The Effect of Foreign Affiliate Employment on Wages, Employment, and the Wage Share in Austria*

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Abstract

This paper estimates the effects of outward Foreign Direct Investment (employment in the affiliates abroad) on employment, wages, and the wage share in Austria using panel data for the period of 1996-2005. There is evidence of significant negative effects of FDI on both employment and wages, and consequently on the wage share. The results are not limited to workers in low skilled sectors, but it is primarily blue collar workers, who are affected. The negative employment effect is mainly due to the rise in the employment in the foreign affiliates in Eastern Europe. The negative wage effects are originating from affiliate employment in both the East and the developed countries in industry, but no effect is found in the total economy.

Keywords: Austria, FDI, wage, employment, labor share
Jel code: F160, J230, J300, O520

I. Introduction

The aim of this paper is to empirically analyze the impact of Foreign Direct Investment (FDI) outflows on the labor market outcomes in Austria. In the last fifteen years there has been a significant increase in the globalization of the Austrian economy through an increase in exports, final imports, offshoring (intermediate imports), and outward FDI. The integration of the Central and Eastern Europe (CEECs) to the European economic sphere, added a new dimension to the globalization of the Austrian economy, although Austrian FDI towards Western Europe also increased significantly during this period. Austria is one of the relatively most integrated Western high wage-country to the low-wage East. Its geographical proximity as well as historical ties and its small size played a role in this fast integration.

The globalization of the economy has coincided with adverse developments in the labor markets, raising doubts about a causal link. Since the 1980s industrial employment is decreasing, and total employment is stagnant in spite of the jobs created in services. In the meantime real wages have stagnated in the total economy particularly since the mid 1990s. The service wages are even slightly declining in the last five years on average. This development is in striking contrast to the strong improvement in labor productivity, which has always exceeded real wage increases since the 1980s with few exceptions.

As a combination of these developments (in employment, wages, and productivity), the wage share (labor compensation/gross value added in non-agricultural sector) declined from a level of 72% in 1978 to 54.9% as of 2005[1]. The deterioration continued in the past years in spite of the profitability gains due to enlargement (Altzinger, 2006). The decline in labor share is not specific to Austria. The general declining trend in labor's share in many OECD countries since the mid-1970s and early 1980s is addressed recently by the OECD (2007) and the IMF (2007) in addition to some earlier studies (Harrison, 2002; Diwan, 2001; Epstein, 2000, Guscina, 2006; Stockhammer et al, 2007). Breuss (2007) finds that increased

trade with the East and FDI in general causes a decline in the labor share in the developed EU countries.

Austria is an interesting case to investigate the effects of FDI on labor market outcomes, being a small economy, which is highly integrated to the other high wage as well as low wage countries. In this paper first we estimate the effects on employment and wages, and then combining the effects on both wages and employment we calculate the cumulative effects on functional income distribution, i.e. wage share. The estimations are made for a panel of sectors for the period of 1996-2005. The effects are separately estimated for low and high skilled sectors, industry vs. services, and blue vs. white collar workers. We pay particular attention to the possible different effects of FDI in the developed countries vs. the CEECs and the other low wage countries. The contribution of this study is to combine the effects on wages and employment to address the effect of FDI on functional income distribution using detailed sectoral analysis.

The rest of the paper is organized as follows. Section two reviews the theoretical expectations and empirical findings about the FDI effects on labor market outcomes. Section three presents the model. Section four discusses the data and methodological issues. Section five presents the stylized facts of FDI and labor market outcomes in Austria. Section six present the estimation results. Section seven concludes.

II. The literature on the home country effects of FDI

FDI will generate two different channels of effects on the labor market outcomes through changing the magnitudes of trade and changing the allocation of types of production within the firm. Regarding both effects, it is important whether FDI has a vertical (cost seeking) vs. horizontal (market seeking) character. The labor market effects are expected to be the strongest for cost-saving vertical FDI.

With respect to the effects through the mechanism of trade, while vertical FDI will lead to more intermediate imports, which may substitute certain types of domestic labor, it may however also create more exports (to the foreign affiliate through intermediate exports and elsewhere if there is a cost advantage obtained through FDI) and more output through scale effects as mentioned above, which can offset or can be offset by the labor replacement effects.

Horizontal FDI on the other hand replaces the exports of the country, and may generate negative employment effects in tradable sectors, but in services these effects are less likely to take place. In the extreme case, if the affiliates replicate all activities, then employment at home can decrease (Head and Ries, 2002). But if affiliates produce only the final goods of the company and use intermediate inputs from the parent firm, this will generate a skill upgrading effect.

Vertical FDI is particularly expected to change the factor composition of production at home. As certain jobs are relocated abroad, others may be created at home. Thus foreign labor might substitute some factors of productions, but complement others. In a capital abundant country, it could be expected that there will be some increase in the use of capital and less demand for labor. In a skilled labor abundant country the demand for skilled labor's employment is also expected to increase relative to unskilled labor as headquarter services increase (Helpman and Krugman, 1985). So initially employment at the parent company may fall due to substitution effects, but then there may be additional production of skill-intensive products to be exported to the foreign affiliates (scope effects), and a general increase in market share and output due to cost saving effects (scale effects), which may increase also overall employment (Hanson et al., 2003). Thus the overall effect depends on the negative substitution vs. positive scope and scale effects. The argument then follows that if labor markets are flexible, there will be negligible effect on total employment. The net effect on employment would then depend on the net of jobs destroyed and created. But skilled labor

might also be substituted by foreign labor through an overall increase of capital intensity at home. Horizontal FDI will have less effect on the composition of factor demand, since it does not particularly change the international division of labor, but it can still create more demand for factors, e.g. skilled labor, that are used more intensively at the headquarters of the multinational firm.

Moreover the effects on the home country should be evaluated with respect to both the direct effects on the parent company as well as the indirect effects through the rest of the sector. The analysis of the direct effects on the parent company requires firm level data, whereas both firm level and sectoral data for the non-investing companies reflect the indirect effects through the spill-over effects. It is possible to have a case where the parent company enjoys positive scope and scale effects, but the employment in the sector overall is negatively affected through substitution of domestic supplier networks with foreign affiliate supply.

In the literature the effects of FDI on home country labor markets are tested by estimating the effects of affiliate sales or employment or labor costs on parent company or home employment and wages. The estimations usually include a control variable for the scale of production at home. Therefore these regressions are more likely to capture the effects of vertical FDI rather than horizontal FDI (Molnar et al, 2007). To decrease this bias, we will use value added instead of output as a control variable; but nevertheless part of the scale effect will still be captured by the value added effect in the case of the horizontal FDI. Regarding the direction of the employment effect, again the question is whether foreign labor is a substitute or complementary to domestic labor, and in the former case to what extent scale vs. labor replacement effects dominate. The effects are expected to be also larger for small home country relative to the location of the affiliates (Molnar et al., 2007).

Regarding the wage effect, for a given capital/labor ratio the effect would be positive if foreign labor is complementary, and negative if it is a competitor. But particularly efficiency seeking FDI may generate negative effects through the so called threat effects as

pointed out by the political economists (Onaran, 2009; Harrison, 2002; Diwan, 2001; Burke and Epstein, 2001; Rodrik, 1997; Crotty et al, 1998). The increase in international capital mobility and offshoring and the asymmetry between the fall back options of capital vs. labor may lead to labor disciplining effects and downward pressure on wage demands. The source of the effect is the threat of relocation, which leads to a defensive race to the bottom of the wages at home. This may particularly be the case if the destination of FDI is low wage countries. However even among high wage countries capital mobility may generate certain labor disciplining effects. The effect may take place even in the absence of relocation. An increasing number of studies emphasize that labor disciplining and threat effects of capital mobility may not be directly reflected in the actual volumes of capital flows, and call for direct qualitative evidence on these effects (Burke and Epstein, 2001). In this paper such threat effects without an actual relocation of production taking place will show up in the time effects in our estimations.

In the empirical literature regarding the home country effects of FDI, there are rather mixed results (Molnar, et al, 2007; Lipsey, 2002). Blomström et al. (1997) analyze the relation between employment in the parent firm and foreign production based on firm level data for the US and Sweden, and find some negative relationship in the US, but a robust positive relation in Sweden. Lipsey (2002) however finds positive relation in the machinery sector in the US, and negative effect in the transport equipment sector. Braconier and Ekholm (2001) show that Swedish firms' expansion in the CEE leads to job loss in mostly low wage EU countries than in high wage countries. Lipsey et al (2000) find for Japan a positive effect of foreign output on domestic employment. For the case of US, Brainard and Riker (1997) also find that there is substitution between labor at home and abroad, however the substitution is greater between affiliates in different countries. Different from these previous studies Desai et al (2005) and Hanson et al (2003) find a positive effect of affiliate activity on employment in manufacturing in the US. Desai et al (2005) also find a positive association

between wages between foreign affiliates and parent companies. Molnar et al (2007) find that outward investment has a significant positive effect on employment growth in the US, but a negative effect in Japan, and no effect in Germany; additionally they find that in manufacturing industries in the OECD with strong links to non-OECD countries, outward investment makes labor demand curve more elastic at home and increases the speed of adjustment; but in services outward FDI has a positive effect on employment. In the case of multinationals in the EU, Konings and Murphy (2003) finds substitution effect between parent employment and its affiliates in the EU15, but no effect with respect to the low wage regions in the EU and the CEECs. Regarding the effect of the affiliate labor costs in the CEECs on employment European Commission (2005) finds negative effects in France and Belgium, and Becker et al (2005) find negative effects in Germany and Sweden, albeit higher substitution effects are found with respect to EU15 in the latter study. Lipsey (2002) also points out that there may be a difference between firm and industry level studies: Substitution among types of activities may take place not only between home and foreign operations of a firm, but also between parent firms and non-multinational firms in the same industry at home.

Regarding the effects of FDI on labor market outcomes in Austria, Bellak and Altzinger (2001) find a negative effect of affiliate sales on parent employment. Based on firm level survey results, Marin (2004) predicts that 22.000 jobs were lost in Austria due to outward FDI towards the East during 1990-2001, most of which were skilled jobs. However she finds no statistically significant effect of affiliate wages on parent company's employment (Marin, 2004). Pfaffermayr (2001) finds that employment in the foreign affiliates of Austria in developed countries are substitutes for domestic labor, whereas foreign employment in the East is complementary, since domestic employment does not respond to wage differences with respect to the East. Falk and Wolfmayr (2007) find mixed evidence based on static vs. dynamic estimations: according to the static results, they find a significant negative effect of foreign affiliate employment in the five New Member States in the East on domestic

industrial employment, and a positive effect on services employment. However the dynamic estimation results point at no significant impact on industrial employment, but a negative effect on services due to both affiliate employment in developed countries and the East. Based on firm level data, they find no significant effect of affiliate employment on parent company employment.

III. The model

The model exists of a pair of equations for labor demand and wage bargaining, which then is solved simultaneously and inserted into a wage share equation to calculate labor's share in value added.

The industry's derived demand for labor is given as follows:

$$\ln(l_{i,t}) = \beta_i + \beta_t + \beta_w \ln(w_{it}) + \beta_q \ln(q)_{i,t} + \beta_k \ln(k)_{i,t} + \beta_{kict} \ln(ict)_{i,t} + \beta_f \ln(f_{i,t}) + \sigma_{t,i} \quad (1)$$

where $\ln(l_i)$, $\ln(w_i)$, $\ln(q_i)$, $\ln(k_i)$, $\ln(ict_i)$, and $\ln(f_i)$ are the employment, real wage (labor compensation, deflated by sectoral producers price index), real value added, real non-ICT capital stock, real ICT capital stock, and employment in foreign affiliates in sector i respectively, and all are in logarithms. The focus of the paper is the effect of employment in foreign affiliates as a demand shifter[2], f, as we will discuss in more detail below. The other variables are the control variables. Capital stock is disaggregated as normal and ICT capital to differentiate the technology effects from extensive investment. The labor demand is based on a production function with a quasi-fixed capital constraint in the short run[3]. Theoretically a positive labor demand effect of output is expected. The demand for labor is expected to be negatively affected by the real wages from a classical point of view; however this is an empirical issue for this study to be tested. Non-ICT capital may be substituting or complementing labor; the latter would be the case if the firm has excess capacity. But a negative substitution effect of ICT capital may be expected at least for less skilled workers

(Chennels and Van Reeen, 1999). β_i is a sector specific coefficient. β_t is the time dummy, capturing time specific shocks such as exogenous technology shocks not captured by the ICT capital stock, or policy changes and other institutional factors such as employment taxes, employment legislation that may affect labor demand.[4]

The wage bargaining model is given as follows:

$$\ln(w_{i,t}) = \alpha_i + \alpha_t + \alpha_l \ln(l_{i,t}) + \alpha_k \ln(k_{i,t}) + \alpha_{kict} \ln(ict_{i,t}) + \alpha_f \ln(f_{i,t}) + \varepsilon_{t,i} \qquad (2)$$

where all variables are as defined above. This model is consistent with union bargaining and efficiency wage models (Konings and Vandenbussche, 1995; Greenaway et al, 1999b) In order to avoid the complications of modeling the formation of price expectations, an ex post bargained wage model is used. We thus look at the outcome of bargaining, i.e. the (ex post) real wage. Furthermore to be parallel to the labor demand equation, we are estimating real wages deflated by producers' prices rather than consumer prices[5]. Again the focus is on employment in foreign affiliates, f, which capture the effects of relocation on the bargaining power of domestic labor, and shift the bargaining curve as we will discuss in more detail below. The other variables are control variables. The capital/labor ratio, thus ln(k)+ln(ict)-ln(l), determines the productivity of labor and worker's aspirations and will have a positive effect on wages, but the degree at which they can index wages to productivity improvements will depend on their bargaining power. Also in more capital intensive sectors with a higher capital/output ratio the organizational strength and the bargaining power of the workers will be higher, and firms would be more willing to accommodate wage demands since labor costs are constituting a smaller part of their total costs. In the case of ICT-capital, however, the positive effect may be reversed with a technological replacement effect, particularly in the case of less skilled workers, who may be substituted with ICT-capital. This effect will disappear if capital and labor are complementary. The employment in the sector captures the insider power and the demand effect, and will affect workers bargaining power

positively and lead to higher real wage. However the responsiveness of wages to employment will also depend on the strategy of the labor unions, i.e. the trade off between wages and employment for the unions during a recession. Unions may choose to bargain for job protection and accept stagnant wages, in which case the positive effect of employment on wages will disappear. Moreover in our model employment and capital stock are used both in logarithms, as opposed to a model with employment and capital/labor ratio. Thus the negative denominator effect of employment in the capital/labor ratio will also be incorporated to the coefficient of employment in our model, making the interpretation of the sign of the coefficient hard. We nevertheless prefer this model because it is parallel to the employment model, which will have a computational advantage when deriving the wage share below. α_i is a sector specific coefficient. α_t is the time dummy, accounting for the economy wide labor market conditions that affect workers' outside options[6], an alternative economy wide wage[7], and the institutional factors that may affect the bargaining power like union density, collective bargaining coverage[8], and structural change in the composition of the workers. The effects of major changes in industrial relations after privatization will also be reflected in the time dummies.[9]

Finally the wage share, the share of wage bill[10]/gross value added of the sector (ws) is by definition actual real wage (bargained wage deflated by producer's price index, w) over productivity (real value added/employee)[11]:

$$ws_t = w_t / (q/l)_t \qquad (3)$$

Taking logarithms, ln(ws) is defined as

$$\ln(ws)=\ln(w)+\ln(l)-\ln(q) \qquad (4)$$

Substituting ll equation (1) in lwr (equation 2) we get ln(w) expressed only in terms of the explanatory variables, x, which is the vector of ln(q), ln(k), ln(ict), and ln(f) as defined above:

$$\ln(w_{i,t}) = \frac{\alpha_i + \alpha_t + \alpha_l\beta_l + (\alpha_x + \alpha_l\beta_x)x_{i,t} + \varepsilon_{t,i}}{1 - \beta_w\alpha_l} \quad (5)$$

Similarly substituting lwr (equation 2) in ln(l) (equation 1), we get ln(l) expressed only in terms x as above:

$$\ln(l_{i,t}) = \frac{\beta_i + \beta_t + \alpha_w\beta_w + (\beta_x + \beta_w\alpha_x)x_{i,t} + \sigma_{t,i}}{1 - \beta_w\alpha_l} \quad (6)$$

Then substituting both equation 5 & 6 in lws (equation 4) we get:

$$\ln(ws_{i,t}) = \frac{\beta_i + \alpha_i + \beta_t + \alpha_t + \alpha_w\beta_w + \alpha_l\beta_l + (\alpha_x(1+\beta_w) + \beta_x(1+\alpha_l))x_{i,t} + \varepsilon_{t,i} + \sigma_{t,i}}{1 - \beta_w\alpha_l} - \ln(q)$$

(7)

Taking the derivative of ln(ws) with respect to the components of x, e.g. foreign affiliate employment, ln(f), which is our interest in this paper, we calculate the effect on ws for a given value added (q)[12]:

$$\frac{\partial \ln(ws)}{\partial \ln f} = \frac{\alpha_f(1+\beta_w) + \beta_f(1+\alpha_l)}{1 - \beta_w\alpha_l} \quad (8)$$

This expression incorporates the effect of foreign affiliate employment on wages discounted by the effect of wages on employment (if wages have a negative effect on employment) and the effect of foreign affiliate employment on employment amplified by the effect of employment on wages (if employment has a negative effect on employment), both discounted by a common factor $(1-\beta_w\alpha_l)$[13]. If neither wages nor employment affect each other ($\beta_w = \alpha_l = 0$), then the effect of foreign affiliate employment on the wage share is simply the summation of its effects on wages and employment.

IV. Data, estimation methodology and specification of the equations

The empirical analysis is based on the panel data of the sub-sectors of industry and services. Appendix A reports the data sources. The panel data technique addresses the research questions based on variations both over time and across sectors. The other advantage of panel data is that it makes empirical tests possible with a database of relatively short time dimension. The unit of analysis is the sectoral employment and the results incorporates not only the direct effects on parent companies but also the indirect effects on the rest of the sector through spill-overs.

The effects of outward FDI on the labor market outcomes at home is measured by the effects of employment in the foreign affiliates of Austria (weighted by the share of the Austrian firm) in each sector disaggregated as affiliates in developed countries with relatively higher wages and the East[14]. FDI to other countries is not included as a third category since their share in total outward FDI is negligible. The sectors are defined according to the sector of the foreign affiliate. FDI data at this detail is available only at the level of 1-digit NACE classification and for the period of 1993-2004. Capital stock is also only available at 1-digit level.

In order to account for different impacts on skilled vs. less skilled labor, two methods will be used: first separate estimations are made for low and high skilled sector groups (Appendix B reports the list of the sectors and Appendix C reports the skill taxonomy); second the estimations are repeated for white-collar workers, who are assumed to represent skilled labor, vs. blue-collar workers, who are assumed to represent less skilled labor. Nevertheless, we need to be careful in assuming that all white collar workers are skilled workers, and all blue collar workers are low skilled workers. While white collar workers in both high skilled manufacturing and sevices industries can be skilled workers, they may well be low skilled workers in low skilled services sectors. Similarly blue collar workers in high skilled industries can be skilled workers.

In all equations lags of the explanatory variables and the dependent variable will be used to account for short vs. longer run effects[15]. The lagged employment accounts for the adjustment process due to costs of hiring and firing. The lagged wage accounts for sticky wage adjustment through time. Furthermore, the capital stock and foreign affiliate data ends in 2004; in order to be able to estimate the effects including 2005, we will use the first and second lags of these variables. By doing so we do not lose observations overall. Since the effect of both capital accumulation and FDI on labor markets may require a long adjustment process using deeper lags makes also economically sense.

Thus the equations (1) and (2) to be estimated for FDI effects on employment and wages take the following form respectively:

$$\ln(l_{i,t}) = \beta_i + \beta_t + \beta_l \ln(l_{i,t-1}) + \sum_{j=0}^{1} \beta_{wj} \ln(w_{i,t-j}) + \sum_{j=0}^{1} \beta_{q_j} \ln(q_{i,t-j}) + \sum_{j=1}^{2} \beta_{kj} \ln(k_{i,t-j}) + \sum_{j=1}^{2} \beta_{kictj} \ln(ict_{i,t-j}) + \sum_{c} \sum_{j=1}^{2} \beta_{fcnj} \ln(f_{c\,i,t-j}) + \varepsilon_{t,i} \tag{1a}$$

and

$$\ln(w_{i,t}) = \alpha_i + \alpha_t + \alpha_w \ln(w_{i,t-1}) + \sum_{j=0}^{1} \alpha_{lj} \ln(l_{i,t-j}) + \sum_{j=1}^{2} \alpha_{kj} \ln(k_{i,t-j}) + \sum_{j=1}^{2} \alpha_{kictj} \ln(ict_{i,t-j}) + \sum_{c} \sum_{j=1}^{2} \alpha_{fcnj} \ln(f_{c\,i,t-j}) + \varepsilon_{t,i} \tag{2a}$$

The sector index i=1,…,12 for industry[16] i=13,…,20 for services, i=1,…,20 for total economy, and t=1996-2005.[17] c is the affiliate country index corresponding to affiliates in developed countries vs. the East. We also estimate a pool for economy wide total high and low skilled sectors including both manufacturing and service sectors[18]. Both equations are also repeated for blue and white collar workers for the period of 1997-2005 since data for blue vs. white collar workers start in 1995 in NACE level classification.

We estimate the dynamic equation in first difference form in order to transfer out the fixed effects, and use a generalized method of moments technique as in Arrelano and Bond

(1991) to overcome the bias that will result in the coefficient of the lagged dependent variable due to differencing. Differencing also helps to overcome the possible problems associated with unit roots.[19] The presence of unit roots as well as the importance of the partial adjustment process are the reasons for estimating a dynamic specification in difference form rather than a fixed effects models, which would have the advantage of accounting for heterogeneity across sectors. Nevertheless the disadvantage of the dynamic estimation is the low number of cross-sections. We compute standard errors that are robust to the existence of sector specific serial correlation. Additionally, the real wage is endogenous and therefore instrumented in the employment equation. In the wage equation employment, capital stock, and foreign employment are endogenous and instrumented. In the employment equation the instruments are employment dated t-2 and earlier, the second and third lags of real wage[20], and the first differences of the exogenous variables, i.e. output, capital stock, foreign employment and their lags. In the wage equation the instruments are wages dated t-2 and earlier, the second and third lags of employment, the third and fourth lags of the capital stock, foreign employment.

Based on these estimation results we then calculate the long run coefficients using the contemporaneous and lagged effects and the speed of adjustment for the vector of explanatory variables, x, for employment equation as

$$\beta_x = \frac{\sum_{j=0}^{1} \beta_{xt-j}}{(1-\beta_l)} \qquad (9)$$

and for the wage equation as

$$\alpha_x = \frac{\sum_{j=0}^{1} \alpha_{xt-j}}{(1-\alpha_w)} \qquad (10)$$

The wage share effects in equation 8 are then calculated based on these long run coefficients.

V. Stylized facts

From early 1990s onwards Austrian FDI to both the developed countries and the East are increasing, with the increase towards the latter being higher. Austria's total FDI stock in the East as of 2004 is 38.0% of its total FDI stock. Austrian FDI is predominantly in services, but the ten biggest Austrian investors in the NMS represent a mix of financial and industrial capital. Regarding FDI outflow the banking sector makes up 30% of the total (Havlik et al., 2005).

Table 1 shows the cumulative % change in foreign affiliate employment during 1995-2004. The share of the employment in the foreign affiliates of Austria in the East in the total employment in foreign affiliates is 71.9% as of 2004, and is much higher than that of the affiliates in the developed countries (24.4%). Particularly in the high skilled services sectors the share of the East increases to 91.9%. Employment in the affiliates of Austria in the East increased 190.9% in industry and 302.8% in services during 1995-2004. The increase in the high skilled industry has been 252%, exceeding that in low skilled sectors significantly. However the increase in the employment in the foreign affiliates of Austria in the East in the high skilled services has been phenomenal with a rate of 824%. Employment in the affiliates of Austria in the developed countries also increased remarkably, albeit with lower rates: 87.3% in industry and 161.5% in services during 1995-2004. In the services the increase has been more important in the low skilled sectors, mainly construction and trade.

Please insert Table 1 approximately here

The increase in Austrian FDI goes along with the increase in Austrian exports as well as intermediate imports from the East. Austria's international trade with the East is dominated

by intra-firm trade. Almost 70% of Austria's imports from the East and 22% of exports are trade within a multinational enterprise (Marin, 2004).

Table 2 portraits the performance of labor markets during this period of internationalization based on the average annual change (compound average) of wages, employment, the wage share as well as value added and productivity for the sub-periods during 1976-2005 (and for the cumulative of 1990-2005).

Please insert Table 2 approximately here

The growth in value added has been strong during the period of internationalization, albeit slower than in the 1970s, however since the 1980s industrial employment is decreasing, whereas total (non-agricultural) employment is stagnant (a mere increase of 0.7% per year during 1990-2005). Employment is increasing in high skilled services, but low skilled services employment is stagnating. Within industry, the decline in low skilled industrial employment is stronger than that in high skilled industrial employment. The decline in manufacturing jobs is an ongoing process of structural change that started in the 1980s, but the decline did not decelerate after 1990 compared to 1980-1990 period. The opposite trend in domestic employment compared with the increasing foreign affiliate jobs is also striking.

In parallel to the unfavorable developments in employment, real wages (per employee, deflated by CPI) stagnate in the total economy (non-agricultural) since 1990s. In the last five years (2000-05) there has been even a slight decline (-0.2% per year). This trend is similar in industry although less dramatic. The low skilled industry sectors have experienced a more remarkable wage moderation than high skilled. The service wages have been even declining in the last five years on average (-0.4% per year), and the decline starts even earlier in the high skilled services, which have declined 0.4% per year during the last 10 years (1995-2005). Although the integration of Austria to the global economy seems to have affected employment much more than real wages and although the changes across sectors in wages are much more similar than in employment, the degree of wage moderation points at

significant changes in labor's bargaining power in the 1980s and then further since the second half of the 1990s. In the aggregate economy as well as in manufacturing real wage increases have lagged behind productivity since 1980s with few exceptions.

These developments have led to a significant erosion in the share of labor as a whole in value added in the aggregate economy as well as its sub-sectors since the late 1970s with a further acceleration since mid-1990s. Although the deterioration in the wage share is a phenomenon that dates back to late 1970s, whether the acceleration since the mid-1990s is partially related to increased capital mobility is the research question of this paper. The decline in the wage share in the last ten years has been highest in the high skilled industry, followed by low skilled industry and low skilled services, and even high skilled services took their share of the loss with a decline in the wage share.

Regarding the relative wage and employment of skilled labor[21], in industry both blue and white collar employment declined, with the decline in the former being more remarkable. In high skilled services both types of jobs increased, whereas in low skilled services blue collar employment declined and white collar employment increased slightly. During the period of 1995-2005 the relative employment of white to blue collar workers increased in industry and low skilled services, while their relative wage decreased, whereas both relative employment and wages of the white collar workers increased in high skilled services. Indeed the relative movements in the high skilled services point at a rather flexible response.

VI. Estimation results

VI.1 Employment

Table 3 reports the estimation results for employment modeled as in equation 1a. The respective columns of the Table are for total industry, total economy, low and high skilled sectors (including industry and services), and services. We will base our discussion of the

regression results on the long-run effects (calculated as in Equation 9), rather than separately discussing the current or lagged effects.

Please insert Table 3 approximately here

The Sargan test (from the homoskedastic estimator, which is reported at the end of the result tables) can not reject the null hypothesis that the overidentifying restrictions are valid. There is no second order autocorrelation in the first differenced residuals, which is an important condition for the validity of the estimations. The lagged dependent variable is significant in all specifications, verifying the need for a dynamic model.

We first start with the estimation results about the effects of foreign affiliate employment, and later discuss the effects of the control variables, i.e. output, wages, and technology. In total manufacturing an increase in foreign affiliate employment in the East has a significant negative long run effect on employment in the same sector in Austria. The same effect takes place in the total economy and in both the low and high skilled sectors.

The effects are economically significant as well. Table 4a shows the cumulative effect of each explanatory variable on employment, calculated as the long run coefficients multiplied by the actual change in the explanatory variable. A memo item in the last line reports the actual change in employment. These results indicate that in industry the 190% increase in affiliate employment in the East (82406 new jobs) over the period of 1995-2004 has resulted in a decline of 6.96% in employment, which means a loss of 43402 jobs in industry in Austria during 1996-2005. Similarly the cumulative number of jobs that were lost in the total economy are estimated to be 155488 over 10 years (a decline of 5.97% in 2005 compared to 1995) corresponding to an increase of 241% (188207 new jobs) in employment in the affiliates in the East in all sectors. To put it differently each job that has been created additionally over this period in the Eastern affiliates of Austria has substituted 0.53 jobs in net terms in industry, and 0.58 jobs in the total economy (as a ratio to jobs created in the Eastern affiliates in all sectors). These are the net effects showing the net of the jobs lost due to

substitution and jobs created due to complementary and scale effects. These numbers are overestimating the actual change in employment, which has declined 4.9% in industry, and increased 7.3% in total economy. But they indicate that for a given positive effect of growth and a negative effect of technical change, employment would have declined 6.96% less in industry if there were no Austrian foreign investment in the East in this period.

Please insert Table 4 approximately here

Regarding the employment in the foreign affiliates of Austria in developed countries while no effect can be detected in industry (at the aggregate level), there seems to be a significant negative effect in services (both white and blue collar). However these results need to be interpreted with care for estimations covering only few sectors (thereby few observations), and while the direction of the effects is indicative, the magnitudes can be misleading. In the total economy affiliate employment in the developed countries seem to be substituting blue collar workers at home, but there is no effect at the aggregate level[22].

Regarding skill differentials, estimation results for blue and white collar workers for the total economy and manufacturing are in the Appendix D Table 1[23]. At the level of the total economy, the employment of blue collar workers seems to be more affected by the rise of employment in the Austrian foreign affiliates relative to the white collar workers. But interestingly the workers working in the higher skilled sectors are more affected than those working in the lower skilled sectors; however employment declines in both sector groups due to capital outflow.

We checked the robustness of these results by using an alternative dynamic estimation technique (Arellano–Bover/Blundell–Bond system estimator)[24], and these effects are robust in the specification using the lags for the industry, but not for total economy. The estimation results are in the Appendix D Table 2. However when current values are used instead of lagged values, the results are not significant. Nevertheless, since it takes a while for domestic production and employment to adjust to the changes in the international division of labor and

the possibility of new production locations abroad, lagged effects are important, and should not be disregarded. Also the shift from substitution to scope and scale effect can also be only observed through a longer time horizon. The results of the alternative specification indicate even a larger effect of the employment in Eastern affiliates: a cumulative decline of 10.4%, which correspond to a loss of 64760 jobs, i.e. 0.79 jobs per job created in the East.

Regarding the control variables, while growth of value added as well as non-ICT capital has a positive effect on employment, the growth of ICT capital has a negative effect on employment growth in industry reflecting the effects of labor saving technical change. The effect is highly significant in spite of the existence of time dummies. In the total economy the effect ICT capital as well as non-ICT capital is insignificant, whereas growth remains to be significant. The technical change in this case is only captured by the time dummies. Employment does not seem to be responsive to changes in wages.

Time dummies remain significant despite the presence of capital stock as an explanatory variable. This captures not only the ongoing structural change but also other exogenous technical change effects that are not reflected by the capital stock.

If we compare our results with the previous research results, the negative effects of Eastern affiliate employment is consistent with the findings in Bellak and Altzinger (2001), and the survey evidence in Marin (2004), but she finds no negative effect of affiliate wages. Regarding Falk & Wolfmayr (2007), while the negative effect of affiliate employment in services is consistent with their dynamic estimation results, we find no effect of Eastern affiliate employment in services, whereas they do. Furthermore for industry they find no significant effects both at sectoral and firm level. One difference is that they cover only the Eastern employment in the five NMS. The more important difference is the use of lags. While they do not use lagged effects, we find that this makes a difference in the results. They use the Arellano–Bover/Blundell–Bond system estimator, but our results using the same estimator with lagged effects also indicate a negative effect of affiliate employment in the East.

However, Falk & Wolfmayr (2007) also mention that aggregate studies might be hiding important firm level adjustment processes, which we also agree. Based on firm level data they find no significant effect of affiliate employment on parent companies' employment. While this reflects the direct effects on the parent companies, the sectoral results incorporate also the indirect results at the sectoral level, where negative effects seem to be dominating according to the results of our study.

VI.2 Real wages

Table 6 reports the estimation results for real wages modeled as in equation 2a. The respective columns of the table are for total industry, total economy, low and high skilled sectors (including industry and services), and services.[25]

Please insert Table 6 approximately here

According to the long-run coefficients (calculated as in Equation 10), employment in the foreign affiliates in the East as well as developed countries have a significant negative effect on wages in industry, but no effect in total economy. Based on the regression results for blue and white collar workers, there is only evidence of a negative wage effect for blue collar workers due to foreign affiliate employment in the industry. In the total economy the increase in affiliate employment in developed countries has a negative effect in only low skilled sectors (including both low skilled industry and service sectors), whereas there is a negative wage effect of Eastern affiliate employment in high skilled sectors. There is evidence of some positive effect of affiliate employment in the East on wages in services sectors as well as on wages in the low skilled sectors. This could be explained by a positive scope effect and skill upgrading in the low skilled or services sectors, which have a complementary relation to Eastern affiliate employment.

Table 4b shows the cumulative effect of each explanatory variable on wages, calculated as the long run coefficients multiplied by the actual change in the explanatory variable. In terms of economic significance, the increase in the affiliate employment in the East and developed countries resulted in a 17.9% and 7.2% cumulative decline in real wages in the industry during the period of 1996-2005 respectively. Thus altogether real wages would have increased 25.2% more in industry if there were no Austrian foreign investment in this period.

The increase in employment in the Eastern affiliates particularly affects the blue collar wages in industry. The estimation results for blue and white collar workers for the total economy and manufacturing are in the Appendix D Table 3. At the level of total economy there seems to be no differential wage response for blue and white collar workers.

Regarding the control variables, in industry while employment has a negative effect on wages, non-ICT capital stock has a positive effect, reflecting an increase in wages together with the capital intensity of the sector.

Again the time dummies remain significant and are mostly negative, indicating the significance of institutional factors as well as possible negative effects of capital mobility that is not necessarily reflected in the volume of actual transactions.

VI.3 Wage share

Combining the long run effects on employment and wages as defined in equation (8), we get the joint effect of the changes in capital stock (ICT and non-ICT) and the employment in foreign affiliates of Austria. Based on the calculated long run coefficients for the wage share, Table 4c report the cumulative %-points effect[26] of the actual change in the explanatory variable. These effects are partial effects for a given level of value added.

Based on the estimation results, in industry the increase in employment in the foreign affiliates of Austria in the East and the developed countries has resulted in a cumulative decline of 13.2%-points and 4.7%-points in the wage share respectively during 1996-2005 (thus a total of -17.9%-points). These results overestimate the 8.2%-points actual decline in the wage share, however the direction is suggestive. Overall in the total economy the increase in the Eastern affiliate employment has resulted in a 1.8%-point decline in the wage share.

VII. Conclusion

This paper estimates the employment and wage effects of outward FDI on employment, wages, and the wage share in Austria. There is evidence of significant negative effects of FDI on both employment and wages.

The negative employment effect of Austria's investment abroad is primarily due to the rise in the employment in the foreign affiliates in the East. The employment in foreign affiliates in developed countries seems to have a negative effect in services only, which could be interpreted as the horizontal FDI effect. The negative wage effects are originating from affiliate employment in both the East and the developed countries in industry, but no effect is found in the total economy. There is evidence of some positive wage effect of affiliate employment in the East in the services. Bringing together these effects we find that the increase in employment in the foreign affiliates of Austria has resulted in a deterioration of wage share with the effect originating from both country groups in industry, and only from the East in the total economy.

The results are not limited to workers in low skilled sectors; there are also negative effects in high skilled sectors. But it is mostly the blue collar workers who are negatively affected from outward FDI.

Technological change also results in a decline in the industry wage share. Time dummies remain significant and are mostly negative. In the employment estimation this not only captures the ongoing structural change but also other exogenous technical change effects that are not captured by the capital stock. In the wage equation this shows the importance of institutional factors that are changing at the expense of labor's bargaining power and the possibility of threat effects of potential capital mobility, which has not been realized yet.

It could be said that these results are nevertheless reflecting a relatively short period of 10-15 years, and thus only incorporating the substitution effects, and the stages where scope and scale effects are expected has not arrived yet. However labor market outcomes have persistence. Negative employment effects generate long term unemployment problems as well as a decline in labor's bargaining power. Additionally job losses lead to a negative popular perception of European Integration, leading to political tensions. But this discontent as well as the negative effects of openness are not an unavoidable destiny. On the contrary the European Integration could be seen as an advantage to institutionalize the coordination of labor market policy and wage bargaining incorporating productivity-led wage increases to facilitate wage convergence along with a systematic EU policy on regional development and social cohesion, thus an economically relevant EU budget. This also defines new tasks for the trade unions in old member states in terms of communicating with the trade unions in the East, particularly if they are organized in different affiliates of the same multinational company.

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Table 1. Cumulative % change in the Foreign Affiliate Employment, 1995-2004							
	Industry			**Services**			**Total Economy**
Employment in the foreign affliates of Austria	Low skilled	High skilled	Total	Low skilled	High skilled	Total	
Developed	63.70	96.35	83.03	208.15	47.52	161.50	117.79
East	81.88	252.55	177.01	86.56	824.46	302.85	241.01

Table 2 Annual % change in labor market outcomes (compund average)

	Wage share	Real value added	Employment	Real Wage	Real Wage blue collar*	Real wage white collar*	Employment blue collar*	Employment white collar*
TOTAL ECONOMY								
1976-1980	-0.03	2.80	1.45	2.09				
1980-1985	-0.62	1.26	-0.31	0.33				
1985-1990	-0.20	3.22	1.37	2.08				
1990-1995	-0.21	2.29	0.78	1.11				
1995-2000	-0.54	3.19	1.05	0.28	0.60	2.16	-0.23	1.03
2000-2005	-0.49	1.74	0.33	-0.19	0.13	-0.53	-0.39	0.63
1990-2005	-0.47	2.40	0.72	0.40	0.37	0.81	-0.31	0.83
TOTAL INDUSTRY								
1976-1980	0.51	2.93	0.49	2.49				
1980-1985	-1.11	0.78	-2.57	0.73				
1985-1990	-0.02	2.86	-0.50	2.68				
1990-1995	-0.11	0.93	-2.03	1.74				
1995-2000	-1.57	4.31	-0.93	1.08	1.32	1.06	-1.30	0.34
2000-2005	-0.09	1.62	-0.62	0.58	0.70	0.15	-1.69	-1.77
1990-2005	-0.66	2.28	-1.19	1.13	1.01	0.61	-1.49	-0.72
TOTAL HIGH INDUSTRY								
1976-1980	0.74	6.70	1.80	2.86				
1980-1985	-0.74	1.23	-2.00	1.10				
1985-1990	-0.35	4.92	0.87	2.80				
1990-1995	-0.34	2.29	-1.70	1.94				
1995-2000	-1.76	5.17	-0.02	1.15	1.14	0.77	-0.50	1.73
2000-2005	0.28	2.35	0.14	0.39	0.60	0.12	-1.31	-2.70
1990-2005	-0.68	3.26	-0.53	1.16	0.87	0.44	-0.91	-0.51
TOTAL LOW INDUSTRY								
1976-1980	0.31	0.21	-0.48	2.07				
1980-1985	-1.43	0.39	-3.01	0.33				
1985-1990	0.21	0.88	-1.69	2.33				
1990-1995	0.13	-0.61	-2.35	1.45				
1995-2000	-1.32	3.20	-1.83	0.78	1.41	1.16	-1.90	-1.42
2000-2005	-0.58	0.59	-1.45	0.64	0.77	0.44	-2.00	-0.52
1990-2005	-0.67	1.05	-1.88	0.96	1.09	0.80	-1.95	-0.97
TOTAL SERVICE								
1976-1980	-0.19	2.75	1.98	1.89				
1980-1985	-0.36	1.42	0.81	0.19				
1985-1990	-0.20	3.34	2.17	1.89				
1990-1995	-0.15	2.71	1.81	0.99				
1995-2000	-0.23	2.85	1.66	0.11	0.30	2.45	0.31	1.14
2000-2005	-0.60	1.77	0.59	-0.39	-0.03	-0.53	0.21	0.96
1990-2005	-0.37	2.44	1.35	0.23	0.14	0.95	0.26	1.05
TOTAL HIGH SERVICE								
1976-1980	-0.51	3.40	2.48	1.74				
1980-1985	-0.73	2.36	2.19	-0.07				
1985-1990	-0.44	3.26	2.37	1.65				
1990-1995	-0.53	2.83	1.79	0.86				
1995-2000	0.03	2.85	2.52	-0.34	0.52	3.47	1.51	1.48
2000-2005	-0.64	2.03	0.94	-0.43	0.41	-0.61	0.99	1.10
1990-2005	-0.42	2.57	1.75	0.03	0.47	1.41	1.25	1.29
TOTAL LOW SERVICES								
1976-1980	0.09	1.88	1.52	1.91				
1980-1985	0.05	0.04	-0.55	0.07				
1985-1990	0.14	3.46	1.96	2.15				
1990-1995	0.48	2.53	1.84	1.18				
1995-2000	-0.68	2.84	0.68	0.50	0.32	-0.12	-0.46	0.33
2000-2005	-0.51	1.36	0.18	-0.43	-0.22	-0.35	-0.35	0.61
1990-2005	-0.27	2.24	0.90	0.42	0.05	-0.23	-0.41	0.47

*1995-2005

**1993-1994

Table 3. Estimation results: Δln Employment (1996-2005)

Variable	Industry	Total Economy	Total low skilled	Total high skilled	Services
Δln Employment t-1	0.698	0.762	0.730	0.730	0.725
	0.000	*0.000*	*0.000*	*0.000*	*0.000*
Δln Real wage t	-0.082	-0.076	-0.120	-0.051	-0.387
	0.517	*0.457*	*0.439*	*0.568*	*0.040*
Δln Real wage t-1	-0.055	-0.056	0.300	-0.193	-0.087
	0.717	*0.597*	*0.105*	*0.152*	*0.585*
Δln Real value added t	0.383	0.289	0.455	0.215	0.161
	0.000	*0.000*	*0.000*	*0.000*	*0.145*
Δln Real value added t-1	-0.200	-0.177	-0.356	-0.073	0.088
	0.009	*0.000*	*0.003*	*0.101*	*0.146*
Δln Non-ICT capital t-1	-0.251	-0.104	0.346	-0.415	-0.178
	0.225	*0.614*	*0.320*	*0.001*	*0.696*
Δln Non-ICT capital t-2	0.324	0.238	-0.072	0.554	0.244
	0.076	*0.237*	*0.810*	*0.000*	*0.590*
Δln ICT capital t-1	0.140	0.049	0.097	0.079	0.053
	0.011	*0.351*	*0.296*	*0.057*	*0.128*
Δln ICT capital t-2	-0.150	-0.049	-0.115	-0.078	-0.063
	0.009	*0.343*	*0.208*	*0.053*	*0.098*
Δln foreign Employment developed t-1	0.001	0.000	0.013	-0.010	-0.001
	0.880	*0.976*	*0.048*	*0.101*	*0.756*
Δln foreign Employment developed t-2	-0.011	-0.007	-0.023	0.007	-0.017
	0.356	*0.192*	*0.008*	*0.255*	*0.002*
Δln foreign Employment eastern t-1	0.020	0.011	0.039	0.008	0.001
	0.005	*0.111*	*0.000*	*0.191*	*0.865*
Δln foreign Employment eastern t-2	-0.031	-0.017	-0.041	-0.014	0.007
	0.000	*0.010*	*0.000*	*0.070*	*0.130*
Constant	0.413	0.456	-3.006	1.212	2.123
	0.629	*0.678*	*0.035*	*0.296*	*0.369*
Number of observations	105	170	73	97	65
Number of groups	12	20	9	11	8
AR (2) p-value	0.947	0.486	0.101	0.232	0.112
Joint sign. of time dummies (p-value)	0.000	0.002	0.000	0.000	0.000
Sargan test (p-value)	0.654	0.595	0.706	0.320	0.187
p-values under coefficients (in italics)					

Table 4. Cumulative % change effects (1996-2005)

a. Employment: Cumulative % change during 1996-2005 due to:		
	Industry	**Total economy**
Real wage	0.00	0.00
Real value added	18.90	11.59
Non-ICT Capital	0.69	0.00
ICT Capital	-20.97	0.00
Foreign affliate employment-developed countries	0.00	0.00
Foreign affliate employment-east	-6.96	-5.97
Foreign employment total cumulative %change effect	-6.96	-5.97
Memo item: Actual cumulative % change in employment	-4.89	7.32
b. Wage: Cumulative % change during 1996-2005 due to:		
	Industry	**Total economy**
Employment	3.35	-3.31
Non-ICT Capital	0.93	0.00
ICT Capital	0.00	0.00
Foreign affliate employment-developed countries	-7.23	0.00
Foreign affliate employment-east	-17.93	0.00
Foreign employment total cumulative %change effect	-25.17	0.00
Memo item: Actual cumulative % change in wages	12.86	3.91
c. Wage share: Cumulative %-point change during 1996-2005 due to:		
	Industry	**Total economy**
Non-ICT Capital t-1	0.75	0.00
ICT Capital t	-4.32	0.00
Foreign affliate employment-developed countries	-4.74	0.00
Foreign affliate employment-east	-13.18	-1.82
Foreign employment total cumulative %change effect	-17.92	-1.82
Memo item: Actual cumulative %-point change in wage share	-8.24	-4.80

Table 5. Estimation results: Δln Real wage (1996-2005)

Variable	Industry	Total Economy	Total low skilled	Total high skilled	Services
Δln Real wage t-1	0.819	0.739	0.673	0.788	0.560
	0.000	*0.000*	*0.000*	*0.000*	*0.000*
Δln Employment	-0.045	-0.015	-0.038	-0.018	-0.157
	0.415	*0.790*	*0.589*	*0.755*	*0.034*
Δln Employment t-1	-0.124	-0.118	-0.110	-0.069	0.057
	0.042	*0.041*	*0.120*	*0.251*	*0.562*
Δln Non-ICT capital t-1	0.263	0.137	-0.621	0.217	0.323
	0.038	*0.292*	*0.219*	*0.012*	*0.331*
Δln Non-ICT capital t-2	-0.019	-0.022	0.642	-0.128	-0.369
	0.879	*0.873*	*0.118*	*0.265*	*0.296*
Δln ICT capital t-1	-0.036	0.044	-0.094	0.039	0.104
	0.409	*0.185*	*0.431*	*0.228*	*0.000*
Δln ICT capital t-2	0.052	-0.038	0.102	-0.031	-0.094
	0.224	*0.276*	*0.390*	*0.356*	*0.000*
Δln foreign Employment developed t-1	-0.015	-0.002	-0.015	0.006	-0.002
	0.001	*0.744*	*0.003*	*0.367*	*0.696*
Δln foreign Employment developed t-2	0.000	0.001	-0.002	-0.004	-0.005
	0.980	*0.817*	*0.578*	*0.609*	*0.470*
Δln foreign Employment eastern t-1	0.002	-0.002	0.017	-0.007	-0.003
	0.779	*0.512*	*0.035*	*0.086*	*0.431*
Δln foreign Employment eastern t-2	-0.017	0.002	-0.016	0.006	0.016
	0.004	*0.639*	*0.005*	*0.267*	*0.000*
Constant	1.612	3.073	4.860	2.226	6.019
	0.131	*0.002*	*0.000*	*0.035*	*0.000*
Number of observations	105	170	73	97	65
Number of groups	12	20	9	11	8
AR (2) p-value	0.197	0.125	0.376	0.227	0.740
Joint sign. of time dummies (p-value)	0.000	0.000	0.000	0.000	0.000
Sargan test (p-value)	0.219	0.048	0.289	0.394	0.521

p-values below the coefficients (in italics)

Appendix A

Data sources

Statistics Austria, Panel data of industries, 1976 onwards, NACE 2-digit

FDI-database of Austrian National Bank, 1993 onwards, NACE 1-digit (At 2 digit level even total FDI data is hidden or does not exist in many sectors (15, 23, 25, 30, 33, 34, 35, 36) for all years or most years).

Association of Austrian Social Insurance, employment and median wage for white and blue collar workers, only 1995 onwards at a comparable classification, NACE 1-digit for wages and NACE 2-digit for employment.

EU KLEMS Database, March 2007, http://www.euklems.net for the capital stock, 1976-2004, NACE 1-digit

Appendix B Sectoral classification at 1-digit NACE level

1-Digit	
10-14	Mining and quarrying
MANUFACTURING	
15-16	Food products, beverages and tobacco
17-19	Textiles, textile products, leather and footwear
20	Wood and products of wood and cork
21-22	Pulp, paper, paper products, printing and publishing
23-25	Chemical, rubber, plastics and fuel products
26	Other non-metallic mineral products
27-28	Basic metals and fabricated metal products
29	Machinery and equipment, n.e.c.
30-33	Electrical and optical equipment
34-35	Transport equipment
36-37	Manufacturing nec
40-41	Electricity, gas and water supply
45	Construction
50-52	Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods
55	Hotels and restaurants
60-64	Transport, storage and communications
65-67	Financial intermediation
70-74	Real estate, renting and business activities
85-93	Health and social work, Other community, social and personal service activities

Appendix C: Skill taxonomy for manufacturing industries

Skill groups	1-Digit
Low Skill	15-16 17-19 26 27-28 36-37
High Skill	20 21-22 23-25 29 30-33 34-35

Service

Skill groups	1-Digit
Low Skill	45 50-52 55
High Skill	40-41 60-64 65-67 70-74 85-93

Total economy and industry: Includes also mining and quarrying (classified as low skilled)

Note: Classification is based on Peneder (1999). The medium skilled/blue collar industries are classified as medium skilled, whereas medium skilled/white collar industries sectors that are also technology driven are classified as high skilled; the other medium skilled/white industries are classified as medium skilled.

Appendix D Table 1 Estimation results: Δln Employment (1997-2005)

Variable	Industry		Total Economy	
	Blue	White	Blue	White
Δln Employment t-1	0.856	0.859	0.874	0.814
	0.000	*0.000*	*0.000*	*0.000*
Δln Real wage	-0.389	-0.363	0.050	-0.100
	0.135	*0.004*	*0.837*	*0.298*
Δln Real wage t-1	-0.160	0.094	-0.305	0.101
	0.581	*0.572*	*0.069*	*0.332*
Δln Real value added	0.129	0.071	0.111	0.065
	0.001	*0.223*	*0.029*	*0.113*
Δln Real value added t-1	0.004	-0.003	0.056	0.000
	0.942	*0.965*	*0.307*	*0.994*
Δln Non-ICT capital t-1	-0.640	-0.485	-0.819	-0.390
	0.036	*0.113*	*0.004*	*0.010*
Δln Non-ICT capital t-2	0.725	0.597	0.834	0.518
	0.001	*0.035*	*0.000*	*0.000*
Δln ICT capital t-1	0.181	0.075	0.150	0.071
	0.003	*0.351*	*0.040*	*0.247*
Δln ICT capital t-2	-0.154	-0.061	-0.144	-0.068
	0.010	*0.430*	*0.055*	*0.277*
Δln foreign Employment developed t-1	-0.009	-0.009	-0.008	0.002
	0.344	*0.370*	*0.077*	*0.476*
Δln foreign Employment developed t-2	-0.002	0.011	-0.008	0.000
	0.831	*0.290*	*0.090*	*0.959*
Δln foreign Employment eastern t-1	-0.009	-0.016	-0.002	-0.013
	0.318	*0.191*	*0.875*	*0.112*
Δln foreign Employment eastern t-2	-0.007	-0.001	0.007	0.000
	0.510	*0.948*	*0.332*	*0.985*
Constant	1.551	0.858	-0.767	-0.630
	0.270	*0.498*	*0.617*	*0.608*
Number of observations	96	95	154	153
Number of groups	12	12	20	20
AR (2) p-value	0.115	0.139	0.119	0.042
Joint sign. of time dummies (p-value)	0.000	0.000	0.000	0.000
Sargan test (p-value)	0.118	0.357	0.001	0.545
p-values under coefficients (in italics)				

Appendix D Table 2 Estimation results: ln Employment vs. Foreign affiliate employment, Methodology: Arellano–Bover/Blundell–Bond system estimator (1996-2005)

Variable	Industry	Total Economy
ln Employment t-1	0.908	0.847
	0.000	*0.000*
ln Real wage t	-0.057	-0.138
	0.217	*0.086*
ln Real value added t	0.142	0.217
	0.013	*0.007*
ln Non-ICT capital t-1	-0.014	-0.043
	0.177	*0.056*
ln ICT capital t-1	-0.007	-0.007
	0.162	*0.320*
ln foreign Employment developed t-1	-0.003	-0.008
	0.522	*0.198*
ln foreign Employment eastern t-1	-0.005	-0.003
	0.026	0.462
Number of observations	132	215
Number of groups	12	20
Sargan test (p-value)	0.156	0.287
Hansen test (p-value)	1	0.979
AR (2) p-value	0.710	0.310

p-values below the coefficients (in italics)

Appendix D Table 3 Estimation results: Δln Wages (1997-2005)

Variable	Industry		Total Economy	
	Blue	White	Blue	White
Δln Real wage t-1	0.457	0.464	0.849	0.498
	0.000	*0.000*	*0.000*	*0.000*
Δln Employment	-0.130	-0.284	0.128	-0.108
	0.006	*0.003*	*0.080*	*0.334*
Δln Employment t-1	-0.014	0.081	-0.170	-0.069
	0.733	*0.407*	*0.026*	*0.519*
Δln Non-ICT capital	0.025	0.127	-0.070	0.331
	0.881	*0.561*	*0.720*	*0.088*
Δln Non-ICT capital t-1	0.335	0.260	0.164	-0.028
	0.042	*0.217*	*0.382*	*0.884*
Δln ICT capital t-1	0.027	0.012	0.111	0.047
	0.530	*0.847*	*0.043*	*0.393*
Δln ICT capital t-2	-0.005	0.009	-0.120	-0.034
	0.904	*0.877*	*0.024*	*0.527*
Δln foreign Employment developed t-1	-0.006	-0.008	-0.002	-0.004
	0.317	*0.326*	*0.781*	*0.477*
Δln foreign Employment developed t-2	0.002	0.001	-0.005	-0.004
	0.803	*0.888*	*0.391*	*0.495*
Δln foreign Employment eastern t-1	-0.014	-0.011	-0.007	-0.003
	0.029	*0.305*	*0.331*	*0.658*
Δln foreign Employment eastern t-2	-0.014	-0.007	0.011	0.004
	0.014	*0.402*	*0.116*	*0.577*
Constant	2.299	2.624	0.885	2.706
	0.000	*0.002*	*0.208*	*0.000*
Number of observations	96	95	154	153
Number of groups	12	12	20	20
AR (2) p-value	0.041	0.555	0.094	0.310
Joint sign. of time dummies (p-value)	0.000	0.000	0.484	0.000
Sargan test (p-value)	0.080	0.345	0.051	0.175

p-values below the coefficients (in italics)

Endnotes

[1] The wage share index adjusted for the employment strucure (basis year of 1970) and calculated as a ratio to net national income decreased even more sharply (Guger and Marterbauer, 2004).

[2] An alternative measure could be the wages in the affiliates. While the affiliate employment data is specific to the foreign affiliates of Austria, the wage data is available only for the sectoral average in the host countries. So we prefer to use the affiliate employment in this study.

[3] See Greenaway et al. (1999a) and Hine and Wright (1998) for a model with wage/capital cost as the explanatory variable in a model for trade effects. Since it is hard to measure the capital costs the authors then rely on time dummies to reflect this effect, assuming perfect capital markets. However if we assume that capital is quasi-fixed, then we obtain instead a capital constrained labor demand model. OECD (2007) estimates a similar labor demand function to estimate the effects of imports.

[4] The analysis of these effects, albeit interesting, are outside the scope of this paper.

[5] Although the workers bargain for a targeted purchasing power based on expected CPI inflation, for the firms it is their producers' prices (determined by the wage costs and non-labor costs and their mark-up power) which also is a binding constraint for the wage demands of workers. So one could estimate the real wage equation either deflated by consumer or producers' prices and account for these price differentials by adding the wedge, the ratio of CPI/PPI. But since it is not a core variable, we will drop it at the estimation stage to gain degrees of freedom.

[6] Economy wide unemployment to account for general labor market conditions is not added since this also requires dropping the time dummies; also in a panel context economy wide variables are less useful.

[7] In Austria wage determination is a result of industry-wide collective bargaining, but pattern bargaining makes it highly centralized. But Aiginger et al. (1996) also mention that subsequent negotiations at the firm level are possible, particularly in large firms, which are exposed to higher international competition. Nevertheless regarding the effects of alternative wage as well as pattern bargaining, a reference wage like the average wage rate of the economy could be included. While this would make sense, if one were only interested in wage differentials, it is defeating in our context, since the average wage needs to be explained and not taken as given. Furthermore it would require dropping the time dummies.

[8] There is no collective bargaining coverage or union density data compatible with NACE classification.

[9] See Azmat et al (2007) which cites privatization as a major factor behind the decline in the wage bill in the OECD in the network industries.

[10] We use labor compensation rather than wage and salaries to account for the non-wage payments to labor such as social security contributions of the employers as well. A correction of the wage share to account for the labor income of the self-employed was not possible due to lack of detailed sectoral data.

[11] This is a simplification in order to explain the changes in the wage share, assuming that the change in the producers' price index and value added price index are the same, which in reality is different.

[12] Also a given and PPI/value added deflator is assumed.

[13] $(1-\beta_w\alpha_l)$ needs to be positive to have a meaningful solution.

[14] 20 countries including the 10 Eastern European new member states, five non-member South Eastern European countries, and four European countries of the Community of Independent States (Russia, Ukraine, White Russia, Moldavia).

[15] Further lags are not used due to the limited sample size. They were also not significant.

[16] Industry includes 11 manufacturing sectors and mining and quarrying. Mining is added to the pool to increase the sample size; however the results are qualitatively robust to the exclusion of mining.

[17] Estimating these two equations in systems form would potentially create efficiency gain, but they are not needed for consistency. Given our limited degrees of freedom and the complication of systems estimation with panel data, we restrict the estimation to separate equations with endogeneity.

[18] The total economy excludes agriculture, since labor market dynamics in agriculture has a rather different character.

[19] Real wage, real value added, employment, capital stock, foreign employment, all suffer from unit root problems. Unit root tests are available upon request.

[20] The instrument set in the case of the lags of employment is expanded as the panel progresses and the number of potential lags increases. This method is efficient; however it was not possible in the case of the other endogeneous variable due to the limited matrix size of the estiamtion software (STATA 10).

[21] The source of blue and white collar employment and wages is the Social Security records and wages are median wages, whereas aggregate employment and wages are based on national accounts and wages are mean wages. Therefore there are some differences in their changes.

[22] Although there are negative effects for both low and high skilled sectors at the level of the total economy, these results are less reliable due to the low number of observations, and wherever they are not consistent with the total finding, we will not emphasize them.

[23] The Sargan test for the estimation for the blue collar workers in the total economy rejects the validity of the instrument set; however due to the small number of observations, this problem is unavoidable.

[24] Arellano–Bover/Blundell–Bond estimator is based on a system of equations: the difference equation as described above according to Arellano–Bond, adding the original equation in levels to the system, where variables in levels are instrumented with suitable lags of their own first differences. This method is particularly suitable for the employment equation which behaves like random walk. In the case of the real wage equation, this is less of a problem. In this estimation we used orthogonal transformation instead of differencing to maximize the sample size in the presence of missing observations.

[25] The Sargan test except for the total economy can not reject the null hypothesis that the overidentifying restrictions are valid. There is no second order autocorrelation in the first differenced residuals.

[26] Based on the long run elasticities for the wage share, we calculate the % change effect and finally express these effects in %-points, which makes more sense in the case of wage share.