Profit Sharing, Economic Integration and Employment: Econometric Evidence from Finland*

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Abstract

By using theoretical model and empirical analysis, we investigate how economic integration affects the impact of the profit sharing on the employment. We show that, in theory, the effects of economic integration on the impact of profit sharing on employment depend definitely trade-off between intensified competition and better advantage of economies of scale. If product market competition increases, the possibilities of profit sharing to improve employment through economic integration increase with moderated wages. While, the economic integration associating with market power in turn decreases the possibilities of profit sharing with higher wages to improve employment. As increased trade competition crowds out better advantage of economies of scale, economic integration increases profit sharing with wage-moderating and thus improve labour demand. We test the idea whether European integration has changed the impact of the profit sharing on the employment in Finland using data from the manufacturing sector from 1996 to 2004. The results show that profit-sharing has positive impact on employment in the process of economic integration, but can have ambiguous effects on the stability of employment.

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1 INTRODUCTION

The earliest arguments for gains from economic integration are based on that international competition promotes economic efficiency. The protection of market is costly because resources are not allocated in areas where a country has a comparative advantage. Bernard et al. (2006) find that economic activity is reallocated towards high-productivity firms as trade costs fall in industry. The benefits of economic integration result from access to larger markets, and therefore larger profits and possible economies of scale. The recent emphasis on imperfectly competitive markets in international trade creates another argument for gains from integration: in a protected market dominated by only a few firms, trade reform increases competition which is also important for productive efficiency. Research on productivity often examines the relationship between productivity increases and structural changes in an economy, such as trade policy reforms. According to recent heterogeneous firm models (see for example Helpman et al. 2003, or Bernard et al. 2003) the benefits of trade are accrue to the most productive firms within industry, whereas the costs are felt disproportionately by the least productive. Bayoumi et al. (2004) conclude that greater competition significantly stimulates macroeconomic performance and that it may improve macroeconomic management by increasing the responsiveness of wages and prices to market conditions. In line with this view intensified competition in product markets could be expected to affect on the impact of profit sharing on employment. The relationship between profit-sharing and firm's performance has been addressed in several empirical studies (see Fitzroy and Kraft 1987, Cable and Wilson 1989 and 1990, Wadhwani and Wall 1990, Kruse 1992, Cahuc and Dormont 1997, Conyon and Freeman 2001). All of these studies show that profit-sharing is correlated with a better productivity. This implies that employment might be higher in profit-sharing firms through the productivity effects of economic integration. Gersbach (2000) argues that reductions in product market imperfections might enhance employment through lower mark-ups, higher total productivity and expanded sets of product varieties. If, however, it is supposed that economic integration only strengthens the price competition, then the productivity changes associated with trade reform may be mismeasured. Then, the impact of liberalization on product market

leads to biased estimates of the relationship between trade reform and productivity growth. This suggests that it has to be taken account for changes in both of price-cost margins and returns to scale as the measures of competition estimating the effects of economic integration on the impact of profit sharing on employment.

There is also the issue of employment stability. One of the concerns is how changes in the degree of product market competition can affect labour practices in the progress of integration where firms face aggregate and industry-specific shocks. Economic integration is a process in which markets for goods and factors of production tend to become perfectly integrated. The mobility of production has been increasing as a consequence of product market integration. As Rodrik (1998, 1999) argues, open economies, which are free to trade with each other, differ from closed economies in the respect that in particular capital and employers are internationally mobile. The progress of integration with the wider trade and capital flows has been strengthening the competition both within and across industries and countries, which has reflected in the labour market. Product demand will become more sensitive to price differentials between economies and firms' location decisions more responsive to relative labour costs. Rodrik (1997, 1998) explains when the shock of product market is a negative one; there is a larger decrease in employment in the more open economy than there is in the more closed economy. A consequence of integration is greater instability in labour-market outcomes when openness magnifies the effects of shocks on labour demand. On the other hand, the firms with access to the wider market were expected to be able to expand sales and production to take better advantage of economies of scale while continuing to cover production costs despite lower price-cost margins. This implies that the creative destruction of exporting is associated with the reallocation of resources from less efficient to more efficient firms which may generate more job creation than job destruction. The impact of profit sharing on the changes of net employment refers here to profit sharing as method of payment based on performance of firms, as opposed to base wage. The loss of national adjustment variables with the progress of integration will result in an increased need for alternative flexible mechanisms to correct possible asymmetric shocks across industries and countries. Therefore, competitiveness pressure on the labour market towards greater flexibility is expected to increase under diminishing trade barriers. Haffner et al. (2000) find evidence that both product market competition and

labour market flexibility have been fostered by integration within the EU-countries. Weitzman (1985, 1987) has argued that the merit of profit-sharing is that it guarantees stability of employment in the face of shocks. The theoretical arguments rely crucially on the assumption that firms use the base wage and not the total level of remuneration as the relevant marginal cost of labour. A wage system has a negative macroeconomic externality, while a profit-sharing system has favourable externality effects on employment and, indirectly, on price stability. It is argued that, if there is a general rise in product market competition, the loss of rents would be shared by the firms and workers with no overall impact on employment (see Geroski et al., 1995, for example). Kruse (1991) presents evidence suggesting that the statistical association between aggregate unemployment and employment at the firm level is less strong for profit-sharing firms. However, Wadhwani and Wall (1990) present a more formal test of this proposition in the context of a labour demand model, and find no difference in the effect of aggregate demand shocks on employment between profit-sharing and non-profit-sharing firms.

Profit sharing has been extensively used in European countries as part of the compensation scheme in the labour market. Pendleton et al. (2001) presents detailed data on the significant proportion of workplaces with financial employee participation, in particular in the form of profit sharing schemes, in EU-countries. Profit sharing has increased considerably in Finland during the late 1990s. Profit sharing has been seen as a way to introduce wage flexibility in a setting where wage levels are determined centralized, as in case of Finland. We consider the hypothesis that profit sharing is introduced not as an incentive mechanism, but as a way to obtain a more stable employment in the process of economic integration. The purpose of this study is to examine by using theoretical model and empirical analysis the effects of economic integration on the impact of profit sharing on employment. The commitment to profit sharing serves as a strategic device inducing a reduction in the negotiated base wage, thereby generating a link between the imperfections in the product market and equilibrium employment. In theory, the impact of profit sharing on employment with economic integration depend definitely on trade-off between intensified competition and better advantage of economies of scale. A comparatively high degree of product market competition will make labour demand more elastic and shift it outwards. Due to rent sharing behaviour, wage rates can be expected to be inversely related to product market competition. Hence, it

can be argued that the possibilities of profit sharing to improve employment through economic integration is progressively increased when product market competition increases. However, there is case in which firms might choose to pay higher wages when they have market power and are earning higher monopoly rents. With increased integration and competition firms with access to the wider market are expected to be able to expand sales and production to take better advantage of economies of scale. Thus, market power may arise from specialization in production and differentiation of products to establish segmented markets. The economic integration associating with market power might in turn decrease the possibilities of profit sharing with higher wages to improve employment. As a consequence, the validity of the relationship has to be determined empirically. We focus on the empirical work with the aim of determining the effect of European integration on the impact of profit sharing on the employment. The question about the relationship between the intensity of economic integration and employment in the presence of profit sharing has not been studied empirically. This has been tested using data from the Finnish manufacturing sector from 1996 to 2004.

The study is organized as follows. Section 2 focuses on identifying the main channels through which economic integration affects the impact of profit sharing on the employment. It specifies a theoretical framework for empirical analysis. Section 3 set up the econometric model. The data is described in Section 4. Section 5 presents the estimation strategy, and reports on the empirical results. A few concluding remarks are given in the last section.

2 THEORETICAL FRAMEWORK

We will structure a general theoretical model of intra-industry trade to capture the effects of product market integration[1] on the impact of profit sharing on employment via the removal of barriers. Intra-industry trade may be defined as the two-way exchange of goods in which neither country seems to have a comparative cost advantage. We suppose that labour markets are unionized which generates rigidities in the wage setting

process. As Koskela and Stenbacka (2005) emphasize, the profit sharing decisions take place within the framework of an institutional environment where the profit-sharing schemes have to be independent of wage agreements. It is supposed that the firms commit themselves to a profit sharing arrangement which specifies to what extent the wage contracts are performance-related.[2] The firm determines the employment, once the base wage and the profit share have been determined. The wages serve as a commitment, which the firm takes as given when it decides about profit sharing. We consider an open economy where there are many firms at industry level producing differentiated good with capital and labour as inputs. Supposing that product markets are imperfectly competitive, there is monopolistic competition in good markets adapting the model of Dixit and Stiglitz (1977) where there is assumed to be no strategic (Bertrand or Cournot) interaction between firms.[3] The structure of this general model is such that consumers demand a variety of differentiated products.

Assuming that linear-homogenous technology can be represented for each firm *i* at industry *j* by CES (constant elasticity of substitution)[4] production function form, it can be specified as

$$Y_{ji} = \left[L_{ji}^{\varphi_{ji}} + K_{ji}^{\varphi_{ji}} \right]^{\frac{1}{\varphi_{ji}}} \tag{2.1}$$

where elasticity of substitution between capital and labour is defined $\sigma_{ji} \equiv \frac{1}{1-\varphi_{ji}} \geq 0$, and capital is denoted by K_{ji}, and labour by L_{ji}. The elasticity of substitution is defined as the effect of a change in relative factor prices on relative inputs of these two factors, holding output constant (see Allen 1938, or Hamermesh 1993). It can be thought as pa-

[1] An integration process is implying more integration across product markets.
[2] It is crucial that firms feel able to reduce average total remuneration. If firms feel that they must continue to pay the same amount to each worker as in the existing wage system, introducing profit sharing will not alter hiring behavior. Then, as Wadhwani and Wall (1990) argue, if firms feel committed to paying a certain total amount, the manner in which this amount was divided into the two components (base wage and profit linked pay), would become irrelevant.
[3] This approximates a situation in which there are a large number of varieties and each firm has some power over the pricing of its product.
[4] The CES function exhibits constant returns to scale. However, trade may give rise to take advantage of economies of scale in production.

rameterized on trade costs (τ_j) to reflect that integration expands the set of factors by increasing mobility of capital. Thus, firms can substitute other factors of production for immobile workers more easily by investing. If the elasticity of substitution is great, as labour costs rises relative to capital costs, labour will be substituted for capital.[5]

We suppose for simplicity that all industries produce only differentiated products.[6] The firms face at industry *j* representative consumer's tastes which are assumed represented by the utility function

$$V = \Sigma_j b_j \frac{1}{\theta_j} D_j^{\theta_j} \tag{2.2}$$

where $D_j = \Sigma_{i=1}^{n} D_{ji}$ is an index of consumption of the differentiated products at industry *j*, and b_j is the positive constant. Firm *i* at industry *j* is assumed to choose the price and decide on employment so as maximize the following profit function

$$(1-\Pi_{ji}^{w})\Pi_{ji} = (1-\Pi_{ji}^{w})\left[p_{ji}(Y_{ji})Y_{ji} - w_{ji}L_{ji} - r_{ji}K_{ji}\right]. \tag{2.3}$$

where p_{ji} represents the price of variety *i*, and capital costs are denoted by r_{ji}. The firm takes the wage rate w_{ji} and the profit share Π_{ji}^{w} as given. The profit share determines what fraction of the firms' profits will be transferred to employed workers. From the underlying utility function, given by (2.2), by imposing the symmetry assumption a consumer maximizing[7] will set the demand in the product market as

[5] When there is a rise in the labour costs, the relative price of capital in terms of labour in this industry will decline i.e. capital here will be relatively cheap. As a result competitive forces will lead to the adoption of more capital-intensive production. In case of a unitary elasticity of substitution, the capital/labour ratio will also change by equal percentages as the factor-price ratio. If the elasticity of substitution is less than one, an increase in the price of labour must induce firms to use more capital, but the increase in the use of capital is not equal relative to an increase in the labour-price.

[6] It is possible to suppose that there is a sector producing the outside good only for domestic market.

[7] Each consumer maximises their utility function (2.1) subject to the budget constraint. The budget constraint simply requires that the value of expenditure is not more than value of the income.

$$D_j = \left(\frac{P_j^*}{b_j} \right)^{\frac{-1}{1-\theta_j}} \tag{2.4}$$

where $\varepsilon_j = \frac{1}{1-\theta_j} > 1$ is the product-demand elasticity, and P_j^* represents an index of the price level in terms of international integration. The product-demand elasticity can be thought as an increasing function of the number of products $\varepsilon_j = \varepsilon_j(n_j)$, where $\varepsilon_j'(n_j) > 0$, and n_j is the number of products/firms at industry *j*. An increase in the number of firms leads to an increase in the degree of competition. The demand of products type *i* is given as

$$D_{ji} = D_j \left(\frac{p_{ji}}{P_j^*} \right)^{-\phi_j} \tag{2.5}$$

where p_{ji} represents the price of variety *i* with $\phi_j > 1$ denoting the elasticity of substitution between any two products types (see Helpman and Krugman 1989).[8] The industry's elasticity of substitution among differentiated goods can be thought as a decreasing function of the advantage of economies of scale $\phi_j = \phi_j(a_j)$, where $\phi_j'(a_j) < 0$, and $a_j \equiv \frac{A_j}{A_j^*}$ is an exogenous comparative productivity for domestic industry relative to foreign. A growth in the advantage of economies of scale in industry leads to a decrease in the degree of substitution among differentiated goods within industry.[9] From utility maximizing of consumer and using (2.5), we have

[8] Tefler (1995) discussed that when consumers regard home and foreign product varieties as imperfect substitutes, the overall industry product-demand elasticity depends on the elasticity of substitution between home and foreign varieties.

[9] Together with interaction between number of products/firms and degree of price competition, intra-industry trade and economic integration can be seen as the result of the interaction between product differentiation and economies of scale. Each industry contains a large, but limited because of economies of scale, number of potential differentiated products that consumers regard as imperfect substitutes. Given

(2.6) $$D_{ji} = a_j \, p_{ji}^{-\phi_j} P_j^{*\phi_j - \varepsilon_j}$$

That is, demand for any product type depends on both its own price in terms of the other product and on the overall price index in terms of that product. So long as $\varepsilon_j < \phi_j$, i.e. the elasticity of substitution within the industry is larger than the price elasticity, the demand for an individual product will depend positively on the overall price index.

Consider now the impact of a reduction in marginal trade costs on product markets. Let τ_j denotes a trade cost due to transactions costs and other trade barriers related to foreign trade[10] at industry *j*. The effects on imperfectly competitive product markets of increased integration via declining trade costs are basically of two counteracting sorts. Hence, it turns out to vary competition by varying both advantage of economies of scale holding ε_j constant, and number of firms holding ϕ_j constant. First, individual producers with access to the wider market were expected to be able to expand production to take better advantage of economies of scale (a_j). This has associated to reduced market imperfection and to increased incentive of product-differentiating. Hence, we assume that

(2.7) $$\frac{\partial \phi_j}{\partial a_j} \frac{\partial a_j}{\partial \tau_j} > 0 .$$

Second, market entry becomes easier and/or less costly implying that more goods become traded goods (n_j). With increased integration and competition, an industry's market share becomes increasingly sensitive to price changes raising the elasticity of the consumption price. Thus, we have

(2.8) $$\frac{\partial \varepsilon_j}{\partial n_j} \frac{\partial n_j}{\partial \tau_j} < 0 .$$

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the opportunity to trade, industries will specialize in the production of different ranges, while the degree of price competition will increase.

[10] For simplicity, we assume that the trade costs of import and export outputs are equal.

The higher the degree of price competition is, i.e., the closer substitutes the good sale on the world market is, the more elastic with respect to own price output demand becomes. On the other hand, if the initial competitiveness of domestic industry is much better than the competitiveness of foreign industry, an increase in the degree of competition tends to give rise to a higher supply taking better advantage of economies of scale.

The relative price $\frac{p_{ji}}{P_j^*}$ chosen by the firm. In the imperfect competition, we have then the condition of pricing rule for products types at industry *j*

$$P_j^* \geq \left[\sum_{i=1}^{n} \frac{\left(1+\tau_j\right)}{a_j} p_{ji}^{1-\phi_j} \right]^{\frac{1}{1-\phi_j}}. \tag{2.9}$$

A given variety *i* within industry *j* is offered by firms at a price p_{ji} in terms of the overall price index P_j^*, in terms of various trade costs τ_j related to foreign trade at industry *j*, and in terms of the comparative productivity of domestic industry relative to foreign a_j. In optimum, the price equals to the marginal revenue from exporting, where we must have that relative trade cost equals to mark-up factor i.e. $\frac{1+\tau_j}{a_j} = \frac{\phi_j + \varepsilon_j}{\phi_j + \varepsilon_j - 1}$ (see, e.g., Helpman and Krugman 1989, p. 18). We summarize the characterization of the optimal pricing rule in

Proposition 1 *Lower trade costs with increased integration, higher number of firms and in consequence of its higher elasticity of product demand will reduce the mark-up price, whereas better advantage of economies of scale and in consequence of its lower elasticity of substitution between differentiated products will raise it, ceteris paribus.*

Using (2.6) under utility maximization of an individual consumer i.e., set marginal utility equal to marginal cost, each single firm *i* at industry *j* faces a downward sloping demand curve

$$Y_{ji} = D_{ji}(p_{ji}) = p_{ji}^{-(\phi_j+\varepsilon_j)}. \tag{2.10}$$

The closer substitutes for output Y_{ji} on the international market are, the more elastic output demand becomes.[11] Profit maximization implies that the firms will set a price, which exceeds the marginal cost by a constant mark-up factor, i.e. using (2.9) we have, in optimum, $\frac{1+\tau_j}{a_j} = \frac{\phi_j+\varepsilon_j}{\phi_j+\varepsilon_j-1} > 1$. In a process of integration, there are pressures for the mark-ups to decline with increasing elasticity of product demand.[12] On the other hand, a decrease in the product-substitution elasticity may compensate this effect. For example, Bottasso and Sembenelli (2001) conclude using Italian firm level data that EU Single Market Program has lead to a decrease in the mark-up and an increase in productivity for those firms that were expected, ex-ante, to be more sensitive to the abolition of external trade barriers.[13]

Determining the implicit form of labour demand, the conditional labour costs can be derived from (2.1) as

$$w_{ji} = \left[\frac{Y_{ji}}{L_{ji}}\right]^{\frac{1}{\sigma_{ji}}}. \tag{2.11}$$

[11] Applying one of the four Hicks-Marshall laws of derived demand, the demand for anything is likely to be more elastic, the more elastic is the demand for any further thing, which it contributes to produce (Hicks 1966, p. 242).

[12] Whenever an economy faces a larger number of firms in an integrated world market, trade itself leads to a decline in the mark-ups. Hence, the degree of competition tends to increase when more goods become traded. By increasing competition facing individual firms in product markets, it is intended that firms should lower their mark-ups of prices over marginal costs. For instance, Hoon (2001) has affirmed that as domestic and foreign firms compete in the markets for traded goods, there are pressures for the mark-ups to decline.

[13] Overall, these results are consistent with the long standing view that economic integration reduces firms' market power and increases productivity via the removal of trade barriers.

Similarly, it can be derived for capital costs, r_{ji}. Under the assumption of wage taking and profit maximizing behaviour labour demand can be written by using equations (2.10) and (2.11)

$$L_{ji} = p_{ji}^{-(\phi_j+\varepsilon_j)} w_{ji}^{-\sigma_{ji}}. \tag{2.12}$$

Differentiating (2.12) with respect to the wages gives

$$\frac{\partial L_{ji}}{\partial w_{ji}} = -\sigma_{ji} p_{ji}^{-(\phi_j+\varepsilon_j)} w_{ji}^{-\sigma_{ji}-1} < 0. \tag{2.13}$$

Firms decide on employment to maximize profits for given wage rate and profit share, constrained by both the elasticity of substitution among differentiated goods and the elasticity of demand in their product market

$$(1-\Pi_{ji}^{w})\Pi_{ji} = (1-\Pi_{ji}^{w}) p_{ji}^{-\phi_j-\varepsilon_j} \left[p_{ji} - w_{ji}^{1-\sigma_{ji}} - r_{ji}^{1-\sigma_{ji}} \right]. \tag{2.14}$$

Differentiating (2.14) with respect to the wages gives

$$\frac{\partial \Pi_{ji}}{\partial w_{ji}} = -p_{ji}^{-(\phi_j+\varepsilon_j)} w_{ji}^{-\sigma_{ji}} < 0. \tag{2.15}$$

Determining the wages and the profit share, the labour market is assumed to be imperfectly competitive. It is commonly accepted that the monopoly union model in a simple way (see, e.g., Booth 1995) captures the qualitative implications of different labour market models at least in respect to generate unemployment, and in the wage response to the degree of centralization. The base wage is determined by trade union under circumstances where the profit share Π_{ji}^{w} is given. It is supposed that the firms commit themselves to a profit sharing arrangement which specifies to what extent the wage contracts are performance-related. The profit sharing decision is made in anticipa-

tion of its effects on the base wage and labour demand. Each monopoly union maximizes the income of their members subject to the labour demand function (2.12), and constrained by both the elasticity of substitution among differentiated goods and the elasticity of demand in the product market. Let N_{ji} be the labour force for each firm *i* at industry *j*, and thus $\left[N_{ji} - L_{ji}\right]$ is unemployment. Union's utility function is given by

$$\Omega_{ji}(w_{ji}) = L_{ji}\left[w_{ji} + \frac{\Pi_{ji}^{w}}{L_{ji}}\Pi_{ji}\right] + \left[N_{ji} - L_{ji}\right]s_{ji} \tag{2.16}$$

where the first term captures the rent to the employed at industry *j*, and s_{ji} captures the the outside option i.e., benefits for unemployed union member. Some authors (see, especially, Weitzman (1987) and Jackman (1988)) have argued that, in models where the unions keep wages above market-clearing levels, the introduction of profit sharing may reduce unemployment. This will occur essentially because a given reduction in the base wage leads to a less than one-to-one reduction in total remuneration. So, provided that employers look only at the base wage in setting employment, the trade-off between employment and wages has become more favourable to employment. Using implicit form of labour demand (2.12) the elasticity of labour demand with wages can be written as

$$\eta_{ij} \equiv -\left(\frac{\partial L_{ji}}{\partial w_{ji}}\frac{w_{ji}}{L_{ji}}\right) = \sigma_{ji} \tag{2.17}$$

That is, the elasticity of labour demand is equal to the elasticity of substitution between capital and labour σ_{ji}. The higher the elasticity of substitution, the more elastic is labour demand.

Maximization of (2.16) with respect to wage rate yields an equation for the equilibrium wages

$$w_{ji} = \frac{s_{ji}}{\left[1 - \frac{1}{\eta_{ji}} + \frac{1}{\eta_{ji}} \Pi_{ji}^{w}\right]}. \tag{2.18}$$

According to (2.18) the wage rate is proportional to the outside option. We can see that the integration of product market has no direct effect on the base wage. However, the product market integration affects the wage through three indirect mechanisms, namely via the profit share, the elasticity of labour demand with own price, and the elasticity of substitution between capital and labour. By using (2.8), if product markets are imperfectly competitive, integration can make product markets more competitive via international trade. Several models of imperfect competition predict that trade liberalization makes demand more elastic, but not infinitely so.[14] The market shares of a domestic supplier and a foreign supplier become more sensitive to the relative price, when industry is more integrated. International integration reducing trade frictions and therefore making it easier to shift supplier can have potentially large effects on product-elasticities. On the contrary, by using (2.7), individual industry with access to the wider market might be able to expand sales and production taking better advantage of economies scale which can be associated to decreased elasticities of product substitution. It is important to emphasize, as Koskela and Stenbacka (2005) argue, that there is no direct effect of profit sharing on the wage elasticity of labour demand because profit sharing operates like a non-distortionary profit tax. We can conclude that an increased elasticity of labour demand will have a wage-moderating effect:

$$\frac{\partial w_{ji}}{\partial \eta_{ji}} < 0. \tag{2.19}$$

Since the demand for labour is a derived demand, which varies proportionately with the elasticity of demand for goods, the intensified product market competition alone makes

[14] In a perfectly competitive international market the output price decreases as the demand decreases, and firms take the market price of output as given. Supposing decreasing returns to scale, each firm decreases labour demand to the level where price equal marginal cost (see, e.g., Varian 1992, pp. 215-216). The models of international trade (e.g., Heckscher-Ohlin model) with perfectly-competitive product markets have the extreme result of infinitely-elastic product demand and thus infinitely-elastic labour demand.

the demand for labour more elastic because of declining mark-ups.[15] Intuitively, increased product market competition makes it harder for the firms to survive with higher wages and thus makes the firms' employment decisions more sensitive to changes in the wage rate. Then, with heightened foreign competition the unions face more elastic labour demand relation and thus moderate their wage demands. For example, Huizinga (1993), and Danthine and Hunt (1994) find that the creation of firm level competition increases the elasticity of labour demand which moderates union's wage demand i.e., increased goods market competition leads lower wages and then higher employment. However, the effect of integration on the price sensitivity of the market share may be compensated by its direct effect on the market share i.e., market power can arise from specialization in production and differentiation of products being able to take better advantage of economies scale with segmented markets. Nickell et al. (1994), and Stewart (1990) find evidence of a positive (time series) relationship between wages and market power. This suggests that the sharing of mark-ups and of higher wages being associated with market share. From (2.18) we can directly observe that an increased profit share Π_{ji}^{w} will have a wage-moderating effect:

$$\frac{\partial w_{ji}}{\partial \Pi_{ji}^{w}} < 0 . \tag{2.20}$$

We can suppose that intensified product market competition increases the firm's incentives to use profit sharing. This is because with perfect competition in the product market the wage elasticity of labour demand is very high and thereby wage moderation can be achieved with introducing the profit sharing. While, market power can arise from specialization in production and differentiation of products being able to take better advantage of economies scale with segmented markets which reduces the firm's incentives to use profit sharing with higher wage rate.[16] These findings are summarized in

[15] Applying one of the four Hicks-Marshall laws of derived demand, the demand for anything is likely to be more elastic, the more elastic is the demand for any further thing, which it contributes to produce (Hicks 1966, p. 242).

[16] Nickell (1999) finds some evidence that sharing of monopoly rents leads to higher wages in the presence of market power in the product market.

Proposition 2 *Lower trade costs with increased integration, higher number of firms and in consequence of its higher elasticity of product demand* ($\frac{\partial \varepsilon_j}{\partial n_j}\frac{\partial n_j}{\partial \tau_j} < 0$) *will increase the elasticity of labour demand* ($\frac{\partial \eta_{ji}}{\partial \varepsilon_j} > 0$) *and increase incentives for using profit sharing* ($\frac{\partial w_{ji}}{\partial \Pi_{ji}^w} < 0$) *and thus decrease wages pressure* ($\frac{\partial w_{ji}}{\partial \eta_{ji}} < 0$)*, whereas better advantage of economies of scale and in consequence of its lower elasticity of substitution between differentiated products* ($\frac{\partial \phi_j}{\partial a_j}\frac{\partial a_j}{\partial \tau_j} > 0$) *will decrease the labour-demand elasticity* ($\frac{\partial \eta_{ji}}{\partial \phi_j} > 0$) *and decrease incentives for using profit sharing* ($\frac{\partial w_{ji}}{\partial \Pi_{ji}^w} < 0$) *and thus increase wages* ($\frac{\partial w_{ji}}{\partial \eta_{ji}} < 0$).

Given the equilibrium wage rate (2.18), we have employment equation by using labour demand (2.12)

$$L_{ji} = p_{ji}^{-(\phi_j+\varepsilon_j)}\left[\frac{s_{ji}}{1-\frac{1}{\eta_{ji}}+\frac{1}{\eta_{ji}}\Pi_{ji}^w}\right]^{-\sigma_{ji}} . \tag{2.21}$$

As expected, the employment depends negatively on the unemployment benefits s_{ji}. The number of firms (both domestic and foreign) competing in this industry can arise as a result of integration process, which shifts the foreign output mix towards this industry. An integration process can force domestic firms to face heightened foreign competition. We see that an increase in the elasticity of product demand triggered by more firms (i.e., ε_j rises) decreases firm's labour demand ($\frac{\partial L_{ji}}{\partial \varepsilon_j} < 0$). Product demand becomes more

price elastic when product markets are more integrated, but is the effect of product market integration on the price sensitivity of the market share larger than its direct effect on the market share. In consequence of decreased trade costs product substitution becomes less elastic (i.e., ϕ_j falls) which can be associated to better advantage of economies scale and thus increased firm's labour demand ($\frac{\partial L_{ji}}{\partial \phi_j} < 0$). Because of these counteracting effects we cannot conclude that the scale effects of integration tend to decrease the labour demand. We summarize these findings in

Proposition 3 *Lower trade costs with increased integration, higher number of firms and in consequence of its higher elasticity of product demand will decrease labour demand, whereas better advantage of economies of scale and in consequence of its lower elasticity of substitution between differentiated products will increase it.*

By using (2.19), when the unions face more elastic labour demand relation and thus moderate their wage demands, we find that increased labour-demand elasticity increase labour demand due to the reduced market power of unions:

$$\frac{\partial L_{ji}}{\partial \eta_{ji}} > 0 \,. \tag{2.22}$$

It is perfectly plausible that in firms where wages are bargained collectively, an increase in product market competition will tend to lower wages[17] and raise employment in the presence of profit sharing.[18] From (2.21) we can directly observe that an increased profit share will increase employment:

[17] Abowd and Lemieux (1993) has studied how product market conditions affect wages through their effects on the financial strength of the firm by using data from collective agreements in Canada and they show that higher foreign competition reduces wages.

[18] Blanchard and Giavazzi (2003) and Spector (2004) have developed a monopolistic competition model with collective wage bargaining, but not with profit sharing, to study the effects of product market com-

(2.23) $$\frac{\partial L_{ji}}{\partial \Pi_{ji}^{w}} > 0 .$$

We can conclude that the effects of economic integration on the impact of profit sharing on employment depend definitely on trade-off between intensified competition and better advantage of economies of scale. If product market competition increases, the possibilities of profit sharing to improve employment through economic integration increase with moderated wages. While, the economic integration associating with market power in turn decreases the possibilities of profit sharing with higher wages to improve employment. As increased trade competition crowds out better advantage of economies of scale, economic integration increases profit sharing with wage-moderating and thus improve labour demand. We summarize the characterization of the scale effects of economic integration on the impact on the profit sharing on employment in

Proposition 4 *As increased trade competition crowds out better advantage of economies of scale,* $\frac{\partial \phi_j}{\partial a_j}\frac{\partial a_j}{\partial \tau_j} < \frac{\partial \varepsilon_j}{\partial n_j}\frac{\partial n_j}{\partial \tau_j}$, *and the elasticity of labour demand increases,* $\frac{\partial \eta_{ji}}{\partial \phi_j} < \frac{\partial \eta_{ji}}{\partial \varepsilon_j}$, *the process of economic integration increases incentives for using profit sharing* ($\frac{\partial w_{ji}}{\partial \Pi_{ji}^{w}} < 0$) *and decreases wages pressure* ($\frac{\partial w_{ji}}{\partial \eta_{ji}} < 0$) *which improves employment* ($\frac{\partial L_{ji}}{\partial \Pi_{ji}^{w}} > 0$).

The process of integration reduces the trade barriers, and therefore leads to not only more trade, but also more foreign investment. Increased investment opportunities make firms more sensitive to changes in such costs. In the process of integration international trade can increase the elasticity of substitution between labour and capital. As Rodrik

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petition under imperfectly competitive labour markets and argued that higher product market competition will increase employment.

and van Ypersele (2001) explain, in the process of integration real and financial capital are more sensitive to respond to shocks such as changes in productivity or the terms of trade. A negative shock at home may induce a capital outflow abroad. A capital outflow is also liable to affect the marginal productivity of labour, in turn leading to effects on the wages (see, e.g., Keen and Marchand, 1997). From (2.17) we can directly observe that the higher the elasticity of substitution, the more elastic is labour demand. This implies that increased elasticity of substitution between labour and capital increases incentives for using profit sharing with lower labour price which increases labour demand. Particularly in production with low-skill workers employers can react sensitively to changes in prevailing wages by investing.[19] Thus, creating wage compression by union encourage firms to invest in technologies increasing the productivity of less-skilled workers. We find that in consequence of decreased trade costs as substitutability increases (i.e. $\frac{\partial \sigma_{ji}}{\partial \tau_j} > 0$) labour demand increases:

$$\frac{\partial L_{ji}}{\partial \sigma_{ji}} > 0 . \tag{2.21}$$

On the contrary, the shifts in the production technology or an increase in the use of physical capital have also required that workers acquire new skills which increase the demand for human capital (i.e. $\frac{\partial \sigma_{ji}}{\partial \tau_j} < 0$) and thus decrease the elasticity of substitution between labour and capital. This suggests that decreased incentives to use profit sharing with higher labour price depreciates labour demand. We summarize the substitution effect of integration on the impact on the profit sharing on employment in

[19] In the case of labour demand with several inputs, adopting more capital-intensive production will decrease the demand for low-skilled workers and increase the demand for educated workers. Then, a rise in the cost to employers of using the physical capital will decrease the demand of educated workers used at each level of production. In case of complements, the elasticity of substitution is low so that a rise in the price of capital also leads to a decrease in employment.

Proposition 5 *Lower trade costs with increased integration, higher elasticity of substitution between labour and capital* ($\frac{\partial \sigma_{ji}}{\partial \tau_j} > 0$) *will increase incentives for using profit sharing* ($\frac{\partial w_{ji}}{\partial \Pi_{ji}^{w}} < 0$) *and decrease wages* ($\frac{\partial w_{ji}}{\partial \sigma_{ji}} < 0$) *which increases labour demand* ($\frac{\partial L_{ji}}{\partial \sigma_{ji}} > 0$), *whereas lower elasticity of substitution between labour and capital* ($\frac{\partial \sigma_{ji}}{\partial \tau_j} < 0$) *will decrease incentives using for profit sharing* ($\frac{\partial w_{ji}}{\partial \Pi_{ji}^{w}} < 0$) *and increase wages* ($\frac{\partial w_{ji}}{\partial \sigma_{ji}} < 0$) *which decreases labour demand* ($\frac{\partial L_{ji}}{\partial \sigma_{ji}} > 0$).

In summary, the effects of economic integration on the impact of profit sharing on employment depend definitely on trade-off between intensified competition and better advantage of economies of scale. If product market competition increases, the possibilities of profit sharing to improve employment through economic integration increase with moderated wages. While, the economic integration associating with market power in turn decreases the possibilities of profit sharing with higher wages to improve employment. As increased trade competition crowds out better advantage of economies of scale, economic integration increases profit sharing with wage-moderating and thus improve labour demand. In addition, if elasticity of substitution between labour and capital increases in the process of integration, incentives using profit sharing increases with lower labour price which increases labour demand.

3 ECONOMETRIC MODEL

In empirical work, the strategy is to follow our theoretical framework in Section 2 as a basis for econometric identification using the equilibrium condition for employment. We estimate an employment equation, and attempt to evaluate whether economic inte-

gration has changed the effects of profit sharing on the employment. To understand the effects of profit-sharing, a useful method is to compare profit-sharing (*PS*) with non-profit-sharing (*NPS*) firms. Taking a log-linear approximation of equation (2.18) employment[20] can be written as a regression function:

$$\ln(L_{it}) = a_i + \rho(\pi^w_{it}) + \alpha \ln(\omega_{it}) + \psi(p^*_{jt}) + \mu(x_{it}) + \gamma(y^*_{jt}) + \beta(m_{it}) + \delta(fdi^*_{jt}) + \chi(skill_{it}) + e_{it} \tag{3.1}$$

where *i* indexes firms, *j* the industry, and *t* the year. L is quantity of labour employed, *skill* ratio of skilled workers to total employment, ω real labour costs, π^w ratio of profit-sharing payment to wages, and a denotes a firm-specific fixed effect. We tried to improve the estimated model by adding skilled workers ratio in order to take into account labour qualification. It is assumed, in generally, that the share of high-skill workers employers with higher labour price has negative impact on the total employment. For scale effects of real output, we use two different variables: the share of Finland's exports to the EU-countries in production (*x*) and the share of the output of European Union in production (y^*). The first attempts to measure foreign demand for firm's products, and the second attempts to measure the overall demand of European Union. Furthermore, measuring the international product market competition, we use a real competitiveness indicator (p^*) where euro-country weights are based on Finland's bilateral exports. For substitution effects, we use two different variables: the share of Finland's imports from EU-countries in production (*m*) and the share of the investment of EU-countries to Finland in domestic investment (fdi^*). The first attempts to measure foreign intermediate input outsourcing, and the second attempts to measure overall substitution between labour and investment.

There is an issue that deserves some discussion here. It is that profit-sharing firms might exhibit greater employment stability - this effect might derive either from Weitzman´s model where such firms are in a short-run 'excess demand for labour' regime, or

[20] Taking logarithms in conditional labour demand, equation (2.18) yields to the form which is very useful for estimation.

from the possibility that profit-sharing will cause remuneration to adjust more quickly to international shocks. We may test for this effect by examining to the response of employment to international shocks by differencing. The scale effects measure the impact of international demand shocks on labour demand. These estimates test whether the responsiveness of profit-sharing firms to the demand shocks differs from the responsiveness of non-profit-sharing firms. A smaller employment fluctuation requires that the coefficients on the change in industry output be smaller for profit-sharing firms.

4 DATA

The labour demand is estimated using assembled panel data from the manufacturing sector based on a diversity of sources: the surveys of the Confederation of Finnish Industries and Employers, the Longitudinal Database on Plants in Finnish Manufacturing (LDPM) of Statistics Finland, the Financial Market Statistics of Bank of Finland, the Foreign Trade Statistics of National Board of Customs, and the Industrial Structure Statistics of OECD STAN Database.[21] The panel data covers period from 1996 to 2004. The data from the Confederation of Finnish Industries and Employers includes individual level observations which is linked to the data of the respective firms. This survey gives information, at the firm level, about the number of employees, base wages, bonus payments on the profit-sharing basis[22], and worker's individual qualifications like education. The datasets used for our analysis consist of two panels: the first sample (*PS*) concerns 981 profit-sharing firms, and the second sample (*NPS*) concerns 115 non-profit-sharing firms. Each firm of the first sample was engaged in a profit-sharing agreement for at least one year. Demand estimation requires measures of employment, real labour prices, real investment and real output for all firm-year observations. The LDPM panel includes annual data for manufacturing plants covering variables as production, investment, the price indices for production and investment, employment (pro-

[21] The manufacturing industries are included by the standard ISIC classification, excluding petroleum, energy, and quarrying.
[22] The profit-relating payments are determined here as performance-related payments which not include benefits in kind, supplements for shift and earnings for overtime hours.

duction and non-production workers), and nominal wages and employer social security payments for production and non-production workers. The labour demand is supposed to depend on the labour costs negatively. Employment comes directly from the data set as the number of production and non-production workers. For total employment we construct real labour costs as nominal annual wages and social security payments deflated by the producer price index and divided by the number of workers.

The ideal data here would be firm-level data because firms are the relevant units that actually demand factors. However, plant-level data sets do not contain firm-level trade-prices and all measurements of foreign demand (supply) for firm-level products (non-labour inputs), so the next best alternative for these integration measurements is using industry-level (2-digit ISIC manufacturing industries) data. We construct a real competitiveness indicator of the industry relevant to *i*th firm as nominal competitiveness indicator multiplied by terms of trade ratio of export and import prices. The constructed nominal competitiveness indicator for the period 1996 - 2004 is based on Financial Market Statistics maintained by Bank of Finland. The industrial prices of exports and imports are based on Producer Price Indices of Statistics Finland. An increase in the real competitiveness indicator means that an industry's price competitive ability decrease which is supposed to decrease the product demand and thus the labour demand. We construct two different variables for scale effects of real output: the share of firm's exports to the EU-countries in production at firm level and the share of the industrial output of European Union in industrial firms' production. Firm's exports to the EU-countries are based on Foreign Trade Statistics maintained by National Board of Customs. Another variable, the production of European Union for each industry relevant to *i*th firm is based on OECD Industrial Structure Statistics. In theory, the labour demand is supposed to depend on the production positively. If product demand rises and thus production increases, the firms' demand for factors rises. The assumption is that higher export signals better scale economies (or less foreign competition).[23] A rise in exports increases the production of industry, which is supposed to increase the labour demand. On the other hand, the more the rest of the EU accounts for the output of industry, the more competitive that industry is for domestic firms. We construct two different vari-

ables for substitution effects: the share of firm's imports from EU-countries in production at firm level and the share of the industrial investment of EU-countries to Finland in industrial firms' investment. Firm's imports from the EU-countries are based on Foreign Trade Statistics maintained by National Board of Customs. Another variable, foreign direct investment for each industry relevant to *i*th firm is based on Financial Market Statistics of Bank of Finland. If demand for the non-labour inputs were to increase induced by increased demand of outputs and thus production level, this effect would increase the labour demand. While, foreign outsourcing and/or international investment provides an alternative to many production-intensive firms and thus decreases dependence on production labour, but also increases reliance on human capital and thus non-production labour.[24] Then, it is supposed that increased foreign outsourcing and/or international investment decrease, especially, the demand of production labour.

Table 4.1 Variable summary statistics.

Profit-sharing firms

Variable	Mean	Std. Dev.	Min	Max
Number of total workers (logarithm)	4.920	1.213	0.000	10.06
Skilled workers ratio	0.357	0.232	0.000	1.000
Real labour price (logarithm)	3.557	0.273	-1.670	7.610
Profit-sharing ratio	0.011	0.021	0.000	0.387
Competitiveness index (real)	0.935	0.105	0.702	1.414
Exports ratio (real)	0.194	0.272	0.000	6.662
EU-output share (real)	76750	60165	7732	323430
Imports ratio (real)	525.4	3788	0.000	159793
EU-investment share (real)	374.2	383.7	1.273	1463

Non-profit-sharing firms

Variable	Mean	Std. Dev.	Min	Max
Number of total workers (logarithm)	4.314	0.853	2.708	7.090
Skilled workers ratio	0.259	0.156	0.000	1.000
Real labour price (logarithm)	3.383	0.243	2.468	4.248
Competitiveness index (real)	0.935	0.105	0.702	1.414
Exports ratio (real)	0.157	0.210	0.000	1.002
EU-output share (real)	113622	78459	7732	323430
Imports ratio (real)	1073	4720	0.000	57124
EU-investment share (real)	361.5	422.9	1.273	1463

[23] Péridy (2004) finds using data of four EU countries over the period 1975 - 2000 that exports unambiguously rise with the degree of scale economies.

[24] Empirical studies reviewed by Hamermesh (1993), usually point to a lower degree of substitution between skilled labour and capital than between unskilled labour and capital (see, e.g., Griliches 1969, Bergström and Panas 1992, Biscourp and Gianella 2001).

Table 4.1 reports summary statistics of the observations. *PS* firms, which are larger than *NPS* firms, perform better in international product market as regards the level of exports ratio and EU-output share. This different characteristic between *PS* firms and *NPS* firms allows us to think that profit-sharing firms are more under international competitiveness pressure with access to the wider product market while *NPS* firms are more closed of economic integration. One important feature is that the level of labour costs is higher in *PS* firms which indicates higher skilled workers ratio than in *NPS* firms. Thus, we can not conclude whether there is substitution between the base wage and the profit share.[25] Furthermore, the better international performances of *PS* firms does not mean that profit-sharing caused them. To explore the issue of profit-sharing effects, there occurs simultaneity bias due to the fact that profit-sharing payments may be the outcome as well as the cause of better performance in international product market. Let us underscore that we do not consider the effect of profit-sharing on international performance. We will concentrate our econometric work on the aim of determining the effect of economic integration on the impact of profit sharing on the employment.

5 EMPIRICAL ANALYSIS

The empirical study of the effects of profit sharing has typically focused on its impact on productivity and employment through productivity effects. Cahuc and Dormont (1997) evaluate the consequences on productivity and employment of the large increase in profit-sharing in France. Their datasets used for this analysis consist of two panels of profit-sharing and non-profit-sharing manufacturing firms observed over the period 1986-1989. Estimation of employment equation in levels and growth rates shows that profit-sharing has ambiguous effects on employment. Kruse (1991) tests an implication of Weitzman's profit-sharing theory that profit-sharing firms will have more stable employment than fixed-wage firms using panel data on manufacturing firms for the years 1971-1985. Adapting a dynamic labour demand framework for the U.S., results suggest

[25] The most convincing result would be obtained from the estimation of a wage equation (see Wadhwani and Wall 1990). However, we had no appropriate variable to carry out this regression i.e., we have no

that the statistical association between aggregate unemployment and employment at the firm level is less strong for profit-sharing firms. Wadhwani and Wall (1990) present a more formal test of this proposition in the context of a labour demand model. However, using british micro datasets over the period 1972-1982, they find no difference in the effect of aggregate demand shocks on employment between profit-sharing and non-profit-sharing firms. In contrast to these work, this study is the first to determine the effects of economic integration on the impact of profit-sharing on the employment using data from the Finnish manufacturing sector.[26]

5.1 Estimation strategy

There are some issues to mention regarding the estimation strategy. One is the exogeneity of the regressors in the employment equation. As Hamermesh (1986) discusses, some of them might actually be endogenous variables. Quandt and Roser (1989) estimated an equilibrium model of the labour market, and used it to test the assumption of production exogeneity. They did not reject the assumption that production is exogenous. Furthermore, for the possibility of endogeneity of investment the presence of capital market imperfections suggests that firms will find it difficult to adjust investment quickly in response to exogenous shocks that may influence employment decisions.[27] If some regressors are endogenous, then least-squares parameter estimates will suffer endogeneity bias, the net direction of which is not clear.

A panel sample offers a number of possibilities for structuring and handling the data, which leads to various types of estimators. In the case of a standard linear regression model, if it is well specified, the various estimators should all be consistent. Conversely, the differences of various estimators, when significant, imply some sort of specification error, and this can provide formal specification tests (Hausman and Taylor 1979). Therefore, a useful tack is to present the results of within-firm estimates relying on the

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information about the union density or the unemployment benefits.

[26] Kauhanen and Piekkola (2002) and Snellman et al. (2003) have examined the effects of profit sharing on earnings and productivity using Finnish linked employer-employee data. Their results suggest that profit-sharing has positive effects on productivity.

[27] Capital stock is estimated as the real value of machinery, equipment, transportation equipment, buildings and structures.

deviations to the firm means and first-difference estimates using the yearly growth rates. The most usual transformation applied to panel data is that variables are in logs of levels.

A fourth issue is, as usual on micro data, that our variables suffer from measurement errors, because we have no information, at the firm level, on factor utilization rates, hours of work and prices. But the main difficulty stems from the lack of an estimate of capital average age at the microeconomic level. Therefore, it was difficult to adjust accurately the capital stock for inflation. This measurement problem does not seriously affect the estimates when they are carried out on the levels of the production variables of firm *i* at year *t*. In this case, as Cahuc and Dormont (1997) argue, the variance due to differences between firms is largely predominant, and much greater than the variance due to measurement errors of this kind. This is no longer true, as Griliches and Hausman (1986) argue, when regressions use first differences which give more importance to ´noises´ due to measurement errors. Taking time differences also controls for unobserved time-invariant industry fixed effects influencing the labour-demand level. However, time-differencing can also aggravate regressor measurement error and result in inconsistent estimates. Hsiao (1986) argues that if variables are indeed subject to measurement errors, exploiting panel data to control for the effects of unobserved individual characteristics using standard differenced estimators may result in even more biased estimates than simple ordinary least squares (OLS) estimators using cross-sectional data alone. Thus, we first estimate the employment equation for the levels by OLS with fixed effects including time dummies. Furthermore, to minimize inconsistency, Griliches and Hausman (1986) suggest that the employment should be estimated using long differences. When the concern focuses on trends over time rather than levels, then the bias of measurement might not influence decisively. However, our set of data has restricted sample size both of in the cross-section dimension and time dimension. One limitation of the data is the short period covered by the profit sharing survey. Taking into account our data restrictions we did not take longer differences. In fact, we proceed with the generalized method of moments (GMM) estimation, which provides a convenient framework for obtaining consistent and at least asymptotically efficient estimators for the dynamic panel data (Bond, 2002). More specifically, the equations (3.1) were estimated using the first-differenced GMM method developed by Arellano and Bond

(1991). This method estimates the model in first differences but uses the lagged variables in levels as instruments.

5.2 Estimation results

We limit the presentation of our results to regressions performed on the profit-sharing sample with and without the effects of economic integration. Because of slight performance in international product market the estimated labour demand with the impact of economic integration for non-profit-sharing sample is presented in Appendix 1. *NPS* firms produce more for the domestic market with higher import penetration, while *PS* firms produce more for export competing markets. Every firm of *PS* sample does not operate a profit-sharing scheme each year of the period. Thus, the number of *NPS* firms fell to 115 owing any profit-sharing observation during our period. The estimations have been carried out with and without the variable *skill*. We present here the results with skilled workers ratio, which do not differ from the results obtained without this variable.[28]

Our estimated labour demand without the effects of economic integration is presented in Table 5.1. And, the results with the effects of economic integration for employment function estimates are reported in Table 5.2. In first-difference estimates, we allow for dynamics through a quite simple (given the short period available) partial adjustment mechanism. Moreover, the high dominance of between-firm differences in the levels variability is concomitant with serious autocorrelations of variables and residuals. This leads the estimates to be biased as soon as the model is specified in an autoregressive pattern. Although, these estimates test whether the responsiveness of profit-sharing firms to the demand shocks differs from the responsiveness of non-profit-sharing firms. Determining the effect of economic integration on the impact of profit-sharing on the employment, we keep the static form to estimate labour demand on levels, which is in accordance with the cross-section feature of total regression.

[28] We also estimated the specifications pooling the *PS* and *NPS* firms, but it shown no difference of results between pooled samples and *NPS* sample.

Table 5.1 Regression results for employment on the profit-sharing sample without the effects of economic integration

Method	**Fixed effects**		**First-differences GMM**	
	[1]		**[2]**	
Employment			0.200	(8.96)
Labour price	-0.817	(-34.6)	-0.851	(-35.0)
Profit-sharing	0.008	(0.05)	-0.030	(-0.21)
Skilled workers	-0.211	(-5.48)	-0.072	(-1.59)
Price index	-0.333	(-6.94)	-0.397	(-6.73)
Production	0.671	(84.9)	0.585	(64.5)
Capital stock	0.057	(10.3)	0.073	(10.3)
Number of obs	5580		3896	
R^2 (within)	0.774			
F-test (p-value)	1148.96	(0.000)		
Sargan test (p-value)			59.23	(0.000)
AR(1)				(0.000)
AR(2)				(0.706)

Notes: (1) The specification is $\ln(L_{it}) = a_i + \rho(\pi^w_{it}) + \alpha \ln(\omega_{it}) + \psi(p_{it}) + \gamma \ln(y_{it}) + \delta \ln(k_{it}) + \chi(skill_{it}) + e_{it}$ where L log of quantity of labour employed, π^w profit-sharing payments/wages, ω log of ((base wage + employer social security payments) / number of workers), p implicit price index of production, y log of production, k log of capital stock, and *skill* skilled workers / total employment. (2) Values of t-ratios are reported in parentheses. (3) Column [1]: estimated by OLS with fixed effects including time dummies. (4) Column [2]: GMM refers to Arellano and Bond (1991) dynamic panel data estimation method. (5) Sargan test for over-identifying restrictions. (6) Arellano-Bond test for first and second order autocorrelation of the differenced errors.

Considering the results without the effects of economic integration in Table 5.1, the estimated coefficients have, generally, the expected effects. The coefficients of production and capital (on logs of levels) are significant and have the expected signs. As expected, the prices of production and labour have negative effect on labour demand. Although, the coefficients of labour demand elasticity with own price are unexpected large. These results are also unchanged when introducing a lagged value of the employment through the autoregressive specification. Considering on the profit-sharing effect, we notice that these regressions lead to a non-significant effect of profit-sharing on labour demand. This result is supportive of other findings on profit-sharing using different samples and techniques (Cahuc and Dormont 1997, Wadhwani and Wall 1990).

Table 5.2 Regression results for employment on the profit-sharing sample with the effects of economic integration

Method	**Fixed effects**		**First-differences GMM**	
	[1]		**[2]**	
Employment			0.463	(10.9)
Labour price	-0.444	(-13.8)	-0.680	(-19.1)
Profit-sharing	1.666	(5.96)	0.210	(0.78)
Skilled workers	-2.382	(-41.7)	-1.618	(-21.9)
Competitiveness	-0.117	(-1.69)	-0.132	(-1.98)
Exports	0.155	(4.92)	0.066	(1.78)
EU-output	-0.0001	(-1.83)	-0.0001	(-2.39)
Imports	-0.0001	(-3.38)	-0.0001	(-4.10)
EU-investment	-0.0001	(-1.46)	-0.0001	(-1.36)
Number of obs	6595		4576	
R^2 (within)	0.343			
F-test (p-value)	182.79	(0.000)		
Sargan test (p-value)			70.73	(0.000)
AR(1)				(0.000)
AR(2)				(0.668)

Notes: (1) The specification is $\ln(L_{it}) = a_i + \rho(\pi^w_{it}) + \alpha \ln(\omega_{it}) + \psi(p^*_{jt}) + \mu(x_{it}) + \gamma(y^*_{jt}) + \beta(m_{it}) + \delta(fdi^*_{jt}) + \chi(skill_{it}) + e_{it}$ where L log of quantity of labour employed, π^w profit-sharing payments/wages, ω log of ((base wage + employer social security payments) / number of workers), p^* industry international price index, x firm's exports to EU-countries / firm's production, y^* EU-countries' industry production / firm's industry production, m firm's imports from EU-countries / firms' production, fdi^* EU- countries' industry foreign direct investment / firms' industry capital stock, and *skill* skilled workers / total employment. (2) Values of t-ratios are reported in parentheses. (3) Column [1]: estimated by OLS with fixed effects including time dummies. (4) Column [2]: GMM refers to Arellano and Bond (1991) dynamic panel data estimation method. (5) Sargan test for over-identifying restrictions. (6) Arellano-Bond test for first and second order autocorrelation of the differenced errors.

With the effects of economic integration, the estimates seem in Table 5.2, generally, plausible and well estimated. All the explanatory variables have the expected effect, except the share of the foreign direct investment is not significant. As stressed above, this non-significance may be viewed as the outcome of measurement errors which mainly affects our investment variable. As, an integration process force firms to face heightened foreign competition, we see that the negative coefficients measuring these effects provide support that higher competition decreases the labour demand. Whereas, the positive coefficient associating with market power suggests that the economic integration associating better advantage of economies scale improve employment. The

elasticity of labour demand with own price is increased when first-differences are performed. Turning to the profit-sharing effect the most noteworthy result is the positive coefficient that we find whatever the estimate performed. Regression of column (1) on levels shows that the estimated parameter equals 1.666. In comparison to the without the effects of economic integration, these results on levels indicate that economic integration has positive and significant effect on the impact of profit-sharing on employment. However, the first-difference estimates lead to a non-significant positive effect of profit-sharing on employment. Thus, we do not find that profit-sharing firms might exhibit greater employment stability in the process of economic integration.

For all the reasons stated above, we should believe in results relying on levels that profit-sharing improves employment in the process of economic integration, although there is no evidence that it contributes the stability of employment.

6 CONCLUSIONS

The purpose of this study has been twofold to investigate the effects of the economic integration on the impact of profit sharing on the employment by using theoretical model and empirical analysis. We build the theoretical framework for estimating employment and determining the impact of economic integration on the effects of profit sharing. In a general theoretical model of intra-industry trade, we analyzed how economic integration changes the impact of profit sharing on employment. A model captures both effects running from product markets, the scale effects, as well as factor substitutions possibilities, the substitution effects, to the impact of profit sharing on labour demand. We show that the scale effects of economic integration on the impact of profit sharing on employment depend definitely trade-off between intensified competition and better advantage of economies of scale. If product market competition increases, the possibilities of profit sharing to improve employment through economic integration increase with moderated wages. While, the economic integration associating with market power in turn decreases the possibilities of profit sharing with higher wages to improve employment. Our theoretical model suggests that, as increased trade competition

crowds out better advantage of economies of scale, economic integration increases profit sharing with wage-moderating and thus improve labour demand. In addition, if elasticity of substitution between labour and capital increases in the process of integration, incentives using profit sharing decreases with higher relative labour price which decreases labour demand.

We structured the econometric model in which the aim is to determine whether European integration has changed the impact of profit sharing on the employment in Finland using data from the manufacturing sector from 1996 to 2004. Our finds provide support that economic integration strengthen the positive impact of profit-sharing on the employment. However, we do not find that profit-sharing firms might exhibit greater employment stability in the process of economic integration. These results provide evidence for the hypothesis that profit-sharing improves employment in the process of economic integration, but can have ambiguous effects on the stability of employment.

Finally, the study points up potentially interesting area for future research. One area for further research would be to extend the integration model to capture the effect of profit-sharing on wage formation and thus on the structural unemployment. The most convincing result would be obtained from the estimation of a wage equation determining whether there is substitution between the base wage and the profit sharing.

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APPENDIX 1. Regression results for employment on the non-profit-sharing sample with integration effect

Method	**Fixed effects**		**First-differences GMM**	
	[1]		**[2]**	
Employment			0.473	(2.92)
Labour price	-0.411	(-6.60)	-0.558	(-9.65)
Skilled workers	0.046	(0.37)	-0.349	(-3.13)
Competitiveness	0.035	(0.40)	-0.041	(-0.60)
Exports	0.070	(0.86)	-0.022	(-0.32)
EU-output	-0.0001	(-4.16)	-0.0001	(-1.40)
Imports	-0.0001	(-0.27)	-0.0001	(0.52)
EU-investment	-0.0001	(0.54)	-0.0001	(-0.50)
Number of obs	928		683	
R^2 (within)	0.098			
F-test (p-value)	5.75	(0.000)		
Sargan test (p-value)			24.73	(0.589)
AR(1)				(0.020)
AR(2)				(0.759)

Notes: (1) The specification is $\ln(L_{it}) = a_i + \alpha \ln(\omega_{it}) + \psi(p^*_{jt}) + \mu(x_{it}) + \gamma(y^*_{jt}) + \beta(m_{it}) + \delta(fdi^*_{jt}) + \chi(skill_{it}) + e_{it}$ where L log of quantity of labour employed, ω log of ((base wage + employer social security payments) / number of workers), p^* industry international price index, x firm's exports to EU-countries / firm's production, y^* EU-countries' industry production / firm's industry production, m firm's imports from EU-countries / firms' production, fdi^* EU- countries' industry foreign direct investment / firms' industry capital stock, and *skill* skilled workers / total employment. (2) Values of t-ratios are reported in parentheses. (3) Column [1]: estimated by OLS with fixed effects including time dummies. (4) Column [2]: GMM refers to Arellano and Bond (1991) dynamic panel data estimation method. (5) Sargan test for over-identifying restrictions. (6) Arellano-Bond test for first and second order autocorrelation of the differenced errors.