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A Heterogeneous Dynamic Labor Demand Approach for Germany

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Lena Jacobi and Sandra Schaffner*

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Abstract

In Germany we observe a decline in regular employment and an increase in atypical forms of employment. Especially marginal part-time employment which is characterized by lower tax rates and lower social security contributions increased substantially after a reform in 2003 made this type of employment even more attractive to employers. In our paper we estimate the substitutability of regular employment by marginal part-time employment using data on the industry level before and after the reform. We detect high substitution elasticities with respect to three skill categories of regular employment in both time periods. The substitutability of unskilled full-time workers increased significantly after the reform.

JEL Classification: J23, J31

Keywords: Mini-Jobs, dynamic labor demand, elasticities, Hartz-reforms

July 2008

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1 Introduction

Over the last two or three decades in virtually all developed economies demand for unskilled labor has tended to decline, while the demand for skilled labor has increased. These trends have been explained in an extensive literature by skill-biased technological change or capital-skill-complementarity (Bartel & Lichtenberg, 1987, Krueger, 1993, Autor, Katz, & Krueger, 1998, Acemoglu, 2002 and by intensified competition with low-wage economies (Freeman, 1995, Geishecker, 2006).

In Germany as in many other European countries we observe an additional trend, the decline in the relative employment share of regular employment and a corresponding increase in marginal employment. International competition, new work organization patterns and fluctuating demand have steadily increased the need of firms to make use of more flexible forms of work, like short-term contracts, part-time, and contracting out to self-employed workers employment. Most importantly, the substantial increase of part-time employment over past decades was also stimulated by the growing labor market supply of women and the expansion of tertiary activities which rely particularly on flexible working hours (e.g. retail, gastronomy, health care, domestic workers). Finally, schemes in the tax and social security system in several European Countries make marginal forms of part-time employment attractive to employers by exempting employment under a given hours or earnings threshold from taxes or social security contributions.

In Germany, the use of marginal part-time labor ("geringfügig entlohnte Beschäftigung", since 2003 also called "Minijobs") increased substantially over recent years. This trend may to some extent be due to a recent policy change during the so-called Hartz-Reforms of the labor market in 2003 that further increased the attractiveness of marginal part-time employment. According to the new regulation, marginal part-time employment is employment with earnings below 400 €. Workers with marginal part-time employment contracts are exempt from regular social security contributions. This roughly halves the additional labor costs compared to those of regular employment, which should be conducive to employment growth

On the other hand, since the German social security system is contribution-financed and since individual entitlements for old age pensions are linked to the individual amount of contributions paid to the system, the continuously increasing employment share of marginal part-time employment is a highly debated policy issue. It could well be that firms are simply replacing regular employment by marginal part-time employment in order to benefit from lower indirect labor costs at the expense of the social security system. Yet, the decrease in regular employment might be even sharper if firms were unable to make use of flexible forms of labor. This policy debate hinges to a considerable extent on the empirical question wether regular employment and marginal part-time employment are substitutes or complements in production.

To contribute to this debate this paper provides an empirical analysis of labor demand patterns in Germany during the time period 1999 - 2005. Our major interest lies on the substitution patterns between regular and marginal part-time employment. Thus, in contrast to the large body of literature that merely focuses on different skill levels of full-time employment, we include part-time and marginal part-time employment in our analysis in order to capture the specific situation in Germany.

Furthermore, while our focus is on equilibrium relations, we contribute to the literature by estimating labor demand in a dynamic framework. We test a large number of dynamic models and contrast our results with those from static models. We find that various problems encountered in empirical studies on labor demand in Germany, e.g. positive own-wage elasticities of high-skilled employment (Fitzenberger and Franz (1998, 2001)) are absent if labor demand is modeled dynamically.

The paper is organized as follows: in Section 2 we will briefly introduce to the relevant labor market institutions in Germany and its reforms over the time period 1999 - 2005 and sketches labor demand patterns over those years. Section 3 introduces our empirical model. Results will be discussed in Section 4 and Section 5 seven concludes.

2 The German Labor Market

2.1 Institutions

Marginal part-time employment is not a completely new aspect of the German labor market. This type of contract was already introduced during the economic boom in the 1960s when labor was scarce. Its introduction was intended to mobilize the labor force of housewives, retirees and students. Marginal part-time employment is defined as employment below a given earnings or hours threshold. Under this type of contract, employees are exempt from social security contributions[1]. While the original idea of marginal part-time employment was to increase the net-pay of low-income earners, it is more likely that the major effect of this regulation is the reduction in the

[1]Before April 1999, marginal part-time employment was exempt completely from social security, that is employers did not pay social security contributions either. Instead, employers paid a fix wage tax rate of 20%.

employer's costs of labor. For employees with identical net-earnings per hour, additional wage costs are considerably lower for employees in marginal part-time employment compared to those who are subject to full social security contributions. This makes hiring workers on the basis of marginal part-time employment contracts quite attractive. Obviously, marginal part-time employment is only a viable option, if production processes can be distributed easily on several workers.

In the time period 01.04.1999 – 31.03.2003 marginal part-time employment was defined as a working contract with no more than 15 hours per week and 325 € wage per month. The employer's social security contribution was 22% (12% social pension fund, 10% health insurance) and employees were exempt completely from social security contributions. On 01.04.2003 the earnings threshold was raised to 400 € per month while the restriction on working hours per week was abolished. This allowed employers to hire fewer workers for the same volume of work and thus increased the attractiveness of marginal part-time employment to employers. Furthermore, administration of marginal part-time employment was simplified considerably. Until 01.07.2006 employers paid a fix rate of 25% (12% social pension fund, 11% health insurance, 2% wage income tax), today the rate is 30% (15% social pension fund, 13% health insurance, 2% wage income tax)[2].

While there are no direct incentives for employers to hire regular part-time employees, there are several incentives for employees to take up this kind of job. Since 01.01.2001 employees of firms with more than 15 employees have the legal right to reduce their working time as long as no internal reasons regarding this company prevent such a reduction. The joint taxation of married couples create additional incentives for part-time employment for spouses. Furthermore, since 2003 employees with earnings between 400,01 and 800 € per month may pay reduced social security contributions. The amount of social security contributions paid by the employee depends on the gross income and increases from zero contributions at 400 € to full contributions at 800 €. Since contributions will be reduced only upon request by the employee, it is rather unlikely that the subsidy will not be passed to the employee.

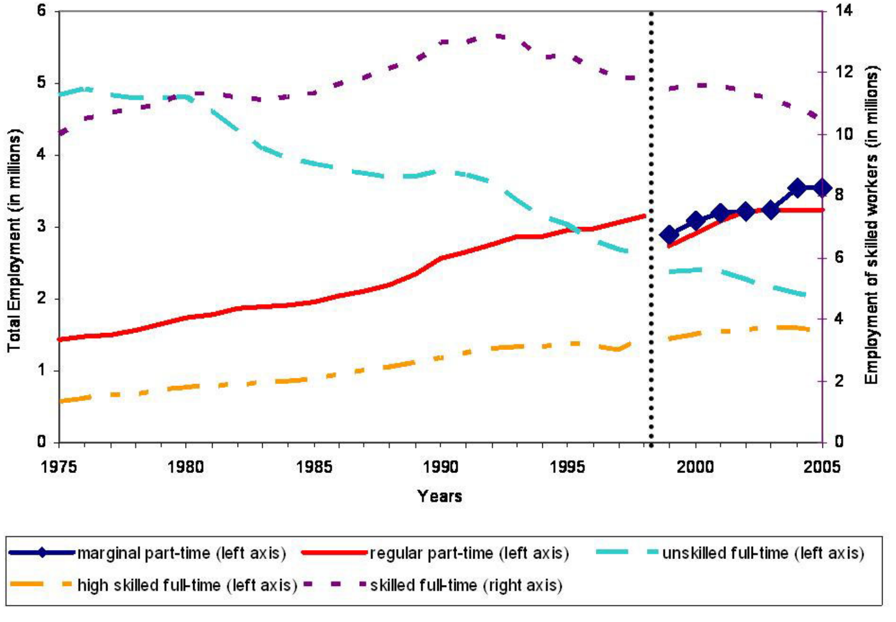
2.2 Employment Trends

In our analysis we distinguish five categories of workers: Marginal part-time employment (M), regular part-time employment (P), unskilled full-time

[2]No health insurance contributions are required for employees with private health insurance

employment (U), skilled full-time employment (S), and high-skilled full-time employment (H). Figure 1 shows the long-term development of these five types of labor between 1975 and 2005 in Western Germany. Only workers subject to social security contributions are recorded over the entire time period. Marginal employment is recorded since 1999. Figures before 1999 are taken from the IAB Employment Subsample, while later figures rely on our estimation sample which is based on the BA-Employment panel.[3]

Figure 1: Development of employment in West Germany



*Our restricted estimation sample
Source: IAB Employment Subsample and BA-Employment Panel, own calculations

In Western Germany high-skilled and part-time labor have steadily increased and unskilled labor decreased over the entire time period. Skilled labor has reached its peak in the beginning of the 1990s and subsequently displayed a decline similar to as unskilled labor. The employment development of East Germany is displayed in table 1. Since reunification, Eastern

[3]Note that our sample is restricted as some industries are entirely excluded from the analysis. (Appendix A)

Table 1: Development of Employment in East Germany

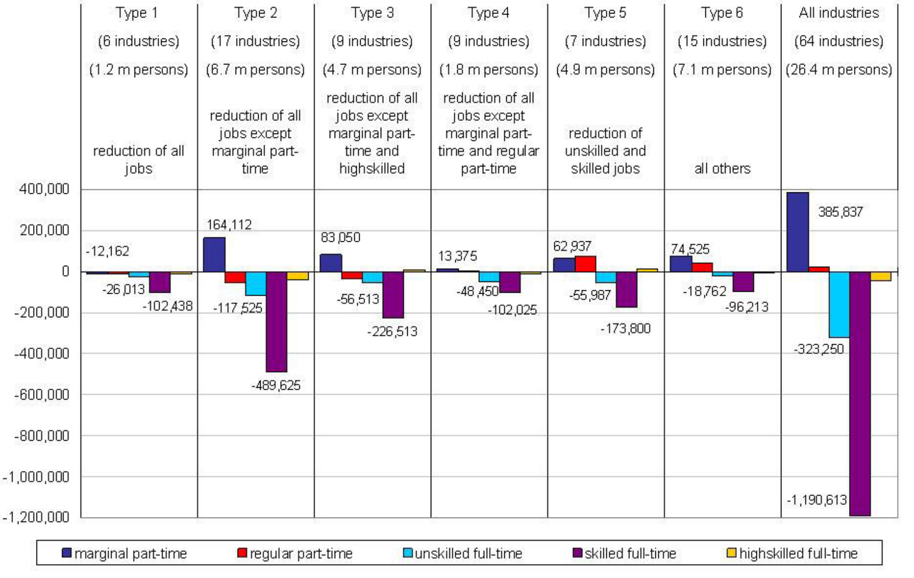
	marginal part-time emp.	regular part-time emp.	unskilled full-time emp.	skilled full-time emp.	high-skilled full-time emp.
1992		0.377	0.298	3.816	0.569
1993		0.429	0.252	3.677	0.561
1994		0.521	0.226	3.548	0.536
1995		0.570	0.217	3.568	0.550
1996		0.554	0.195	3.299	0.500
1997		0.569	0.181	3.121	0.455
1998		0.645	0.169	3.032	0.466
1999	0.387	0.646	0.233	3.248	0.503
2000	0.437	0.686	0.221	3.122	0.498
2001	0.480	0.710	0.213	3.009	0.489
2002	0.500	0.722	0.202	2.896	0.484
2003	0.526	0.716	0.192	2.799	0.467
2004	0.596	0.716	0.189	2.710	0.454
2005	0.552	0.716	0.175	2.583	0.437

Source: BA-Employment Panel, own calculations

Germany has experienced a sharp decline of skilled labor while part-time employment has steadily increased similar to the pattern in Western Germany. The trend for unskilled and high-skilled labor points slightly downward. The decline in skilled labor reflects mostly the substantial decline of the Eastern industry production, but migration to Western Germany has also contributed to this development. A steady rise in marginal part-time employment is apparent since the beginning of its recording in 1999 in both parts of Germany.

To provide an overview on employment trends at the industry level we calculate the net difference of workers for each of the five employment categories for 63 industries between 2002 and 2005, and group industries by employment trend pattern. We identify five main patterns which are displayed in Figure 2, while the sixth group are those industries not suiting in one of the five groups. In group 1 (six industries, 1.2 mill. total employment) employment declined in all labor categories. Here, skilled full-time workers account for two third of the entire reduction. In group 2 (17 industries, 6.7 mill. total employment), which is the biggest group, all types of workers except marginal part-time workers are reduced. In these industries almost 165,000 new marginal part-time jobs were created while the number of skilled full-time workers was reduced by considerably more, namely 490,000. Altogether more than 700,000 regular jobs were lost in this group.

Figure 2: Labor demand patterns: Changes in employment groups between 2002 and 2005 in full-time equivalent workers



Source: BA-Employment Panel, own calculations

The groups (3), (4), and (5) represent industries which experienced an increase in marginal employment and a decline in unskilled and skilled full-time employment, while high-skilled full-time (3), regular part-time (4) or high-skilled full-time and regular part-time (5) employment increased. The illustration shows that more than half of the industries which account for 73% of total employment in our sample have reduced unskilled and skilled full-time employment while increasing more flexible work forms like marginal and regular part-time employment. However, during this period the reduction of regular employment exceeded the increase of marginal employment.

2.3 Previous Literature

Studies on demand for heterogeneous labor in Germany almost exclusively focus on full-time employment. The majority of these studies distinguish between two or three skill categories (Fitzenberger & Franz, 1998, 2001; Fitzenberger, 1999; Falk & Koebel, 1998, 1999, 2001; Ochsen & Welsch, 2005) or between blue and white collar workers (Kugler, Muller, & Sheldon, 1989; FitzRoy & Funke, 1998). FitzRoy and Funke (1995) and Addison, Bellmann, Schank, and Teixeira (2005) combine the distinction between blue and white collar workers with the one by skills and Fitzenberger and Kohn (2006) allow for heterogeneity across cohorts additional to skills. Bauer (1997) distinguishes three skill categories for immigrants and natives respectively.

Most studies have in common that they are based on a long yearly panel for West Germany. Exceptions are Kugler et al. (1989) and FitzRoy and Funke (1998), who use quarterly data. Addison et al. (2005) use employer-employee data of East and West German firms.

Studies based on static models often find positive own-price elasticities for some input factor, which violates the concavity of the cost function and is thus inconsistent with microeconomic theory (e.g. Fitzenberger & Franz, 1998, 2001; Falk & Koebel, 1998, 1999). Fitzenberger and Franz (2001), for example, find positive own-wage elasticities for high-skilled workers. As a solution they specify their model excluding the cost share of high-skilled workers from variable costs and thus treating them as quasi-fixed input. Others, e.g. Falk and Koebel (1999), simply restrict the model such that own-price elasticities are negative although such restrictions are not supported by the data.

The study by Freier and Steiner (2007), which was conducted parallel to our own work, is the only study that considers marginal and regular part-time employment additional to full-time employment, further differentiated by gender. They employ a static labor demand model and, similar to Fitzenberger and Franz (2001), exclude high-skilled full-time employment from variable costs and treat this input as quasi-fixed.

To our knowledge, none of the studies based on a dynamic modeling framework finds positive own-wage elasticities, which indicates to us a clear advantage of such models[4]. Most studies employ partial adjustment models (Kugler et al., 1989; FitzRoy & Funke, 1995, 1998; Fitzenberger, 1999). Falk and Koebel (2001) estimate various types of error correction models additional to partial adjustment and autoregressive error models.

Therefore we believe that dynamic models have to be preferred to static models and apply a dynamic framework in our own estimation strategy.

[4]Kaiser (2000), who finds a positive own-wage elasticity for medium skilled workers is an exception. However, his results are not directly comparable as he employs a trivariate ordered probit model due to data restrictions

3 Methodology

3.1 The model

In our analysis we distinguish five groups of workers as described in the previous section. The empirical model is based on a standard translog cost function defined by Diewert and Wales (1987) which takes the following form:

$$\begin{aligned}
\ln C &= \beta_0 + \sum_{i=1}^{5} \beta_i \ln w_i + \frac{1}{2} \sum_{i=1}^{5} \sum_{j=1}^{5} \beta_{ij} \ln w_i \ln w_j + \delta_y \ln Y \\
&+ \frac{1}{2} \delta_{yy} (\ln Y)^2 + \sum_{i=1}^{5} \beta_{iy} \ln w_i \ln Y + \delta_k \ln K + \frac{1}{2} \delta_{kk} (\ln K)^2 \\
&+ \sum_{i=1}^{5} \beta_{ik} \ln w_i \ln K + \delta_v \ln V + \frac{1}{2} \delta_{vv} (\ln V)^2 + \beta_{iv} \ln w_i \ln V \\
&+ \delta_t Q^t + \sum_{i=1}^{5} \beta_{it} \ln w_i Q^t,
\end{aligned} \tag{1}$$

where w_i indicates the wage of group i ($i = M, P, U, S, H$). Output is represented by Y, K is the capital stock, V intermediate input, and Q^t a time variable (indicator). The translog cost function can be interpreted as a second-order Taylor approximation to a general continuous twice differentiable cost function. We treat capital, output, and intermediate inputs as quasi-fixed inputs and thus use them as control variables in the variable cost model.

The assumption of cost minimizing firms implies linear homogeneity of the cost function in factor prices. Necessary and sufficient conditions for linearly homogeneity in prices are:

$$\sum_{j=1}^{5} \beta_{ij} = \sum_{i=1}^{5} \beta_i = \sum_{i=1}^{5} \beta_{ix} = 0 \qquad \forall x = y, k, v, t. \tag{2}$$

Differentiating the cost function by w_i, taking the symmetry of cross-partial derivates of the cost function into account, which implies that $\beta_{ij} = \beta_{ji}$, and applying Shephard's Lemma leads to the cost share equations:

$$\begin{aligned}
\frac{\partial \ln C}{\partial \ln w_i} &= S_i \\
&= \beta_i + \sum_{j=1}^{5} \beta_{ij} \ln w_j + \beta_{iy} \ln Y + \beta_{ik} \ln K + \beta_{iv} \ln V + \beta_{it} Q^t,
\end{aligned} \tag{3}$$

$$\sum_{j=1}^{5} S_i = 1, \tag{4}$$

where S_i is the sum of wages of workers of group i as a share of the whole wage costs in each industry. The cost function C is concave in prices if $C_{ij} = \frac{\partial \ln C}{\partial \ln p_i \partial \ln p_j}$ is negative semi-definite. Diewert and Wales (1987) show that this condition is fulfilled if $B \equiv [\beta_{ij}]$ is negative semi-definite. Since the shares always sum to unity, each of the share equations can be expressed as a linear combination of the others. Therefore the system of share equations is singular and cannot be estimated without identifying restrictions. For this reason one of the equations is omitted and the summing up conditions (3) are taken into account. We estimate the parameters of the following system of equations:

$$\begin{aligned} S_i &= \beta_i + \sum_{j=1}^{4} \beta_{ij} \ln(\frac{w_j}{w_5}) + \beta_{iy} \ln y + \beta_{ik} \ln K + \beta_{iv} \ln V + \beta_{it} Q^t \qquad (5) \\ \forall i &= 1, 2, 3, 4. \end{aligned}$$

3.2 Dynamic Specification

The static model specified in Equation 5 implies that firms always produce on their long-run optimal level. Costs are minimized with respect to all input factors and adjustment is instantaneous. Because of incomplete information on future prices and output and adjustment costs like hiring, firing, and firm-specific training costs this assumption does not seem very convincing. The delayed adjustment results in autocorrelation of the error terms of the cost function as well as the share equations.

Some studies of the existing literature for Germany apply a dynamic model to take adjustment costs into account. The partial adjustment model is used by Kugler et al. (1989), Kaiser (2000), and Fitzenberger (1999). A more general model is used by Falk and Koebel (2001) and Lindquist (1995) who use data of the Norwegian Aluminium industry. They rely on an error correction model for seemingly unrelated regressions introduced by Anderson and Blundell (1982). One of the advantages of the described dynamic adjustment specification is that it nests well-known models like the partial-adjustment model (Nadiri & Rosen, 1969), the autoregressive error process model and the static model. In both studies the authors use one lag for adjustment and test the nested partial adjustment, autoregressive error and static model. While Lindquist (1995) uses the autoregressive error model (AR1) Falk and Koebel (2001) reject both, the partial adjustment and the AR1 model for their German data for 1976–1995.

We start with the most general dynamic model described by Anderson and Blundell (1982), the General Error Correction Model (GECM), which is specified in the following way[5]:

$$\Delta S_t \quad = \quad B(L)\Delta S_t + \Gamma(L)\Delta X_t - A[S_{t-p} - \Pi(\beta)X_{t-q}] + u_t. \tag{6}$$

$B(L)$ is the lag structure of the dependent variable S_t with lags $1, \ldots p$ while $\Gamma(L)$ is the lag structure of the explanatory variables X_t with lags $1, \ldots, q$. The long-run coefficients are represented by $\Pi(\beta)$.

3.3 Estimation procedure

The time periods before and after the reform on marginal part-time employment in April 2003 (2nd quarter 1999 - 1st quarter 2003 and 2nd quarter 2003 - 4th quarter 2005) will be analyzed separately for East German and West German industries respectively. We distinguish 40 industries in Western and 23 industries in Eastern Germany (for a description of the data see Appendix A).

To obtain the best-fitting dynamic specification of the specified dynamic model we test the number of lags (p, q) to be included. We assume that the lag structure of the dependent and independent variables are the same, that is p = q. Since the analysis is based on quarterly data, we start with four lags and subsequently test if the fit improves as the number of lags is reduced. As can be seen in table 6 in the appendix, both, the Bayesian information criterion and the Akaike information criterion, suggest to use only one lag. For p=q=1, the estimation equation 6 takes the following form:

$$\Delta S_t \quad = \quad A\Delta X_t + C\Delta X_{t-1} + D[S_{t-1} - \Pi(\beta)X_{t-1}] + u_t. \tag{7}$$

Because of the summing-up conditions we leave out the last equation, just as in the static model and split the explanatory variables X in the wages W and the remaining variables $\tilde{X}$:

$$\begin{aligned}
\Delta S_{i,t} &= \sum_{j=1}^{5} a_{ij}\Delta \ln w_{j,t} + \sum_{x} a_{ix}\Delta \ln \tilde{x}_t \qquad (8)\\
&\quad - \sum_{j=1}^{4}(d_{ij}(S_{j,t-1} - \beta_j - \sum_{k=1}^{4}\beta_{jk}\ln\frac{w_{k,t-1}}{w_{5,t-1}} - \sum_{x}\beta_{ix}\ln\ln\tilde{x}_{t-1})) + u_{i,t}\\
i &= 1, \ldots, 4.
\end{aligned}$$

We use a fixed-effects approach to account for heterogeneity on the industry level by netting out industry and, additionally, seasonal effects.

[5]This model is developed in detail in the Appendix C.

Several authors use instruments to adjust for the potential endogenous relationship between wages and labor demand. Fitzenberger (1999), for example, uses industry dummies, time dummies, quasi-fixed inputs, import prices, gross- and net union density and indices for bargained wages. We feel that these instruments are inappropriate in our case, especially for marginal part-time employment. Another possibility is to instrument with lagged variables like Freier and Steiner (2007), FitzRoy and Funke (1995, 1998), and Kugler et al. (1989), who use lagged wages in levels as instruments for first differences of wages. However, our two panels are quite short and we already loose one time period due to the dynamic specification. Instrumenting with lagged variables would reduce our sample even further.

We decide to follow Falk and Koebel (1999, 2001) who refrain from instrumenting wages. We rely on the assumption that labor supply is infinitely elastic, that is, firms take wages as exogenously given in the short and medium run and hire as many workers as their objective goal of profit maximization demands. This scenario does not seem too unrealistic in the German context, where the labor market is imperfectly competitive, characterized by high union power, rigid wages and, at least during our observation period, persistently high unemployment rates, indicating a large excess supply of labor.

The own-price and cross-price elasticities of factor demand can be calculated from the equilibrium part of the model as:

$$\eta_{ij} = \frac{\beta_{ij}}{S_i} + S_j \qquad \forall i \neq j \tag{9}$$

$$\eta_{ii} = \frac{\beta_{ii}}{S_i} + S_i - 1 \qquad \forall i \tag{10}$$

In contrast to the bulk of literature we calculate so called Morishima elasticities of substitution recommended by Blackorby and Russell (1989) instead of the so-called Allen-Uzawa elasticities. The Allen-Uzawa elasticity of substitution (AES) is defined as $A_{ij} = \eta_{ij}/S_j$. It is just dividing the cross-price elasticity by the share of input j. Thus, AES does not provide any new information. Since the share is always positive, the sign of the AES, which is decisive for classification of substitutes and complements, is always the same as the one of the cross-price elasticity. Additionally the AES is symmetrical: $A_{ij} = A_{ji}$. The AES does not give any information on the ease of substitution, just the change of one factor by changing one price.

The Morishima substitution elasticity (MES) is defined in the following way:

$$\sigma_{ij} = \eta_{ji} - \eta_{ii} \qquad \forall i, j \tag{11}$$

The MES is not symmetric and it is a two-factor one-price elasticity. The reaction of two factors by changing one price when holding everything else stable is measured. Frondel and Schmidt (2000) argue that all types of substitution elasticities suffer from the hypothesis that output is constant and only measure net substitution. To take the output effect in a translog approach into account it is necessary to have information on profits which are not available. Therefore we decide estimating MES.

We calculate the substitution elasticities at the weighted mean of the predicted shares using the number of fulltime equivalent workers in each industry as weight. Standard errors of coefficients and elasticities are estimated by a block bootstrap procedure with 500 replications taking the panel structure of our data into account. Thus the resulting standard errors are robust against heteroscedasticity and autocorrelation.

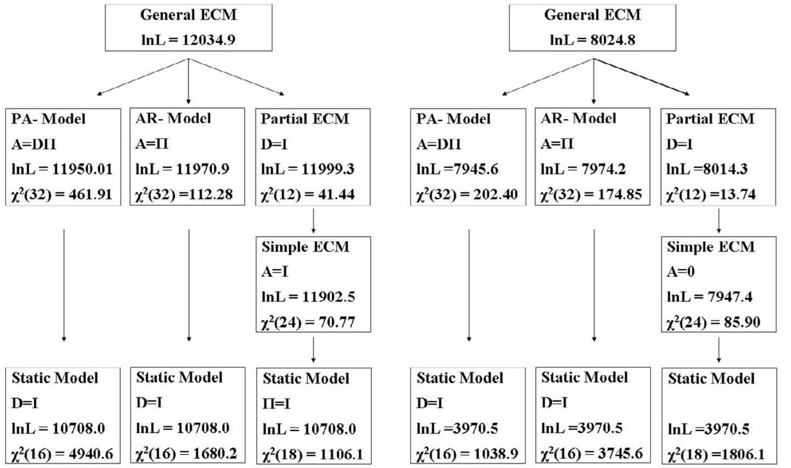
4 Results

4.1 Estimation Results

The autoregressive model, the partial adjustment model, the partial error correction model, the simple error correction model, and the static model are all nested in our general error correction model. Therefore we test the GEC model against these nested models. The results are given in Figures 3 and 4. In both samples (Eastern and Western Germany) and in both time periods all nested models are rejected. Following these tests the GEC model should be our preferred model.

However, we do not regard the estimated elasticities reported in Tables 2 and 3 completely convincing. Although the elasticities have the expected signs and thus satisfy the concavity condition of the cost function, their quantitative magnitudes are in part contrary to economic intuition. In the first observation period, (2nd quarter 1999 – 1st quarter 2003), own wage elasticities for unskilled full-time workers (η_{UU}) are positive and insignificant, while those for skilled full-time workers (η_{SS}) are negative and significant in both parts of the country. In East Germany, the own wage elasticity of part-time workers (η_{PP}) is insignificant as well as the one of high-skilled workers (η_{HH}). Disconcertingly, we find an absolute value of the own wage elasticity of marginal part-time (η_{MM}) greater than one. In the second time period (2nd quarter 2003 - 4th quarter 2005), all own wage elasticities are significantly negative but still the own wage elasticity of high-skilled full-time employment (η_{HH}) is even higher than of the other full-time groups. In Western Germany in the 2nd time period we find a more plausible pattern of own wage elasticities, but here again the own wage elasticity of high-skilled workers (η_{HH}) is insignificant.

Figure 3: Testing GECM against nested models, West Germany



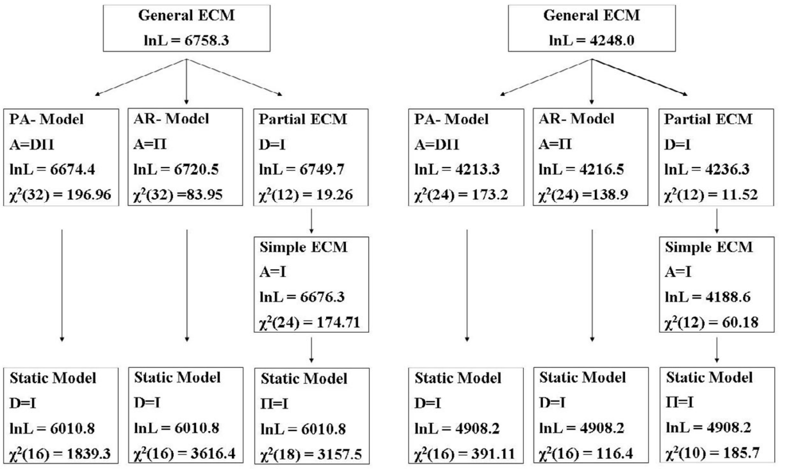
(a) 2nd quarter 1999 - 1st quarter 2003 (b) 2nd quarter 2003 - 4th quarter 2005

The pattern is similar for the PEC and SEC model, which are only modest simplifications of the GEC model[6]. We find it difficult to explain these results and suspect that they result from confronting the complex GEC model combined with a relative small data base. In contrast, the results of the AR1 model seem far more plausible, although here is also one case (Eastern Germany, first observation period) where the own-wage elasticity of high-skilled full-time employment is higher than in the two other full-time employment categories. However, all things considered, we feel more confident of the AR1 model and thus will base the following discussion on the AR1 model.

With the exception just mentioned, own-wage elasticities of full-time employment categories are similar to the u-shaped pattern found by Fitzenberger (1999) and Falk and Koebel (2001), where own-wage elasticities are highest in absolute value for the unskilled and lowest for the skilled, while the elasticities of high-skilled are ranging somewhere in between. Own-wage elasticities of the two part-time employment categories generally exceed the one of full-time employment. The own-wage elasticity of marginal part-time

[6]Results are available on request.

Figure 4: Testing GECM against nested models, East Germany



(a) 2nd quarter 1999 - 1st quarter 2003 (b) 2nd quarter 2003 - 4th quarter 2005

employment (η_{MM}) is the highest in absolute value, while the own-wage elasticity of regular part-time employment (η_{PP}) is comparable to the one of the unskilled. In general, we find that own-wage elasticities in Eastern and Western Germany are rather similar. Only for marginal part-time employment in the first observation period is the own-wage elasticity significantly higher in Western Germany compared to Eastern Germany. None of the changes over the two observation periods are significant, apart from the unskilled (η_{UU}) in Western Germany where we find a significant increase in the absolute value of the own-wage elasticity (from -0.65 to -0.84).

Inspecting the cross-price elasticities, we are mainly interested in whether employment of marginal part-time workers is affected by changes in the wage of other employment categories (η_{MX})and whether changes in the wage of marginal part-time workers affect employment in other categories (η_{XM}). Regarding the latter question we find only modest effects on employment of other categories. Many coefficients are not significantly different from zero. Significant values range between 0.02 and 0.05. Regarding the former question, we find that marginal part-time employment reacts comparably stronger to changes in wages of other categories, especially to the one of skilled full-time workers (near 0.55) and interestingly in the first time period also to the one of high-skilled full-time workers (0.26 in Western Germany and 0.61 in Eastern Germany).

Since cross-wage elasticities are determined by the size of the respective cost shares and the estimated coefficient β_{xy} and since skilled full-time employment accounts for the biggest cost share, it is not surprising that cross-wage elasticities with respect to wages of skilled full-time workers (η_{XS})are generally among the highest (except η_{MS} in Eastern Germany in the first observation period). They are near 0.55 for most employment categories and somewhat lower for high-skilled full-time employment (between 0.30 and 0.45). Since the cost shares of skilled full-time employment are decreasing substantially over the two observation periods, we expect cross-wage elasticities with respect to wages of skilled full-time workers to decline. However, this is not the case. For part-time employment in Eastern Germany we even find that the elasticity increases significantly.

Cross-wage elasticities of skilled full-time employment with respect to wages of other categories (η_{SX}) are well determined for both regions and both time periods. In both parts of the country skilled full-time employment reacts least to changes in wages of marginal part-time workers (η_{SM} near 0.02), although it increases significantly in Eastern Germany over the two time periods. Employment in skilled full-time employment reacts rather strongly to changes in wages of regular part-time workers (η_{SP} near 0.07 except Eastern Germany, second time period: 0.12). In Western Germany the elasticity with respect to wages of unskilled full-time employment (η_{SU}) is high, too (0.10) but significantly lower in Eastern Germany (0.02, 0.04).

Cross-wage elasticities of unskilled full-time employment with respect to wages of other employment categories (η_{UX}) are less well determined. Elasticities with respect to wages of marginal part-time workers are not significantly different from zero except for the second time period in Western Germany (0.05). In contrast we find significant elasticities with respect to regular part-time employment (η_{UP} near 0.08) in both regions in the first time period. Interestingly, unskilled full-time employment also reacts rather strongly to wages of high-skilled full-time workers (η_{UH}) in the second time period in Western Germany (0.13).

Regarding Morishima substitution elasticities, we are interested to know which employment types can be substituted by marginal part-time employment (σ_{XM}) and to what extent. Furthermore it is interesting to see whether substitution elasticities increased over the two time periods. The interpretation is difficult as all estimated elasticities are rather close, the majority ranging between 0.5 and 1.0. Confirming our intuition, it is much easier to substitute marginal part-time employment by other employment categories than vice versa. The estimation results suggest that all other employment categories are almost perfect substitutes for marginal part-time employment as estimated elasticities (σ_{MX}) range between 0.9 and 1.0 in Western Germany and 0.7 and 0.9 in Eastern Germany. In Western Germany in the first time period they do not differ significantly from one.

The extent to which marginal part-time employment can substitute other employment categories is more or less comparable to substitution elasticities between other employment categories. Compared to unskilled and skilled full-time labor marginal part-time is an equal or even better substitute for other employment categories. Surprisingly we find comparatively high substitution elasticities of marginal part-time employment with respect to high-skilled full-time employment (σ_{HM}). For instance, in Western Germany in the first time period the elasticity with respect to high-skilled full-time employment is 0.61 while the one of the other employment categories with respect to high-skilled full-time employment are below 0.41. And in Eastern Germany in the first time period the elasticity even exceeds one (1.23). This suggests that marginal part-time employment is used for a wide range of activities, including high-skilled tasks. The substitutability of marginal part-time employment for unskilled full-time employment increased over the two time periods significantly in Western Germany, such that it equals one in the second period.

4.2 Simulation Results

To illustrate our results we simulate the effects of a one percent increase in the wage of unskilled and skilled workers on the number of employees in each employment category. We simply apply the estimated elasticities to our sample and use population weights. The results are shown in table 4. An increase of 1% in the wages of unskilled workers results in a decrease of almost 16,000 workers of this group in the first period and 17,800 in the second period. Other employment groups are also affected. The biggest shift takes place between unskilled and skilled labor. However, the numbers of all workers except the unskilled increases such that overall employment is higher after the rise in pay than before. All elasticities are estimated with constant output. We would expect that there is a negative impact of a wage increase on the output. This decrease of the output again has a negative effect on all input factors (employment categories). Thus, the negative effect on employment of unskilled workers is bigger than the net effect and the positive effect on employment of the other groups is smaller than taking output as constant. Altogether, the change of the whole employment could be negative.

In the second scenario the wage of skilled workers is raised by 1%. Since the group of skilled workers is by far the biggest one, the changes in employ-

Table 2: Price- and Substitution-Elasticities in West–Germany

	q2 1999 - q1 2003			q2 2003 - q4 2005		
	GECM	AR1	stat	GECM	AR1	static
Own-Wage-Elasticities						
η_{MM}	$-0.9344***$	$-0.9606***$	$-0.9812***$	-0.8328	$-0.8837***$	$-1.0623***$
	(0.0367)	(0.0181)	(0.0307)	(0.0705)	(0.0407)	(0.2787)
η_{PP}	-0.5148	$-0.6988***$	$-0.4552**$	$-0.6382***$	$-0.6248***$	2.6942
	(0.4849)	(0.0526)	(0.2213)	(0.2433)	(0.0674)	(3.0418)
η_{UU}	0.0711	$-0.6459***$	-0.2556	$-0.8872***$	$-0.8401***$	$-1.2671*$
	(0.3412)	(0.0885)	(0.1618)	(0.2972)	(0.0749)	(0.6767)
η_{SS}	$-0.2151**$	$-0.2490***$	$-0.2212***$	$-0.2131*$	$-0.2590***$	-0.4529
	(0.0843)	(0.0413)	(0.0637)	(0.1157)	(0.0414)	(0.3319)
η_{HH}	0.1413	$-0.3522**$	-0.2194	-0.2365	$-0.5269***$	$-4.7868***$
	(0.3095)	(0.1592)	(0.1640)	(0.2285)	(0.0779)	(1.5634)
Cross-Wage-Elasticities						
η_{MP}	0.1060	$0.0913*$	0.0630	0.1633	0.0773	0.0473
	(0.1367)	(0.0516)	(0.0792)	(0.2024)	(0.0628)	(0.8118)
η_{MU}	0.0202	0.0781	-0.1506	0.3640	$0.1662**$	-0.3175
	(0.2186)	(0.0806)	(0.1371)	(0.2665)	(0.0692)	(1.0648)
η_{MS}	0.3481	$0.5330***$	$0.4898**$	0.0601	$0.5845***$	-2.3545
	(0.3304)	(0.1176)	(0.2234)	(0.3677)	(0.1077)	(1.6220)
η_{MH}	$0.4600*$	$0.2581***$	$0.5791**$	0.2455	0.0557	$3.6869**$
	(0.2521)	(0.0548)	(0.2602)	(0.2841)	(0.0823)	(1.4422)
η_{PM}	0.0269	$0.0232*$	0.0160	0.0429	0.0203	0.0236
	(0.0350)	(0.0127)	(0.0221)	(0.0504)	(0.0165)	(0.5929)
η_{PU}	-0.2976	$0.1022*$	-0.1101	-0.1534	0.0531	-0.2352
	(0.3678)	(0.0526)	(0.1578)	(0.2475)	(0.0594)	(2.7273)
η_{PS}	$0.6630*$	$0.5650***$	$0.5818***$	0.1881	$0.3974***$	-1.1776
	(0.3738)	(0.0714)	(0.2043)	(0.3430)	(0.1153)	(3.0115)
η_{PH}	0.1225	0.0084	-0.0325	$0.5606**$	$0.1540***$	-1.3051
	(0.2967)	(0.0572)	(0.1772)	(0.2499)	(0.0556)	(2.4373)
η_{UM}	0.0041	0.0160	-0.0307	0.0981	$0.0448**$	-0.0935
	(0.0416)	(0.0154)	(0.0233)	(0.0634)	(0.0208)	(0.2322)
η_{UP}	-0.2403	$0.0825**$	-0.0881	-0.1573	0.0544	-0.1385
	(0.2696)	(0.0380)	(0.1090)	(0.2484)	(0.0552)	(0.5548)
η_{US}	$0.5980*$	$0.5467***$	$0.4735***$	$1.1921***$	$0.6078***$	-0.0959
	(0.3566)	(0.1078)	(0.1567)	(0.3351)	(0.0994)	(1.0247)
η_{UH}	$-0.4329*$	0.0007	-0.0991	-0.2456	$0.1331***$	$1.5950**$
	(0.2612)	(0.0438)	(0.0920)	(0.2788)	(0.0508)	(0.6245)
η_{SM}	0.0120	$0.0184***$	$0.0169*$	0.0025	$0.0247***$	$-0.1521*$
	(0.0115)	(0.0061)	(0.0091)	(0.0149)	(0.0054)	(0.0808)
η_{SP}	$0.0904*$	$0.0770***$	$0.0787**$	0.0303	$0.0640**$	-0.1521
	(0.0495)	(0.0194)	(0.0332)	(0.0535)	(0.0252)	(0.1806)
η_{SU}	$0.1009*$	$0.0923***$	$0.0801***$	$0.1872***$	$0.0955***$	-0.0210
	(0.0598)	(0.0200)	(0.0264)	(0.0555)	(0.0182)	(0.2175)
η_{SH}	0.0118	$0.0613**$	0.0456	-0.0069	$0.0748***$	$0.7780***$
	(0.0474)	(0.0290)	(0.0384)	(0.0714)	(0.0226)	(0.2927)
η_{HM}	$0.0783*$	$0.0439***$	$0.0986**$	0.0446	0.0101	$0.9519***$
	(0.0426)	(0.0125)	(0.0413)	(0.0446)	(0.0150)	(0.2757)
η_{HP}	0.0823	0.0056	-0.0218	$0.3870**$	$0.1063***$	-0.6738
	(0.1844)	(0.0350)	(0.1039)	(0.1697)	(0.0406)	(0.5549)
η_{HU}	-0.3600	0.0006	-0.0830	-0.1654	$0.0896***$	$1.3983**$
	(0.2264)	(0.0357)	(0.0785)	(0.1985)	(0.0343)	(0.6041)
η_{HS}	0.0581	$0.3021**$	0.2255	-0.0297	$0.3208***$	$3.1104**$
	(0.2408)	(0.1415)	(0.1833)	(0.3164)	(0.0876)	(1.2495)

to be continued at the next page . . .

continuation of table 2 . . .

	q2 1999 - q1 2003			q2 2003 - q4 2005		
	GECM	AR1	stat	GECM	AR1	static
Morishima Substitution-Elasticities						
σ_{PM}	0.6208	0.7901***	0.5183**	0.8015***	0.7021***	−2.6469
	(0.5196)	(0.0869)	(0.2154)	(0.2859)	(0.0929)	(3.0664)
σ_{UM}	−0.0510	0.7240***	0.1050	1.2512***	1.0063***	0.9496
	(0.3242)	(0.1125)	(0.1980)	(0.4286)	(0.1072)	(1.1734)
σ_{SM}	0.5633	0.7820***	0.7110***	0.2732	0.8436***	−1.9016
	(0.3707)	(0.1159)	(0.2678)	(0.3970)	(0.1012)	(1.5463)
σ_{HM}	0.3187	0.6103***	0.7985***	0.4820	0.5826***	8.4737***
	(0.3665)	(0.1849)	(0.2937)	(0.4084)	(0.1405)	(2.5933)
σ_{MP}	0.9613***	0.9837***	0.9973***	0.8757***	0.9040***	1.0859
	(0.0543)	(0.0238)	(0.0388)	(0.0818)	(0.0443)	(0.6627)
σ_{UP}	−0.3687	0.7481***	0.1455	0.7337	0.8932***	1.0319
	(0.5989)	(0.0936)	(0.2761)	(0.4662)	(0.1034)	(2.9483)
σ_{SP}	0.8781**	0.8141***	0.8030***	0.4012	0.6564***	−0.7247
	(0.4139)	(0.0899)	(0.2511)	(0.4049)	(0.1460)	(3.1918)
σ_{HP}	−0.0188	0.3606*	0.1869	0.7971**	0.6809***	3.4818
	(0.4275)	(0.1861)	(0.2233)	(0.3646)	(0.0744)	(2.9513)
σ_{MU}	0.9385***	0.9766***	0.9506***	0.9309***	0.9285***	0.9688***
	(0.0386)	(0.0251)	(0.0308)	(0.1069)	(0.0429)	(0.3461)
σ_{PU}	0.2745	0.7813***	0.3672	0.4809	0.6793***	−2.8327
	(0.7078)	(0.0693)	(0.2702)	(0.4443)	(0.0761)	(3.1518)
σ_{SU}	0.8131**	0.7957***	0.6947***	1.4052***	0.8668***	0.3570
	(0.3985)	(0.1273)	(0.1717)	(0.4105)	(0.1242)	(1.1223)
σ_{HU}	−0.5742	0.3529**	0.1203	−0.0091	0.6600***	6.3818***
	(0.5278)	(0.1730)	(0.2324)	(0.3039)	(0.1014)	(1.9909)
σ_{MS}	0.9464***	0.9790***	0.9981***	0.8353***	0.9085***	0.9102***
	(0.0435)	(0.0194)	(0.0301)	(0.0722)	(0.0412)	(0.2855)
σ_{PS}	0.6052	0.7758***	0.5340**	0.6685**	0.6888***	−2.8463
	(0.5209)	(0.0621)	(0.2487)	(0.2654)	(0.0889)	(3.1070)
σ_{US}	0.0298	0.7382***	0.3357*	1.0744***	0.9356***	1.2461
	(0.3665)	(0.1046)	(0.1777)	(0.3344)	(0.0847)	(0.8045)
σ_{HS}	−0.1295	0.4136**	0.2650	0.2296	0.6017***	5.5648***
	(0.3389)	(0.1861)	(0.1934)	(0.2864)	(0.0959)	(1.7819)
σ_{MH}	1.0127***	1.0045***	1.0799***	0.8773***	0.8938***	2.0142***
	(0.0567)	(0.0208)	(0.0634)	(0.0889)	(0.0422)	(0.4424)
σ_{PH}	0.5971	0.7044***	0.4335*	1.0252***	0.7312***	−3.3680
	(0.4836)	(0.0682)	(0.2461)	(0.3088)	(0.0871)	(3.1246)
σ_{UH}	−0.4311	0.6464***	0.1726	0.7218**	0.9298***	2.6654***
	(0.4784)	(0.1049)	(0.1984)	(0.3315)	(0.0753)	(0.9698)
σ_{SH}	0.2732	0.5511***	0.4467*	0.1835	0.5798***	3.5633**
	(0.3037)	(0.1736)	(0.2390)	(0.4170)	(0.1183)	(1.4826)
standard errors in parentheses						

Table 3: Price- and Substitution-Elasticities in East–Germany

	q2 1999 - q1 2003			q2 2003 - q4 2005		
	GECM	AR1	stat	GECM	AR1	static
Own-Wage-Elasticities						
η_{MM}	−1.1304***	−0.7990***	−1.0962***	−0.6434***	−0.7302***	−0.6474***
	(0.2603)	(0.0597)	(0.0483)	(0.1171)	(0.0879)	(0.1009)
η_{PP}	−0.5633***	−0.7343***	−0.7059***	−0.6766***	−0.7028***	−0.6779***
	(0.1584)	(0.0632)	(0.0312)	(0.0511)	(0.0440)	(0.0547)
η_{UU}	0.2566	−0.4121***	0.0822	−0.5482***	−0.6302***	−0.5995***
	(0.4758)	(0.1332)	(0.1318)	(0.1406)	(0.1351)	(0.1164)
η_{SS}	−0.3009*	−0.2138***	−0.1941***	−0.3206***	−0.2891***	−0.2964***
	(0.1628)	(0.0449)	(0.0345)	(0.0421)	(0.0371)	(0.0343)
η_{HH}	−0.6876**	−0.6223***	−0.5604***	−0.6089***	−0.5517***	−0.5406***
	(0.3197)	(0.1721)	(0.0552)	(0.1302)	(0.0938)	(0.1034)
Cross-Wage-Elasticities						
η_{MP}	0.1150	0.0381	−0.2225***	0.0760	0.1158*	0.1170
	(0.3671)	(0.0530)	(0.0721)	(0.0891)	(0.0633)	(0.1012)
η_{MU}	0.1132	0.1008	−0.0394	0.1528	0.1280	0.1841
	(0.4678)	(0.1258)	(0.1015)	(0.1864)	(0.1147)	(0.1543)
η_{MS}	0.9050	0.0498	0.9309***	0.5520*	0.4173*	0.2939
	(1.0587)	(0.2773)	(0.2730)	(0.3286)	(0.2282)	(0.3123)
η_{MH}	−0.0028	0.6103**	0.4272*	−0.1374	0.0691	0.0524
	(0.8919)	(0.2830)	(0.2522)	(0.2877)	(0.2352)	(0.2981)
η_{PM}	0.0116	0.0039	−0.0228***	0.0089	0.0136	0.0134
	(0.0430)	(0.0057)	(0.0072)	(0.0116)	(0.0086)	(0.0120)
η_{PU}	0.0388	0.0328**	0.0273	−0.0278	−0.0152	−0.0193
	(0.0978)	(0.0165)	(0.0191)	(0.0228)	(0.0182)	(0.0179)
η_{PS}	0.6715**	0.4930***	0.4869***	0.5589***	0.5513***	0.5367***
	(0.3263)	(0.0633)	(0.0442)	(0.0771)	(0.0629)	(0.0726)
η_{PH}	−0.1585	0.2047***	0.2145***	0.1366**	0.1532***	0.1470***
	(0.3044)	(0.0347)	(0.0363)	(0.0532)	(0.0385)	(0.0404)
η_{UM}	0.0291	0.0259	−0.0101	0.0578	0.0484	0.0675
	(0.1081)	(0.0252)	(0.0263)	(0.0629)	(0.0423)	(0.0525)
η_{UP}	0.0987	0.0834*	0.0685	−0.0895	−0.0491	−0.0615
	(0.2155)	(0.0453)	(0.0487)	(0.0585)	(0.0481)	(0.0499)
η_{US}	−0.3963	0.2678	−0.0884	0.7432**	0.7416***	0.8542***
	(0.6278)	(0.1661)	(0.1658)	(0.3002)	(0.1860)	(0.1868)
η_{UH}	0.0120	0.0349	−0.0522	−0.1633	−0.1107	−0.2608
	(0.5976)	(0.0752)	(0.1130)	(0.2971)	(0.1515)	(0.1887)
η_{SM}	0.0146	0.0008	0.0150***	0.0125	0.0095*	0.0065
	(0.0198)	(0.0041)	(0.0046)	(0.0080)	(0.0053)	(0.0068)
η_{SP}	0.1074**	0.0787***	0.0768***	0.1081***	0.1066***	0.1026***
	(0.0453)	(0.0222)	(0.0090)	(0.0220)	(0.0229)	(0.0276)
η_{SU}	−0.0249	0.0168*	−0.0056	0.0446**	0.0445***	0.0512***
	(0.0396)	(0.0099)	(0.0105)	(0.0185)	(0.0118)	(0.0108)
η_{SH}	0.2037*	0.1175***	0.1078***	0.1555***	0.1286***	0.1361***
	(0.1171)	(0.0377)	(0.0227)	(0.0387)	(0.0311)	(0.0290)
η_{HM}	−0.0002	0.0378**	0.0266*	−0.0112	0.0056	0.0042
	(0.0563)	(0.0185)	(0.0151)	(0.0230)	(0.0181)	(0.0236)
η_{HP}	−0.0973	0.1254***	0.1306***	0.0951**	0.1067***	0.1015***
	(0.1727)	(0.0315)	(0.0235)	(0.0385)	(0.0359)	(0.0364)
η_{HU}	0.0029	0.0084	−0.0127	−0.0353	−0.0239	−0.0564
	(0.1390)	(0.0173)	(0.0272)	(0.0737)	(0.0349)	(0.0455)
η_{HS}	0.7822*	0.4507***	0.4158***	0.5603***	0.4633***	0.4914***
	(0.4134)	(0.1365)	(0.0831)	(0.1199)	(0.0853)	(0.0956)

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continuation of table 2 . . .

	q2 1999 - q1 2003			q2 2003 - q4 2005		
	GECM	AR1	stat	GECM	AR1	static
Morishima Substitution-Elasticities						
σ_{PM}	0.6784*	0.7724***	0.4834***	0.7526***	0.8186***	0.7948***
	(0.3646)	(0.0835)	(0.0758)	(0.0861)	(0.0617)	(0.0853)
σ_{UM}	−0.1433	0.5129***	−0.1216	0.7010***	0.7582***	0.7836***
	(0.7708)	(0.1985)	(0.1852)	(0.2283)	(0.1562)	(0.1899)
σ_{SM}	1.2058	0.2635	1.1250***	0.8726**	0.7064***	0.5903*
	(1.1799)	(0.2653)	(0.2905)	(0.3453)	(0.2338)	(0.3210)
σ_{HM}	0.6848	1.2327***	0.9876***	0.4715	0.6208**	0.5930*
	(0.8059)	(0.4358)	(0.2456)	(0.3317)	(0.2493)	(0.3252)
σ_{MP}	1.1420***	0.8029***	1.0734***	0.6523***	0.7437***	0.6608***
	(0.2440)	(0.0616)	(0.0478)	(0.1173)	(0.0882)	(0.1007)
σ_{UP}	−0.2178	0.4449***	−0.0549	0.5204***	0.6150***	0.5802***
	(0.4899)	(0.1333)	(0.1309)	(0.1408)	(0.1410)	(0.1214)
σ_{SP}	0.9724**	0.7067***	0.6810***	0.8795***	0.8403***	0.8331***
	(0.4226)	(0.0829)	(0.0669)	(0.0826)	(0.0680)	(0.0869)
σ_{HP}	0.5291	0.8271***	0.7749***	0.7455***	0.7049***	0.6876***
	(0.4601)	(0.1959)	(0.0609)	(0.1484)	(0.1056)	(0.1144)
σ_{MU}	1.1595***	0.8250***	1.0861***	0.7012***	0.7786***	0.7149***
	(0.3130)	(0.0560)	(0.0518)	(0.1373)	(0.0972)	(0.1176)
σ_{PU}	0.6621**	0.8177***	0.7744***	0.5871***	0.6537***	0.6163***
	(0.2725)	(0.0899)	(0.0634)	(0.0777)	(0.0729)	(0.0862)
σ_{SU}	−0.0955	0.4816***	0.1057	1.0638***	1.0306***	1.1506***
	(0.7084)	(0.1806)	(0.1905)	(0.3173)	(0.1898)	(0.1856)
σ_{HU}	0.6996	0.6572***	0.5083***	0.4457	0.4410**	0.2798
	(0.6875)	(0.1845)	(0.1064)	(0.3825)	(0.2222)	(0.2616)
σ_{MS}	1.1450***	0.7998***	1.1113***	0.6559***	0.7396***	0.6539***
	(0.2720)	(0.0614)	(0.0496)	(0.1184)	(0.0884)	(0.1007)
σ_{PS}	0.6707***	0.8130***	0.7827***	0.7847***	0.8094***	0.7805***
	(0.1812)	(0.0773)	(0.0364)	(0.0612)	(0.0549)	(0.0746)
$\sigma_{U.S.}$	−0.2814	0.4289***	−0.0877	0.5927***	0.6746***	0.6507***
	(0.4942)	(0.1418)	(0.1393)	(0.1474)	(0.1417)	(0.1190)
σ_{HS}	0.8914**	0.7398***	0.6682***	0.7644***	0.6803***	0.6767***
	(0.4167)	(0.2064)	(0.0752)	(0.1592)	(0.1197)	(0.1275)
σ_{MH}	1.1302***	0.8369***	1.1229***	0.6321***	0.7358***	0.6516***
	(0.2438)	(0.0642)	(0.0508)	(0.1265)	(0.0967)	(0.1119)
σ_{PH}	0.4660*	0.8597***	0.8365***	0.7717***	0.8096***	0.7793***
	(0.2497)	(0.0833)	(0.0465)	(0.0639)	(0.0537)	(0.0670)
σ_{UH}	−0.2537	0.4205***	−0.0948	0.5129***	0.6063***	0.5431***
	(0.5305)	(0.1299)	(0.1381)	(0.1725)	(0.1455)	(0.1435)
σ_{SH}	1.0831*	0.6645***	0.6099***	0.8809***	0.7523***	0.7878***
	(0.5666)	(0.1741)	(0.1154)	(0.1468)	(0.1115)	(0.1103)
*s*tandard errors in parentheses						

ment are more substantial than those induced by a change in the wage of the unskilled. It is worth noting here that the highest changes take place in marginal employment. In both settings more labor is shifted to marginal employment after the reform than before. These findings indicate that marginal employment substitutes regular employment better after the reform than before. To interpret the numbers it must be taken into account that no output effects are measured.

Table 4: Simulation: Change in Full-time Employment

Szenario1: unskilled wage + 1%					
marginal part-time	**regular part-time**	**unskilled fulltime**	**skilled fulltime**	**high-skilled fulltime**	**total**
West Germany 1999q2 - 2003q1					
(2,427)	3,084	-15,110	10,615	(1)	1,016
West Germany 2003q2 - 2005q4					
5,931	(1,784)	-17,221	10,314	1,334	2,142
East Germany 1999q2 - 2003q1					
(462)	228	-883	510	(41)	359
East Germany 2003q2 - 2005q4					
(639)	-318	(-591)	931	(-151)	511

Szenario2: skilled wage + 1%					
marginal part-time	**regular part-time**	**unskilled fulltime**	**skilled fulltime**	**high-skilled fulltime**	**total**
West Germany 1999q2 - 2003q1					
16,563	17,048	12,790	-28,635	4,596	22,362
West Germany 2003q2 - 2005q4					
20,498	12,858	12,529	-27,940	5,045	22,990
East Germany 1999q2 - 2003q1					
(228)	3,426	(574)	-6,496	2,214	-53
East Germany 2003q2 - 2005q4					
5,170	3,166	1,069	-6,294	1,490	4,601

Numbers based on insignificant elasticities are reported in parentheses.

5 Conclusion

In this paper we study labor demand for heterogeneous workers in Eastern and Western Germany taking regular and marginal part-time employment into account. We account for adjustment costs by using a dynamic estimation approach. Our results based on the autoregressive error model indicate that own wage elasticities of marginal part-time employment are higher than in any other employment category. This might indicate that marginal part-time employment can easily be substituted by other types of employment as soon as its cost advantage diminishes. However, it might also be due to the higher general turn over in this labor market segment, which allows employers to adjust the employment level faster to wage changes than in other segments. At the same time we find a very high sensitivity of marginal part-time employment regarding changes in wages of skilled workers. Effects of changes in the wage of marginal part-time workers on employment of other categories are rather modest in contrast.

The main interest of our study is the question whether marginal part time employment substitutes regular employment and to what extent. As expected, it is much easier to substitute marginal part-time employment by other employment categories than vice versa. However, surprisingly we find comparatively high substitution elasticities of marginal part-time employment with respect to high-skilled full-time employment. The elasticities even increased significantly over the two time periods. This suggest that marginal part-time employment is increasingly used for a wide range of activities, including high-skilled tasks.

We find high substitution elasticities of unskilled and skilled employment on the one hand and marginal part-time employment on the other hand. The substitutability of unskilled workers by marginal part-time workers increased significantly over the two observation periods, before and after the reform on marginal employment.

Our simulation results show that marginal part-time employment is the category that will react most to wage increases of skilled labor and suggest that marginal employment substitutes regular employment better after the reform than before.

Our findings suggest that the cost advantage of marginal employment plays a crucial role for its attractiveness. Any changes in wage policies regarding marginal labor will have substantial effects on its employment. If policy makers reduced the exemption from social security contributions we would expect a sharp decline in this type of employment and increasing wages of regular employment will most probably further increase marginal part-time employment.

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A Data

The data are drawn from different data sources. Information on employment and wages on the industry level is taken from the Employment Panel, a quarterly data set of the Federal Employment Agency (BA). We use data from the 2nd quarter of 1999, the first wave with information on marginal part-time workers, until the fourth quarter of 2005. The BA-Employment Panel is based on a 2% sample drawn from quarterly employment statistics of the Federal Employment Agency, which registers all individuals subject to social security contribution at a given date (employees, recipients of unemployment benefits, some self-employed, see Koch & Meineken, 2004). Civil servants and most self-employed individuals are not included.

The data set contains roughly 226,000 individuals and provides information on basic individual characteristics, occupational characteristics and some characteristics on the employing establishment. Wages are censored above the assessment threshold for social security contributions("Bemessungsgrenze") but median wages are not affected by censoring. In cases where information on the level of education is missing, we impute the missing information using information of previous or subsequent waves (for non-students only). We aggregate the individual data on the 2-digit industry level. Some industries (agriculture, fishery, forestry, mining, private households) are excluded while some industries are grouped together to guarantee reliable figures for each cell. Due to the smaller sample size, more industries have to be grouped in Eastern Germany. We end up with a panel of 27 waves and 40 industries for Western Germany and 23 industries for Eastern Germany.

Finally, merging data on working hours from the full sample of the Microcensus to our data set, we are able to generate the total number of full-time equivalent employees and the medium gross wage per hour by employment category for each wave and industry. Unfortunately, since the Microcensus provides data only on a yearly base, usually referring to the last week of April, we have to use the same information on working hours for each wave within a given year. Only from 2005 onwards, data will be collected on a quarterly base. However, inspecting the 2005 data for variation in medium working hours across quarters we are unable to find significant variation and therefore feel safe to use the yearly information.

Data on the output (gross value added), the net capital stock, intermediate inputs, and deflators on the 2-digit industry level are taken from national accounts (Fachserie 18, Reihe 1.4). Unfortunately, information is not available on the regional level, thus we use the same national data for Eastern and Western Germany. Since for the net capital stock quarterly data is not available, we derive it by using quarterly data of investment and keeping the depreciation constant within each year. All measures are in constant prices of the year 2000.

Table 5: List of Industries

15	Manufacture of food products, beverages and tobacco products (15 & 16)
17	Manufacture of textiles
18	Manufacture of wearing apparel and leather products (18 & 19)
20	Manufacture of wood and wood products (except furniture)
21	Manufacture of paper and paper products
22	Publishing, printing and reproduction of recorded media
24	Manufacture of chemicals and chemical products
25	Manufacture of rubber and plastic products
26	Manufacture of glass, ceramic and other non-metallic mineral construction prod.
27	Manufacture of basic metals
28	Manufacture of fabricated metal products, except machinery and equipment
29	Manufacture of machinery and equipment not elsewhere classified (n.e.c.)
30	Manufacture of office machinery, computers, radio, television and communication equipment and apparatus (30 & 32)
31	Manufacture of electrical machinery and apparatus n.e.c.
33	Manufacture of medical, precision and optical instruments, watches and clocks
34	Manufacture of motor vehicles, (semi-)trailers and other transport equipment (34 & 35)
36	Manufacturing of furniture, manufacturing n.e.c.
40	Energy and water supply (40 & 41)
45	Construction
50	Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel
51	Wholesale trade and commission trade, except of motor vehicles and motorcycles
52	Retail trade, except of motor vehicles and motorcycles, repair of personal and household goods
55	Hotels and restaurants
60	Land transport, transport via pipelines, water transport, air transport (60–62)
63	Supporting and auxiliary transport activities; activities of travel agencies
64	Post and telecommunications
65	Financial intermediation (except insurance)
66	Insurance funding, activities auxiliary to financial intermediation
70	Real estate activities
71	Renting of machinery and equipment without operator
72	Data processing and databases
73	Research, development, education (73 & 80)
74	Other business activities
75	Public administration and defence; compulsory social security
85	Human health, veterinary and social work activities
90	Sewage and refuse disposal, sanitation and similar activities
91	Activities of membership organizations n.e.c
92	Recreational, cultural and sporting activities
93	Other service activities

B Additional Tables and Regression Results

Table 6: Testing the Number of Lags

Model	Obs	ll(model)	df	AIC	BIC
1234	480	10800.41	420	-20760.83	-19007.84
123	520	11623.72	372	-22503.45	-20921.02
12	560	12471.4	328	-24286.81	-22867.24
1	600	13012.12	280	-25464.25	-24233.11
12 4	480	10755.35	372	-20766.71	-19214.06
1 4	480	10707.95	324	-20767.89	-19415.58

Table 7: West Germany, Regression Results

	q2 1999 - q1 2003			q2 2003 - q4 2005		
	GECM	AR1	stat	Lag1	AR1	stat
a_{MM}	0.0002			0.0019**		
	(0.0004)			(0.0009)		
a_{MP}	−0.0001			−0.0019		
	(0.0018)			(0.0021)		
a_{MU}	−0.0003			−0.0002		
	(0.0023)			(0.0030)		
a_{MS}	−0.0001			−0.0210**		
	(0.0042)			(0.0094)		
a_{MH}	0.0044***			−0.0019		
	(0.0016)			(0.0020)		
a_{MK}	−0.0114			−0.0015		
	(0.0108)			(0.0177)		
a_{MI}	0.0014**			0.0014		
	(0.0007)			(0.0017)		
a_{MY}	0.0000			−0.0001		
	(0.0008)			(0.0017)		
a_{PM}	0.0006			0.0001		
	(0.0008)			(0.0017)		
a_{PP}	0.0192***			0.0282***		
	(0.0039)			(0.0059)		
a_{PU}	−0.0011			0.0027		
	(0.0061)			(0.0059)		
a_{PS}	0.0109			−0.0143		
	(0.0073)			(0.0132)		
a_{PH}	−0.0096*			0.0016		
	(0.0049)			(0.0062)		
a_{PK}	0.0027			−0.0003		
	(0.0166)			(0.0232)		
a_{PI}	0.0009			−0.0023		
	(0.0025)			(0.0027)		
a_{PY}	−0.0023			0.0014		
	(0.0016)			(0.0029)		
a_{UM}	−0.0001			0.0013		
	(0.0024)			(0.0021)		
a_{UP}	−0.0028			−0.0136*		
	(0.0042)			(0.0076)		
a_{UU}	0.0209**			0.0042		
	(0.0102)			(0.0062)		
a_{US}	−0.0615***			−0.0199		
	(0.0230)			(0.0175)		
a_{UH}	−0.0269***			−0.0069		
	(0.0070)			(0.0060)		
a_{UK}	0.0217			0.0249		
	(0.0416)			(0.0349)		
a_{UI}	0.0024			0.0031		
	(0.0029)			(0.0028)		
a_{UY}	0.0039			0.0023		
	(0.0032)			(0.0033)		
a_{SM}	0.0007			0.0005		
	(0.0028)			(0.0032)		
a_{SP}	−0.0036			−0.0195*		
	(0.0053)			(0.0117)		
a_{SU}	−0.0247**			−0.0057		
	(0.0109)			(0.0105)		
a_{SS}	0.1481***			0.1335***		
	(0.0181)			(0.0245)		
a_{SH}	−0.0387**			−0.0436***		
	(0.0187)			(0.0142)		
a_{SK}	0.0011			0.0022		
	(0.0611)			(0.0470)		
a_{SI}	−0.0111			0.0020		
	(0.0068)			(0.0057)		
a_{SY}	−0.0035			0.0004		
	(0.0041)			(0.0050)		

to be continued at the next page . . .

continuation of table 7 . . .

	q2 1999 - q1 2003			q2 2003 - q4 2005		
	GECM	AR1	stat	GECM	AR1	stat
d_{MM}	0.4667***	0.4396***		0.2422***	0.2608***	
	(0.1220)	(0.1301)		(0.0302)	(0.0337)	
d_{MP}	−0.0084	−0.0058		−0.0402**	−0.0213	
	(0.0115)	(0.0154)		(0.0204)	(0.0208)	
d_{MU}	−0.0270**	−0.0194*		−0.0256	0.0146	
	(0.0136)	(0.0118)		(0.0175)	(0.0171)	
d_{MS}	0.0086	0.0074		−0.0152	0.0046	
	(0.0097)	(0.0129)		(0.0115)	(0.0136)	
d_{PM}	−0.0288	0.0026		−0.0062	−0.0053	
	(0.0718)	(0.0683)		(0.0628)	(0.0553)	
d_{PP}	0.1220***	0.1228**		0.1645***	0.1744***	
	(0.0393)	(0.0480)		(0.0577)	(0.0335)	
d_{PU}	0.0635**	0.0542		0.0495	0.0463*	
	(0.0261)	(0.0338)		(0.0443)	(0.0280)	
d_{PS}	0.0065	0.0069		0.0163	0.0122	
	(0.0237)	(0.0265)		(0.0321)	(0.0220)	
d_{UM}	−0.3077*	−0.2249		0.1189	0.1081	
	(0.1759)	(0.2011)		(0.1347)	(0.0723)	
d_{UP}	0.0766*	0.0631		0.0741	−0.0008	
	(0.0464)	(0.0576)		(0.0598)	(0.0437)	
d_{UU}	0.1983***	0.1650***		0.3165***	0.2171***	
	(0.0562)	(0.0520)		(0.0647)	(0.0368)	
d_{US}	−0.0105	−0.0003		0.0369	−0.0156	
	(0.0450)	(0.0457)		(0.0484)	(0.0287)	
d_{SM}	0.0899	0.1619		0.0000	−0.0248	
	(0.1838)	(0.2102)		(0.1931)	(0.1107)	
d_{SP}	0.1532*	0.1549		0.1377	0.0836	
	(0.0805)	(0.1022)		(0.1304)	(0.0674)	
d_{SU}	−0.0304	−0.0050		−0.0260	−0.1200**	
	(0.0589)	(0.0637)		(0.0984)	(0.0548)	
d_{SS}	0.2886***	0.2959***		0.2320***	0.2040***	
	(0.0651)	(0.0720)		(0.0723)	(0.0442)	
β_{MM}	0.0010	0.0004	0.0002	0.0037**	0.0024***	−0.0039
	(0.0009)	(0.0004)	(0.0005)	(0.0018)	(0.0008)	(0.0033)
β_{MP}	0.0004	0.0001	−0.0001	0.0017	−0.0006	−0.0012
	(0.0024)	(0.0010)	(0.0017)	(0.0049)	(0.0011)	(0.0044)
β_{MU}	−0.0020	−0.0007	−0.0055***	0.0071	0.0018	−0.0174***
	(0.0047)	(0.0017)	(0.0020)	(0.0064)	(0.0015)	(0.0057)
β_{MS}	−0.0067	−0.0026	−0.0022	−0.0151*	−0.0011	−0.1148***
	(0.0069)	(0.0023)	(0.0042)	(0.0083)	(0.0020)	(0.0055)
β_{PP}	0.0351	0.0188***	0.0412***	0.0263	0.0277***	0.2808***
	(0.0468)	(0.0048)	(0.0141)	(0.0245)	(0.0034)	(0.0156)
β_{PU}	−0.0360	−0.0006	−0.0214**	−0.0255	−0.0046	−0.0285**
	(0.0309)	(0.0041)	(0.0099)	(0.0236)	(0.0033)	(0.0128)
β_{PS}	0.0013	−0.0074	−0.0072	−0.0444	−0.0232***	−0.1381***
	(0.0336)	(0.0055)	(0.0136)	(0.0321)	(0.0047)	(0.0166)
β_{UU}	0.1052**	0.0268***	0.0678***	0.0014	0.0060	−0.0526***
	(0.0442)	(0.0098)	(0.0156)	(0.0295)	(0.0060)	(0.0183)
β_{US}	−0.0055	−0.0111	−0.0115	0.0556*	−0.0019	−0.0919***
	(0.0416)	(0.0119)	(0.0165)	(0.0338)	(0.0066)	(0.0177)
β_{SS}	0.0886	0.0666***	0.0760**	0.1000	0.0712***	−0.0325
	(0.0554)	(0.0214)	(0.0333)	(0.0730)	(0.0109)	(0.0265)
β_{MK}	−0.0016	−0.0019	0.0010	−0.0071	0.0015	−0.0009
	(0.0038)	(0.0047)	(0.0049)	(0.0150)	(0.0082)	(0.0008)
β_{MI}	0.0017	0.0014*	0.0307	−0.0018	0.0013	0.0031
	(0.0011)	(0.0008)	(0.0303)	(0.0047)	(0.0010)	(0.0026)
β_{MY}	0.0020	0.0001	−0.0022	0.0123	−0.0016	0.0281***
	(0.0021)	(0.0008)	(0.0118)	(0.0078)	(0.0012)	(0.0025)
β_{PK}	−0.0228	0.0019	−0.0423	−0.0035	0.0043	0.0265***
	(0.0309)	(0.0174)	(0.0449)	(0.0558)	(0.0136)	(0.0040)
β_{PI}	0.0060	0.0007	−0.0001	−0.0069	−0.0019	−0.0070***
	(0.0253)	(0.0032)	(0.0010)	(0.0208)	(0.0015)	(0.0013)
β_{PY}	0.0165	−0.0027	−0.0097	0.0203	0.0006	−0.0572***
	(0.0226)	(0.0020)	(0.0100)	(0.0298)	(0.0019)	(0.0043)
β_{UK}	0.0293	0.0049	0.0118**	0.0603	0.0131	0.0191***
	(0.0323)	(0.0247)	(0.0059)	(0.0518)	(0.0171)	(0.0041)
β_{UI}	0.0074	0.0009	−0.0067	0.0108	0.0022	0.0994***
	(0.0135)	(0.0036)	(0.0085)	(0.0157)	(0.0020)	(0.0064)
β_{UY}	−0.0145	0.0040	0.0004	−0.0309	0.0059**	0.0052***
	(0.0313)	(0.0034)	(0.0010)	(0.0309)	(0.0024)	(0.0014)
β_{SK}	0.0035	−0.0160	−0.0069	0.0900	0.0041	0.0653***
	(0.0339)	(0.0241)	(0.0082)	(0.1054)	(0.0271)	(0.0044)
β_{SI}	−0.0239	−0.0081	0.0056	−0.0048	0.0037	−0.0634***
	(0.0185)	(0.0087)	(0.0101)	(0.0279)	(0.0031)	(0.0044)
β_{SY}	−0.0389*	−0.0030	−0.0032	−0.0140	0.0009	−0.0935***
	(0.0232)	(0.0053)	(0.0068)	(0.0397)	(0.0038)	(0.0068)
N	640	640	640	440	440	440

t statistics in parentheses — ** $p < 0.05$, *** $p < 0.01$, *** $p < 0.001$

Table 8: East Germany, Regression Results

	q2 1999 - q1 2003			q2 2003 - q4 2005		
	GECM	AR1	stat	GECM	AR1	stat
a_{MM}	0.0018**			0.0028***		
	(0.0008)			(0.0010)		
a_{MP}	−0.0006			−0.0001		
	(0.0005)			(0.0010)		
a_{MU}	−0.0001			0.0005		
	(0.0015)			(0.0015)		
a_{MS}	−0.0082			−0.0091*		
	(0.0061)			(0.0051)		
a_{MH}	0.0068			−0.0023		
	(0.0043)			(0.0032)		
a_{MK}	0.0216			0.0168		
	(0.0231)			(0.0105)		
a_{MI}	−0.0028			0.0022		
	(0.0022)			(0.0030)		
a_{MY}	−0.0024			0.0014***		
	(0.0017)			(0.0004)		
a_{PM}	−0.0013			−0.0046		
	(0.0015)			(0.0029)		
a_{PP}	0.0180***			0.0234***		
	(0.0040)			(0.0035)		
a_{PU}	0.0023			−0.0064		
	(0.0069)			(0.0051)		
a_{PS}	−0.0625**			−0.0281*		
	(0.0302)			(0.0171)		
a_{PH}	0.0044			−0.0142		
	(0.0088)			(0.0106)		
a_{PK}	−0.0812			0.1640***		
	(0.1023)			(0.0370)		
a_{PI}	0.0066			0.0050		
	(0.0065)			(0.0105)		
a_{PY}	−0.0016			0.0017		
	(0.0043)			(0.0013)		
a_{UM}	0.0007			0.0020		
	(0.0010)			(0.0013)		
a_{UP}	−0.0019			−0.0068***		
	(0.0012)			(0.0013)		
a_{UU}	0.0219***			0.0124***		
	(0.0053)			(0.0025)		
a_{US}	−0.0533***			−0.0123*		
	(0.0135)			(0.0072)		
a_{UH}	−0.0069			−0.0114**		
	(0.0061)			(0.0046)		
a_{UK}	0.0217			−0.0100		
	(0.0887)			(0.0139)		
a_{UI}	0.0019			−0.0036		
	(0.0052)			(0.0039)		
a_{UY}	−0.0023			0.0001		
	(0.0037)			(0.0005)		
a_{SM}	0.0001			−0.0018		
	(0.0025)			(0.0040)		
a_{SP}	−0.0140***			−0.0156***		
	(0.0040)			(0.0044)		
a_{SU}	−0.0098			0.0032		
	(0.0109)			(0.0071)		
a_{SS}	0.1361***			0.0463*		
	(0.0352)			(0.0244)		
a_{SH}	−0.0365			−0.0322**		
	(0.0287)			(0.0154)		
a_{SK}	−0.0415			−0.1390***		
	(0.1728)			(0.0470)		
a_{SI}	−0.0048			−0.0093		
	(0.0094)			(0.0133)		
a_{SY}	0.0051			−0.0039**		
	(0.0063)			(0.0016)		

to be continued at the next page ...

continuation of table 8 ...

	q2 1999 - q1 2003			q2 2003 - q4 2005		
	GECM	AR1	stat	GECM	AR1	stat
d_{MM}	0.2335***	0.2166***		0.7897***	0.8621***	
	(0.0610)	(0.0524)		(0.0382)	(0.0338)	
d_{MP}	−0.0176	−0.0112		−0.0196	−0.0161	
	(0.0123)	(0.0178)		(0.0144)	(0.0139)	
d_{MU}	−0.0240	−0.0138		−0.0328	−0.0227	
	(0.0260)	(0.0354)		(0.0296)	(0.0272)	
d_{MS}	0.0075	0.0119		−0.0165	−0.0122	
	(0.0123)	(0.0129)		(0.0131)	(0.0129)	
d_{PM}	0.1285	0.0978		−0.0415	0.0185	
	(0.1436)	(0.1274)		(0.1386)	(0.1236)	
d_{PP}	0.1409**	0.0858		0.7059***	0.7511***	
	(0.0619)	(0.0627)		(0.0524)	(0.0523)	
d_{PU}	−0.0147	−0.0458		0.1195	0.1257	
	(0.0880)	(0.0705)		(0.1081)	(0.1016)	
d_{PS}	0.0191	0.0016		−0.0683	−0.0431	
	(0.0401)	(0.0522)		(0.0479)	(0.0479)	
d_{UM}	0.0007	0.0208		−0.1637***	−0.1031**	
	(0.1646)	(0.1782)		(0.0503)	(0.0451)	
d_{UP}	0.0153	0.0135		0.0133	0.0200	
	(0.0461)	(0.0498)		(0.0192)	(0.0187)	
d_{UU}	0.2559***	0.2340***		0.7769***	0.8171***	
	(0.0700)	(0.0786)		(0.0392)	(0.0370)	
$d_{U.S.}$	0.0045	0.0018		−0.0027	0.0063	
	(0.0244)	(0.0261)		(0.0174)	(0.0172)	
d_{SM}	−0.0147	0.1268		−0.0347	−0.1013	
	(0.3241)	(0.2659)		(0.1738)	(0.1498)	
d_{SP}	−0.0030	0.0242		0.0874	0.0693	
	(0.0771)	(0.0645)		(0.0655)	(0.0626)	
d_{SU}	−0.1117	−0.0976		−0.0402	−0.0245	
	(0.0917)	(0.1041)		(0.1353)	(0.1228)	
d_{SS}	0.1545**	0.1680***		0.8565***	0.8483***	
	(0.0646)	(0.0521)		(0.0597)	(0.0583)	
β_{MM}	−0.0015	0.0020***	−0.0012	0.0050***	0.0037***	0.0048***
	(0.0030)	(0.0007)	(0.0015)	(0.0011)	(0.0009)	(0.0009)
β_{MP}	0.0001	−0.0007	−0.0035***	−0.0007	−0.0001	−0.0001
	(0.0040)	(0.0005)	(0.0013)	(0.0009)	(0.0008)	(0.0008)
β_{MU}	0.0008	0.0006	−0.0009	0.0017	0.0013	0.0021**
	(0.0047)	(0.0011)	(0.0021)	(0.0013)	(0.0010)	(0.0010)
β_{MS}	0.0026	−0.0066**	0.0028	−0.0013	−0.0033	−0.0050**
	(0.0121)	(0.0030)	(0.0055)	(0.0030)	(0.0025)	(0.0024)
β_{PP}	0.0352**	0.0169***	0.0199***	0.0248***	0.0215***	0.0245***
	(0.0154)	(0.0055)	(0.0057)	(0.0036)	(0.0031)	(0.0028)
β_{PU}	−0.0003	−0.0010	−0.0016	−0.0083***	−0.0067***	−0.0071***
	(0.0090)	(0.0015)	(0.0040)	(0.0013)	(0.0011)	(0.0010)
β_{PS}	0.0005	−0.0185***	−0.0192**	−0.0106**	−0.0115***	−0.0134***
	(0.0293)	(0.0050)	(0.0093)	(0.0042)	(0.0037)	(0.0034)
β_{UU}	0.0509**	0.0229***	0.0437***	0.0159***	0.0128***	0.0140***
	(0.0203)	(0.0064)	(0.0115)	(0.0034)	(0.0024)	(0.0022)
$\beta_{U.S.}$	−0.0445*	−0.0167**	−0.0318**	0.0038	0.0038	0.0081**
	(0.0264)	(0.0073)	(0.0132)	(0.0057)	(0.0042)	(0.0039)
β_{SS}	0.0215	0.0795***	0.0919**	0.0230	0.0433***	0.0377***
	(0.1045)	(0.0248)	(0.0420)	(0.0164)	(0.0132)	(0.0119)
β_{MK}	0.0122	0.0048	0.0228***	0.0150	0.0216**	0.0168**
	(0.0139)	(0.0160)	(0.0057)	(0.0127)	(0.0097)	(0.0085)
β_{MI}	−0.0056	−0.0025	0.1287***	0.0079**	0.0043	0.1461***
	(0.0048)	(0.0023)	(0.0481)	(0.0032)	(0.0029)	(0.0292)
β_{MY}	−0.0031	−0.0023	−0.0104	0.0013***	0.0013***	−0.0005
	(0.0067)	(0.0022)	(0.0136)	(0.0004)	(0.0003)	(0.0101)
β_{PK}	0.0603	0.0387	−0.1653**	0.1895***	0.1375***	−0.0919**
	(0.0697)	(0.0582)	(0.0820)	(0.0477)	(0.0309)	(0.0362)
β_{PI}	0.0509*	0.0028	−0.0048*	−0.0162	0.0039	0.0094***
	(0.0304)	(0.0085)	(0.0028)	(0.0116)	(0.0107)	(0.0025)
β_{PY}	0.0573**	−0.0045	0.0280*	0.0023*	0.0022*	−0.0096
	(0.0255)	(0.0054)	(0.0155)	(0.0014)	(0.0012)	(0.0082)
β_{UK}	0.0050	−0.0056	0.0014	−0.0145	0.0008	0.0017
	(0.0510)	(0.0316)	(0.0075)	(0.0180)	(0.0118)	(0.0030)
β_{UI}	−0.0053	−0.0013	0.0105	0.0038	−0.0032	−0.0198*
	(0.0138)	(0.0050)	(0.0257)	(0.0045)	(0.0041)	(0.0104)
β_{UY}	−0.0043	−0.0013	−0.0042	−0.0002	−0.0003	0.0017***
	(0.0167)	(0.0032)	(0.0029)	(0.0005)	(0.0004)	(0.0003)
β_{SK}	−0.1561**	−0.1084	0.0043	−0.1573***	−0.1228***	0.0015
	(0.0637)	(0.0697)	(0.0128)	(0.0564)	(0.0406)	(0.0009)
β_{SI}	−0.0046	0.0003	0.0044	−0.0113	−0.0141	−0.0003
	(0.0299)	(0.0107)	(0.0058)	(0.0140)	(0.0129)	(0.0003)
β_{SY}	−0.0188	0.0065	0.0078	−0.0037**	−0.0036**	−0.0037***
	(0.0374)	(0.0074)	(0.0163)	(0.0016)	(0.0015)	(0.0012)
N	368	368	368	253	253	253

t statistics in parentheses. ** $p < 0.05$, *** $p < 0.01$, *** $p < 0.001$

C Technical Supplements

C.1 Derivation of the wage elasticities

$$\frac{\delta \ln C}{\delta lnw_i} = S_i \tag{12}$$

$$\frac{\partial \ln C}{\partial lnw_i} = \frac{w_i * C_i}{C} \tag{13}$$

$$C_i = \frac{\partial C}{\partial w_i} \tag{14}$$

$$\frac{\partial^2 \ln C}{\partial lnw_i \partial lnw_j} = \delta_{ij}\frac{w_i C_i}{C} + \frac{w_i w_j C_{ij}}{C} - \frac{w_i w_j C_i C_j}{C^2} \qquad if \quad i \neq j \tag{15}$$

$$\delta_{ij} = 1 \quad if \quad i = j \qquad 0 \quad otherwise \tag{16}$$

for the translog cost function defined in 1 the left hand-side of 14 is equal to β_{ij}

$$\frac{\delta^2 \ln C}{\delta lnw_i \delta lnw_j} = \beta_{ij} \tag{17}$$

$$\beta_{ij} = \delta_{ij}\frac{w_i C_i}{C} + \frac{w_i w_j C_{ij}}{C} - \frac{w_i w_j C_i C_j}{C^2} \qquad if \quad i \neq j \tag{18}$$

$$\Rightarrow \frac{w_i w_j C_{ij}}{C} = \beta_{ij} + \frac{w_i w_j C_i C_j}{C^2} - \delta_{ij}\frac{w_i C_i}{C} \tag{19}$$

$$C = \frac{w_i x_i}{S_i} \tag{20}$$

$$C_i = x_i = \frac{C S_i}{w_i} \tag{21}$$

$$\Rightarrow \frac{w_i w_j C_i C_j}{C} = \begin{cases} \beta_{ij} + S_i S_j, & if \quad i \neq j \\ \beta_{ii} - S_i + S_i^2 & if \quad i = j \end{cases} \tag{22}$$

C.2 Calculating of the wage elasticities of demand

$$\eta_{ij} = \frac{\partial x_i}{\partial w_j}\frac{w_j}{x_i} \tag{23}$$

$$= \frac{C_{ij} w_j}{x_i} \tag{24}$$

$$= \frac{w_i w_j C_i C_j}{C} * \frac{1}{S_i} \tag{25}$$

$$= \begin{cases} \frac{\beta_{ij}}{S_i} + S_j & if \quad i \neq j \\ \frac{\beta_{ii}}{S_i} - 1 + S_i & if \quad i = j \end{cases} \tag{26}$$

C.3 The dynamic specification

Anderson and Blundell (1982) define the long term relationship in the following way:

$$S(t) = \Pi(\beta)x(t) + u(t) \tag{27}$$

The dynamic structure is defined by a lag structure of the dependent and independent variables:

$$\begin{aligned} B^*(L)S(t) &= \Gamma^*(L)x(t) + \epsilon(t) & (28)\\ B^*(L) &= I + B_1^*L + B_2^*L^2 + \cdots + B_p^*L^p, & (29)\\ \Gamma^*(L) &= I + \Gamma_1^*L + \Gamma_2^*L^2 + \cdots + \Gamma_q^*L^q, & (30) \end{aligned}$$

The symmetry and homogeneity conditions:

$$\begin{aligned} \iota' B_j^* &= k_j i' \qquad j = 1, \ldots, p, & (31)\\ \sum_{j=1}^{p} k_j &= k, & (32)\\ i'\Gamma_0^* &= ((1+k)00\ldots 0), & (33)\\ i'\Gamma_j^* &= 0, \qquad j = 1, \ldots, q, & (34) \end{aligned}$$

$$\Pi(\beta) = B^*(1)^{-1}\Gamma^*(1) = [\sum_{j}^{p} B_j^*]^{-1}[\sum_{l}^{q} \Gamma_l^*] \tag{35}$$

Transformations lead to the following general error-correction model:

$$\Delta S_t = B(L)\Delta S_t + \Gamma(L) * \Delta\tilde{X}_t - A[S_{t-p} - \Pi(\beta)X_{t-q}] + u_t, \tag{36}$$

with $\tilde{X}_t$ being X_t without the first element.