the Finnish metal and electrotechnical industry. This was done using annual matched employer-employee panel data for years 1995-2001 consisting of three extensive data sets: two sets of private sector wage statistics and one consisting of firm-specific information on the firms’ characteristics including profitability and other components of financial statements.

A major novelty of the current study is to perform a stepwise analysis in which each of the six different individual-level monthly wage concepts is successively combined with two alternative profitability measures. In this way we are not restricted to the customary analysis of whether rent sharing concerns only one - more or less randomly chosen - wage specification. Instead the chosen approach enables us to focus in more detail on whether rent sharing is an equally important factor already at the base wage level, or alternatively, whether it arises only after different bonus elements and over-
time supplements are included in wage specifications.

According to the study even base salaries seem to vary with the employer firm’s profitability. Using the most extensive multivariate model specification covering, in addition to a number of observable firm and employee characteristics, the unobserved time-constant firm and employee effects as well as the current and one year lagged pay-profits effects the long-run elasticity of monthly real base salary with respect to profits is 0.018 when profits are measured by real operating profits per employee and 0.031 when profits are measured by real value added per employee. The same model specification produced net wage-raising effects of 1.77 % for the base salary when measuring profits with operating profits and 3.10 % when using value added as a profitability measure.

Wage concept 3 - consisting of base wage, benefits in kind, supplements for shift and Sunday work and performance-related payments - produced the largest estimates for the elasticity of monthly wages with respect to real per capita profits in almost all model specifications. When the firm’s ability-to-pay was measured by operating profits the estimated pay-profit elasticities of wage concept 3 ranged from 0.032 to 0.036 depending on the model specification. When financial performance was measured by value added the elasticities were significantly higher ranging between 0.056 (static mean-differenced model) and 0.063 (dynamic mean-differenced distributed lag model). Such auxiliary components as company-wide profit-related bonuses or over-time payments did not add anything particular in terms of the magnitude of shared rents.

The net wage-raising effect as compared to the wage level without rent sharing achieved its highest values when the wage concept 3 and the dynamic mean-differenced distributed lag model were combined. In this case the net long-run wage-raising effect was 3.68 per cent when measuring profits with operating profits and 6.51 per cent when using value added as a profitability measure. Since pay-profits estimates based on value added are not as likely to suffer from the same kind of calculatory downward bias as operating profits are to do the actual size of rent sharing might be closer to the value added based estimates.\(^{34}\)

\(^{34}\)When using firm-employee data the calculatory endogeneity problem, however, is only partial since the dependent wage variable is an employee-level variable while per-capita-profits on the right hand side are defined at firm level. This means that the “feedback” from an exogenous (with respect to profits) increase in an individual wage is of less significance to the employer firm’s profits (especially the larger the firm in question). Thus, in the
The finding that base wages as well as direct performance- and profit-related payment schemes are clearly responsive to firm profits adds to our knowledge about the Finnish manufacturing sector’s wage determination in several ways. Firstly, the finding that even base wages react to profitability changes is interesting since base wages actually form the very basis from which firms are supposed to start when converting the collective increases into individual wages in euros. Especially, as collective wage increases are often determined in percents of base wages (+ basic regular supplements), the cumulative nature makes the role of base wages of a major importance for any firm trying to estimate the development of its total labour costs in the future. Furthermore, we have reason to believe that base wages are fairly rigid downwards in contrast to performance- and profit-related bonus payments. For these reasons firms have to think twice before they raise base salaries.

Still it seems that the firm’s ability-to-pay affects even base wages. Naturally this raises a question why the firms act in this way instead of confining themselves to utilise potentially much more flexible direct performance- and profit-related payment schemes only? The question will be left for future research but we suspect that this may have something to do with the possibility that even though base wages are rigid \textit{ex-post} they are actually more flexible for the employer to change \textit{(i.e. usually meaning wage increases wage cuts being rare)} immediately whenever financial or personnel policy reasons are requiring that. Profit-related bonuses, being instead based on profitability accounting covering often the entire financial year, are usually paid on an \textit{ex-post} basis and often during the following year they were actually earned. Furthermore, the profit-related bonus schemes may have another weakness. That is, even performance-related payments, not to mention profit-related ones, are often based on workers’ collective achievements making these schemes impractical to use when the firm would like to adjust only a certain smaller group’s of workers \textit{individual} wages or even only a single worker’s wage at a time.

Secondly, our findings might hint at there being be an interesting connection between the wage drift phenomenon and base wages as well as performance- and profit-related payments. Namely, the fact that our models control in case of a firm-employee data (us ours) the negative bias pertaining to the use of operating profits is likely to form quantitatively only a minor problem as compared to the case of using firm-level data.
great detail for the effects of individual productivity heterogeneity\textsuperscript{35} as well as of collective wage increases\textsuperscript{36} means that the observed profitability effects upon various earnings concepts represent a residual-like wage drift element after the effects of collective wage increases as well productive heterogeneity within the labour force are cancelled out. Furthermore, as fluctuations of profits are idiosyncratic it seems that wage drift for the part of our various different wage concepts can be described more accurately by non-competitive rent sharing mechanisms than within a perfectly competitive labour market framework.

Thirdly, after having controlled for observed and unobserved effects of individual productivity differences to a large extent and still finding heterogeneity in individual wages within the one and same manufacturing sector, we can conclude that the "one-price" principle describes hardly the wage determination of the Finnish metal and electrotechnical white-collar workers. The conclusion is strengthened by the result of having managed to pinpoint the source of the remaining heterogeneity as originating from a firm-specific factor (i.e. per-capita profits) instead. Therefore we can conclude that the observed residual-like heterogeneity within individual base wages as well as performance- and profit-related bonuses is not consistent with the perfectly competitive labour market model. The appropriate theoretical context for all these wage components needs rather to be sought in the direction of the theoretical non-competitive labour market scenarios such as the efficiency wage and the implicit contracts theories.

In addition to wage drift another major issue arising in the current paper is the rigidity aspect. Our findings show that the wages of the current industry are not totally rigid. Even base wages respond to firm-specific factors and the already existing performance- and profit-related bonuses double the flexibility estimates. However, the question whether the observed wage flexibility is asymmetric so that wages are totally rigid downwards is still open. Of course, this is a focal issue especially thinking about whether firms have any other alternative but cutting their employment during a downswing. Thus, a natural extension for future research would be to analyse whether

\textsuperscript{35}The mean-deviated models capture the effects of observed and unobserved employee-specific effects thus controlling for changes in the overall composition of labour force.

\textsuperscript{36}The collective wage increases are captured by the use of annual dummies and by the contractual homogeneity of the employee sample consisting exclusively of employees working within the same industry and under two to three collective white-collar contracts only.
the observed pay-profits effects are symmetric with respect firm profitability.

Finally, we have also compared our rent sharing estimates with estimates from previous international studies. The main conclusions obtained from various applied measures were the following. First, all the adapted measures produced size estimates for the significance of shared rents at least of the same magnitude as previous Nordic and Western-European findings. Second, comparing findings from the US and especially from papers using instrumented profits our estimates indicated that shared rents play a much smaller roll within the Finnish wage determination system; at least for the part of the metal industry’s white collar workers.

All in, the study highlights the importance of specifying both wages and profitability variables in detail as well as careful microeconometric modelling. These all put strict requirements on the quality of used data: detailed information on wages and other individual-specific characteristics need to be combined with detailed firm-specific accounting information plus other firm characteristics. In addition to these cross-sectional aspects the applied data need to have a time-series dimension also enabling both the analysis over time as well as the controlling of unobserved firm and worker fixed effects.

References


Martins, P. S. (2004), Rent sharing before and after the wage bill, Discussion paper no. 1376, IZA Institute for the Study of Labor.


Oswald, A. (1996), Rent-sharing in the labor market, Research paper no. 474, University Of Warwick, Department of Economics.


Table 1: Finnish metal and electrotechnical industry firms’ profitability and their monthly paid employees’ salaries 1995-2001.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs.</th>
<th>Mean</th>
<th>Std. dev.</th>
<th>Coeff. of variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Real monthly base salary (1995 €)</td>
<td>296625</td>
<td>2294.59</td>
<td>761.03</td>
<td>0.33</td>
</tr>
<tr>
<td></td>
<td>183920</td>
<td>2369.87</td>
<td>779.50</td>
<td>0.33</td>
</tr>
<tr>
<td>(2) Real monthly salary (1995 €): consisting of real monthly base salary (1) + benefits in kind + extra compensation for shift and Sunday work</td>
<td>296625</td>
<td>2331.74</td>
<td>803.65</td>
<td>0.34</td>
</tr>
<tr>
<td></td>
<td>183920</td>
<td>2409.59</td>
<td>824.69</td>
<td>0.34</td>
</tr>
<tr>
<td>(3) Real monthly salary (1995 €): consisting of real monthly salary (2) + performance-related payments</td>
<td>296625</td>
<td>2409.51</td>
<td>850.31</td>
<td>0.35</td>
</tr>
<tr>
<td></td>
<td>183920</td>
<td>2503.89</td>
<td>876.17</td>
<td>0.35</td>
</tr>
<tr>
<td>(4) Real monthly salary with overtime earnings (1995 €): consisting of real monthly wage (3) + overtime earnings per month</td>
<td>296625</td>
<td>2447.95</td>
<td>859.17</td>
<td>0.35</td>
</tr>
<tr>
<td></td>
<td>183920</td>
<td>2542.61</td>
<td>881.44</td>
<td>0.35</td>
</tr>
<tr>
<td>(5) Real monthly salary (1995 €): consisting of real monthly salary (3) + profit-related payments</td>
<td>183920</td>
<td>2506.02</td>
<td>877.23</td>
<td>0.35</td>
</tr>
<tr>
<td>(6) Real monthly salary with overtime earnings (1995 €): consisting of real monthly salary (5) + overtime earnings per month</td>
<td>183920</td>
<td>2544.74</td>
<td>882.34</td>
<td>0.35</td>
</tr>
<tr>
<td>(7) Real annual operating profit per employee (1995 1000€)</td>
<td>296625</td>
<td>52.5914</td>
<td>69.3938</td>
<td>1.32</td>
</tr>
<tr>
<td></td>
<td>183920</td>
<td>66.2108</td>
<td>82.2661</td>
<td>1.24</td>
</tr>
<tr>
<td>(8) Real annual value added per employee (1995 1000€)</td>
<td>296625</td>
<td>89.7022</td>
<td>71.9876</td>
<td>0.80</td>
</tr>
<tr>
<td></td>
<td>183920</td>
<td>104.7188</td>
<td>83.9061</td>
<td>0.80</td>
</tr>
</tbody>
</table>

Notes:
1 All the wages and their components calculated on monthly basis.
2 Profit-related rewards available only from the year 1998 onwards.
3 Profitability variables are calculated on yearly basis and divided by the annual average number of hourly and monthly paid employees of the corresponding firm. The proceeds of sales of tangible capital goods are excluded.
4 The means and standard deviations of all the wage specifications are calculated directly from the employee sample while the means and standard deviations of the profitability variables are calculated from firm-level figures using firm-specific proportions of monthly paid employees as weights.
5 Coefficient of variation measures standard deviation in proportion to mean.
Table 2: Multivariate static wage equations without controls for unobserved effects in the Finnish metal and electrotechnical industry 1995-2001, monthly paid employees.

<table>
<thead>
<tr>
<th>Model</th>
<th>1a</th>
<th>1b</th>
<th>2a</th>
<th>2b</th>
<th>3a</th>
<th>3b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating profit per employee</td>
<td>0.0004366* (1.02E-05)</td>
<td>0.0004388* (0.0000105)</td>
<td>0.0006789* (0.0000112)</td>
<td>0.0004402* (0.0000119)</td>
<td>0.0004402* (0.0000126)</td>
<td>0.0006739* (0.0000156)</td>
</tr>
<tr>
<td>Value added per employee</td>
<td>0.0004402* (0.0000119)</td>
<td>0.0004402* (0.0000126)</td>
<td>0.0006739* (0.0000156)</td>
<td>0.0004402* (0.0000119)</td>
<td>0.0004402* (0.0000126)</td>
<td>0.0006739* (0.0000156)</td>
</tr>
<tr>
<td>$\varepsilon_{w,\pi}$</td>
<td>0.023</td>
<td>0.039</td>
<td>0.028</td>
<td>0.039</td>
<td>0.036</td>
<td>0.060</td>
</tr>
<tr>
<td>Margolis-Salvanes measure (%)</td>
<td>2.32</td>
<td>4.03</td>
<td>2.33</td>
<td>4.03</td>
<td>3.63</td>
<td>6.23</td>
</tr>
<tr>
<td>Lester’s range (%)</td>
<td>12.12</td>
<td>12.67</td>
<td>12.18</td>
<td>12.68</td>
<td>18.84</td>
<td>19.40</td>
</tr>
<tr>
<td>Oswald’s measure (%)</td>
<td>9.14</td>
<td>9.55</td>
<td>8.83</td>
<td>9.20</td>
<td>13.35</td>
<td>13.75</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.6501</td>
<td>0.6505</td>
<td>0.6372</td>
<td>0.6376</td>
<td>0.6398</td>
<td>0.6403</td>
</tr>
<tr>
<td>N</td>
<td>277755</td>
<td>277755</td>
<td>277755</td>
<td>277755</td>
<td>277755</td>
<td>277755</td>
</tr>
</tbody>
</table>

Notes:
1. In models 1a and 1b dependent variable is monthly base wage. In models 2a and 2b dependent variable consists of the model 1a/b base wage+benefits in kind+supplements for shift and Sunday work (all per month). In models 3a and 3b the wage specification is further augmented with performance-related payments. In all models the dependent variable is defined in natural logarithms while the profitability variable is in levels. All pecuniary factors are defined in real terms (wages in 1995 € and profits/value added in 1995 1000€).
2. Profitability is measured by the employer firm’s real annual operating profits per employee (excluding sales of tangible capital goods) or, alternatively, by the firm’s real annual value added per employee.
3. Along with profitability all the models contain the following independent variables: employer firm’s real capital assets per employee; regular monthly working hours; age and its square; seniority within the current company and its square and cube; educational level (five categories); occupation (74 categories in accordance with TT’s own classification); and six year dummies for years 1996-2001. When the wage specification contains even overtime earnings (models 4a, 4b, 5b and 6b) monthly overtime hours are included among the other explanatory variables.
Table 2: (continues)

<table>
<thead>
<tr>
<th>Model</th>
<th>4a</th>
<th>4b</th>
<th>5a</th>
<th>5b</th>
<th>6a</th>
<th>6b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating profit per employee</td>
<td>0.0006875*</td>
<td>0.0006542*</td>
<td>0.0006615*</td>
<td>0.0006615*</td>
<td>0.0006889*</td>
<td></td>
</tr>
<tr>
<td>Value added per employee</td>
<td>(0.0000112)</td>
<td>(0.0000115)</td>
<td>(0.0000114)</td>
<td>(0.0000114)</td>
<td>(0.0000114)</td>
<td></td>
</tr>
<tr>
<td>$\varepsilon_{w,\pi}$</td>
<td>0.036</td>
<td>0.061</td>
<td>0.034</td>
<td>0.061</td>
<td>0.035</td>
<td></td>
</tr>
<tr>
<td>Margolis-Salvanes measure (%)</td>
<td>3.68</td>
<td>6.32</td>
<td>3.50</td>
<td>6.29</td>
<td>3.54</td>
<td></td>
</tr>
<tr>
<td>Lester’s range (%)</td>
<td>19.08</td>
<td>19.66</td>
<td>18.16</td>
<td>19.60</td>
<td>18.36</td>
<td></td>
</tr>
<tr>
<td>Oswald’s measure (%)</td>
<td>13.59</td>
<td>14.01</td>
<td>12.92</td>
<td>14.00</td>
<td>13.24</td>
<td></td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.6442</td>
<td>0.6447</td>
<td>0.6201</td>
<td>0.6220</td>
<td>0.6219</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>277755</td>
<td>277755</td>
<td>165120</td>
<td>165120</td>
<td>165120</td>
<td>165120</td>
</tr>
</tbody>
</table>

Notes:
4 The wage specification in models 4a and 4b is that of the models 3a and 3b above augmented with monthly over-time earnings. The replacement of monthly over-time payments by per-month profit-related payments leads to the wage specification in models 5a and 5b. Finally, when over-time payments are added back to the wage concept of models 5a and 5b there follows the earnings concept of models 6a and 6b. The information on profit-related payments covers only the years 1998-2001 explaining the smaller number of observations.
5 In models 1a-6a the profit variable is real operating profits (without sales of tangible capital goods) per employee (1995 1000€) and in models 1b-6b the profit variable is real value added per employee (1995 1000€). The term "employee" refers to the firm’s total labour force (both hourly and monthly paid workers).
6 $\varepsilon_{w,\pi}$ is the elasticity of wages with respect to profits per employee.
7 The "Margolis-Salvanes measure" tells how many percent higher the mean wage rises due to rent sharing as compared to the average wage without rent sharing.
8 "Lester’s range of pay" tells the percentage change in wages due to the change of profits by four standard deviations starting from the mean profits.
9 "Oswald’s measure" tells how large a share of the total standard deviation of wages is due to profits and rent sharing.
10 To ensure comparability between the adapted model specifications all elasticities and other indicators measuring the economic significance of rent sharing are calculated using the full 1995-2001 sample values of table 1.
11 Standard errors are shown in parentheses and are adjusted for within cluster (i.e. within firm-person) dependence.
12 + indicates significance at 1 %-level and * at 0.1 % -level.

<table>
<thead>
<tr>
<th>Year</th>
<th>Real operating profits per employee</th>
<th>Coeff. of variation</th>
<th>Real value added per employee</th>
<th>Coeff. of variation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Std. dev.</td>
<td>Mean</td>
<td>Std. dev.</td>
</tr>
<tr>
<td>1995</td>
<td>25.01719</td>
<td>29.15382</td>
<td>1.165</td>
<td>59.24043</td>
</tr>
<tr>
<td></td>
<td>(11.01484)</td>
<td>(28.96395)</td>
<td>(2.63)</td>
<td>(42.48277)</td>
</tr>
<tr>
<td>1996</td>
<td>28.22115</td>
<td>24.95325</td>
<td>0.884</td>
<td>63.71453</td>
</tr>
<tr>
<td></td>
<td>(16.0309)</td>
<td>(44.92884)</td>
<td>(2.803)</td>
<td>(53.06562)</td>
</tr>
<tr>
<td>1997</td>
<td>36.65177</td>
<td>30.81109</td>
<td>0.841</td>
<td>71.3357</td>
</tr>
<tr>
<td></td>
<td>(17.19962)</td>
<td>(23.46843)</td>
<td>(1.364)</td>
<td>(49.30028)</td>
</tr>
<tr>
<td>1998</td>
<td>46.29441</td>
<td>49.67852</td>
<td>1.073</td>
<td>83.01507</td>
</tr>
<tr>
<td></td>
<td>(14.6857)</td>
<td>(20.58834)</td>
<td>(1.402)</td>
<td>(46.85685)</td>
</tr>
<tr>
<td>1999</td>
<td>57.343</td>
<td>86.55072</td>
<td>1.509</td>
<td>94.75123</td>
</tr>
<tr>
<td></td>
<td>(13.15199)</td>
<td>(25.49656)</td>
<td>(1.939)</td>
<td>(46.23616)</td>
</tr>
<tr>
<td>2000</td>
<td>78.01971</td>
<td>99.93356</td>
<td>1.281</td>
<td>116.524</td>
</tr>
<tr>
<td></td>
<td>(16.19257)</td>
<td>(31.36941)</td>
<td>(1.937)</td>
<td>(49.37974)</td>
</tr>
<tr>
<td>2001</td>
<td>79.81173</td>
<td>77.83999</td>
<td>0.975</td>
<td>120.8329</td>
</tr>
<tr>
<td></td>
<td>(14.48875)</td>
<td>(20.22252)</td>
<td>(1.396)</td>
<td>(48.41062)</td>
</tr>
<tr>
<td>All</td>
<td>52.56428</td>
<td>69.37993</td>
<td>1.320</td>
<td>89.67198</td>
</tr>
<tr>
<td></td>
<td>(14.77483)</td>
<td>(30.53025)</td>
<td>(2.066)</td>
<td>(48.11952)</td>
</tr>
</tbody>
</table>

Notes:
1 The means and standard deviations of both profitability variables have been calculated by using firm-specific proportions of monthly paid employees as weights.
2 The alternative means and standard deviations have been calculated by using constant firm-specific unit-weights for each firm-year combination in the data. These statistics as well as the corresponding coefficients of variations are presented in the parentheses.
3 All the means and standard deviations denoted in thousands of 1995 euros.
Table 4: Multivariate fixed effects wage equations for the Finnish metal and electrotechnical industry 1995-2001, monthly paid employees.

<table>
<thead>
<tr>
<th>Model</th>
<th>1a</th>
<th>1b</th>
<th>2a</th>
<th>2b</th>
<th>3a</th>
<th>3b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating profit per employee</td>
<td>0.0003247*</td>
<td>(9.31E-06)</td>
<td>0.0003303*</td>
<td>(9.78E-06)</td>
<td>0.0006059*</td>
<td>(1.11E-05)</td>
</tr>
<tr>
<td>Value added per employee</td>
<td>0.0003308*</td>
<td>(9.14E-06)</td>
<td>0.0003374*</td>
<td>(9.61E-06)</td>
<td>0.0006198*</td>
<td>(1.10E-05)</td>
</tr>
<tr>
<td>$\varepsilon_{w,\pi}$</td>
<td>0.017</td>
<td>0.030</td>
<td>0.017</td>
<td>0.030</td>
<td>0.032</td>
<td>0.056</td>
</tr>
<tr>
<td>Margolis-Salvanes measure (%)</td>
<td>1.72</td>
<td>3.01</td>
<td>1.75</td>
<td>3.07</td>
<td>3.24</td>
<td>5.72</td>
</tr>
<tr>
<td>Lester’s range (%)</td>
<td>9.01</td>
<td>9.53</td>
<td>9.17</td>
<td>9.71</td>
<td>16.82</td>
<td>17.85</td>
</tr>
<tr>
<td>Oswald’s measure (%)</td>
<td>6.79</td>
<td>7.18</td>
<td>6.65</td>
<td>7.05</td>
<td>11.91</td>
<td>12.64</td>
</tr>
<tr>
<td>$R^2$: within</td>
<td>0.6491</td>
<td>0.6498</td>
<td>0.6310</td>
<td>0.6317</td>
<td>0.6475</td>
<td>0.6494</td>
</tr>
<tr>
<td>$R^2$: between</td>
<td>0.1955</td>
<td>0.1966</td>
<td>0.1952</td>
<td>0.1962</td>
<td>0.1986</td>
<td>0.2005</td>
</tr>
<tr>
<td>$R^2$: overall</td>
<td>0.1697</td>
<td>0.1711</td>
<td>0.1709</td>
<td>0.1722</td>
<td>0.1768</td>
<td>0.1793</td>
</tr>
<tr>
<td>N</td>
<td>277755</td>
<td>277755</td>
<td>277755</td>
<td>277755</td>
<td>277755</td>
<td>277755</td>
</tr>
</tbody>
</table>

Notes:
1 In models 1a and 1b dependent variable is monthly base wage. In models 2a and 2b dependent variable consists of the model 1a/b base wage+benefits in kind+supplements for shift and Sunday work (all per month). In models 3a and 3b the wage specification is further augmented with performance-related payments. In all models the dependent variable is defined in natural logarithms while the profitability variable is in levels. All pecuniary factors are defined in real terms.
2 Profitability is measured by the employer firm’s real annual operating profits per employee (excluding sales of tangible capital goods) or, alternatively, by the firm’s real annual value added per employee.
3 Along with profitability all the models contain the following independent variables: employer firm’s real per employee capital assets; regular monthly working hours; age and its square; seniority within the current company and its square and cube; educational level (five categories); occupation (74 categories in accordance with TT’s own classification) and six year dummies for years 1996-2001. When the wage specification contains even overtime earnings (models 4a, 4b, 5b and 6b) monthly overtime hours are included amongst the other explanatory variables.
Table 4: (continues)

<table>
<thead>
<tr>
<th>Model</th>
<th>4a</th>
<th>4b</th>
<th>5a</th>
<th>5b</th>
<th>6a</th>
<th>6b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating profit</td>
<td>0.0005892*</td>
<td>0.0006416*</td>
<td>0.0005356*</td>
<td>0.0005356*</td>
<td>0.0005356*</td>
<td>0.0005356*</td>
</tr>
<tr>
<td>per employee</td>
<td>(1.13E-05)</td>
<td>(1.91E-05)</td>
<td>(2.00E-05)</td>
<td>(2.00E-05)</td>
<td>(2.00E-05)</td>
<td>(2.00E-05)</td>
</tr>
<tr>
<td>Value added</td>
<td>0.0006039*</td>
<td>0.0006376*</td>
<td>0.0005376*</td>
<td>0.0005376*</td>
<td>0.0005376*</td>
<td>0.0005376*</td>
</tr>
<tr>
<td>per employee</td>
<td>(1.11E-05)</td>
<td>(1.86E-05)</td>
<td>(1.46E-05)</td>
<td>(1.46E-05)</td>
<td>(1.46E-05)</td>
<td>(1.46E-05)</td>
</tr>
<tr>
<td>$\varepsilon_{w,\pi}$</td>
<td>0.031</td>
<td>0.054</td>
<td>0.034</td>
<td>0.057</td>
<td>0.029</td>
<td>0.049</td>
</tr>
<tr>
<td>Margolis-Salvanes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>measure (%)</td>
<td>3.15</td>
<td>5.57</td>
<td>3.43</td>
<td>5.89</td>
<td>2.86</td>
<td>4.94</td>
</tr>
<tr>
<td>Lester’s range (%)</td>
<td>16.35</td>
<td>17.39</td>
<td>17.81</td>
<td>18.36</td>
<td>14.87</td>
<td>15.48</td>
</tr>
<tr>
<td>Oswald’s measure (%)</td>
<td>11.65</td>
<td>12.39</td>
<td>12.72</td>
<td>13.11</td>
<td>10.72</td>
<td>11.16</td>
</tr>
<tr>
<td>R²: within</td>
<td>0.6795</td>
<td>0.6812</td>
<td>0.5092</td>
<td>0.5096</td>
<td>0.5445</td>
<td>0.5450</td>
</tr>
<tr>
<td>R²: between</td>
<td>0.2026</td>
<td>0.2045</td>
<td>0.1626</td>
<td>0.1647</td>
<td>0.1665</td>
<td>0.1685</td>
</tr>
<tr>
<td>R²: overall</td>
<td>0.1850</td>
<td>0.1876</td>
<td>0.1337</td>
<td>0.1358</td>
<td>0.1375</td>
<td>0.1396</td>
</tr>
<tr>
<td>N</td>
<td>277755</td>
<td>277755</td>
<td>165120</td>
<td>165120</td>
<td>165120</td>
<td>165120</td>
</tr>
</tbody>
</table>

Notes:

4 The wage specification in models 4a and 4b is that of the models 3a and 3b above augmented with monthly over-time earnings. The replacement of monthly over-time payments by per-month profits related payments leads to the wage specification in models 5a and 5b. Finally, when over-time payments are added back to the wage concept of models 5a and 5b there follows the earnings concept of models 6a and 6b. The information on profits related payments covers only the years 1998-2001 which explains the smaller number of observations.

5 In models 4a-6a the profit variable is defined as in models 1a-3a and in models 4b-6b the profit variable is the same as in that of models 1b-3b.

6 In models 5a and 5b the independent variables are the same as in models 1a-3a and 1b-3b. Since monthly overtime earnings are included in the wage specifications of models 4a, 4b, 6a and 6b the corresponding numbers of over-time hours have been included as explanatory variables in these models.

7 $\varepsilon_{w,\pi}$ is the elasticity of wages with respect to profits per employee.

8 The “Margolis-Salvanes measure” tells how many percent higher the mean wage rises due to rent sharing as compared to the wage level without rent sharing.

9 ‘Lester’s range of pay’ tells the percentage change in wages due to the change of profits by four standard deviations (‘Lester’s range’) divided by mean profits.

10 ‘Oswald’s measure’ tells how large a share of the total standard deviation of wages is due to rent sharing.

11 Standard errors are shown in parentheses and they are adjusted for clustering in firm-employee combinations.

12 + indicates significance at 1 %-level and * at 0.1 % -level.
Table 5: Multivariate mean-differenced distributed lag wage equations for the Finnish metal industry 1995-2001, monthly paid employees.

<table>
<thead>
<tr>
<th>Model</th>
<th>1a</th>
<th>1b</th>
<th>2a</th>
<th>2b</th>
<th>3a</th>
<th>3b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating profit per employee</td>
<td>0.0001695*</td>
<td>0.0001674*</td>
<td>0.0002995*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(8.85E-06)</td>
<td>(9.30E-06)</td>
<td>(1.11E-05)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating profit per employee (one year lag)</td>
<td>0.0001649*</td>
<td>0.0001722*</td>
<td>0.0003878*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(8.66E-06)</td>
<td>(9.19E-06)</td>
<td>(1.13E-05)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value added per employee</td>
<td>0.0001787*</td>
<td>0.0001773*</td>
<td>0.0003346*</td>
<td>0.0003346*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(8.49E-06)</td>
<td>(8.95E-06)</td>
<td>(1.06E-05)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value added per employee (one year lag)</td>
<td>0.0001616*</td>
<td>0.0001699*</td>
<td>0.0003689*</td>
<td>0.0003689*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(8.25E-06)</td>
<td>(8.79E-06)</td>
<td>(1.07E-05)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\varepsilon_{w,\pi}^{LR}$</td>
<td>0.018</td>
<td>0.031</td>
<td>0.018</td>
<td>0.031</td>
<td>0.036</td>
<td>0.063</td>
</tr>
<tr>
<td>Margolis-Salvanes (long-term) measure (%)</td>
<td>1.77</td>
<td>3.10</td>
<td>1.80</td>
<td>3.16</td>
<td>3.68</td>
<td>6.51</td>
</tr>
<tr>
<td>Lester's (long-term) range (%)</td>
<td>9.28</td>
<td>9.80</td>
<td>9.43</td>
<td>10.00</td>
<td>19.08</td>
<td>20.26</td>
</tr>
<tr>
<td>Oswald's (long-term) measure (%)</td>
<td>7.00</td>
<td>7.39</td>
<td>6.84</td>
<td>7.25</td>
<td>13.52</td>
<td>14.35</td>
</tr>
<tr>
<td>$R^2$: within</td>
<td>0.6180</td>
<td>0.6187</td>
<td>0.5959</td>
<td>0.5966</td>
<td>0.6046</td>
<td>0.6069</td>
</tr>
<tr>
<td>$R^2$: between</td>
<td>0.1207</td>
<td>0.1217</td>
<td>0.1212</td>
<td>0.1222</td>
<td>0.1179</td>
<td>0.1201</td>
</tr>
<tr>
<td>$R^2$: overall</td>
<td>0.1084</td>
<td>0.1095</td>
<td>0.1096</td>
<td>0.1107</td>
<td>0.1095</td>
<td>0.1119</td>
</tr>
<tr>
<td>N</td>
<td>185360</td>
<td>185360</td>
<td>185360</td>
<td>185360</td>
<td>185360</td>
<td>185360</td>
</tr>
</tbody>
</table>

Notes:
1. $\varepsilon_{w,\pi}^{LR}$ is the long-run elasticity of wages with respect to profits per employee. For other details see table 4.
Table 5: (continues)

<table>
<thead>
<tr>
<th>Model</th>
<th>4a</th>
<th>4b</th>
<th>5a</th>
<th>5b</th>
<th>6a</th>
<th>6b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating profit per employee</td>
<td>0.0003043*</td>
<td>(1.13E-05)</td>
<td>0.0002489*</td>
<td>(0.000142)</td>
<td>0.000166*</td>
<td>(0.000015)</td>
</tr>
<tr>
<td>Value added per employee (one year lag)</td>
<td>0.0003364*</td>
<td>(1.08E-05)</td>
<td>0.0004129*</td>
<td>(0.0000129)</td>
<td>0.0003632*</td>
<td>(0.0000133)</td>
</tr>
<tr>
<td>( \varepsilon_{w, \pi}^{LR} )</td>
<td>0.034</td>
<td>0.059</td>
<td>0.035</td>
<td>0.061</td>
<td>0.028</td>
<td>0.050</td>
</tr>
<tr>
<td>Margolis-Salvanes (long-term) measure (%)</td>
<td>3.43</td>
<td>6.09</td>
<td>3.54</td>
<td>6.32</td>
<td>2.82</td>
<td>5.08</td>
</tr>
<tr>
<td>Lester’s (long-term) range (%)</td>
<td>17.79</td>
<td>18.97</td>
<td>18.37</td>
<td>19.66</td>
<td>14.69</td>
<td>15.91</td>
</tr>
<tr>
<td>Oswald’s (long-term) measure (%)</td>
<td>12.67</td>
<td>13.51</td>
<td>13.12</td>
<td>14.04</td>
<td>10.59</td>
<td>11.47</td>
</tr>
<tr>
<td>( R^2 ): within</td>
<td>0.6286</td>
<td>0.6306</td>
<td>0.4732</td>
<td>0.4748</td>
<td>0.4917</td>
<td>0.4929</td>
</tr>
<tr>
<td>( R^2 ): between</td>
<td>0.1172</td>
<td>0.1193</td>
<td>0.0900</td>
<td>0.0919</td>
<td>0.0882</td>
<td>0.0899</td>
</tr>
<tr>
<td>( R^2 ): overall</td>
<td>0.1120</td>
<td>0.1144</td>
<td>0.0738</td>
<td>0.0758</td>
<td>0.0726</td>
<td>0.0744</td>
</tr>
<tr>
<td>N</td>
<td>185360</td>
<td>185360</td>
<td>125428</td>
<td>125428</td>
<td>125428</td>
<td>125428</td>
</tr>
</tbody>
</table>

Notes:

\(^2 \varepsilon_{w, \pi}^{LR}\) is the long-run elasticity of wages with respect to profits per employee. For other details see table 4.