

A new method on an old question: What explains changes in full-time and part-time employment in Western Germany?

Sabine Klinger, Katja Wolf (Institute for Employment Research, Nuremberg)

Abstract

From 1992 to 2005, part-time employment in Western Germany has grown by 82 percent, whereas full-time employment has shrunk by 14 percent. Behind these general figures there is substantial variation of employment schemes across industries. Beside this, the share of the service industries in gross value added has grown, whereas the importance of manufacturing and construction has decreased considerably. We analyse the extent to which the changes in part-time and full-time employment can be explained by changes in the sectoral composition of the economy or by other factors.

Using West German yearly data from 1992-2005, we estimate a regression analogue shift-share model. It allows us to divide the overall development of employment into the business cycle effect, the sector effect and the employment status effect. Moreover, we control for sectoral gross value added, unit labour costs and working time.

As a methodological contribution we extend the shift-share approach into a dynamic panel model. We use a bias-corrected least squares dummy variable (LSDVc) estimator which is appropriate for our data structure. As a second step, we decompose the fixed effects of the LSDVc estimation into parameters for part-time, full-time, and self-employment as well as six sectors.

Our results confirm previous deterministic shift-share analyses: Characteristics inherent in full-time or part-time employment dominantly explain changes in employment patterns in Western Germany. The sectoral composition of the economy plays a significant but minor role. The model extensions reveal that much of the status and sector effects in the simple shift-share analysis can be captured by determinants of labour demand.

JEL

C 33, E 24, J 21, J 23

1 Introduction

Part-time employment has grown in many developed countries throughout the past decades. In Western Germany, it rose by 82 percent, while full-time employment shrunk by 14 percent between 1991 and 2005. Economic literature has presented several reasons for this change in employment patterns, among them the rising share of service sectors in the sectoral composition of the economy (Leppel/Claim 1988, Delsen 1998, Euwals/Hogerbrugge 2006). We focus on this issue of the sectoral composition question in more detail: To what extent do the rise in part-time employment and the fall in full-time employment depend on the structural change of the economy? This question becomes even more worth inquiring since part-time ratios as well as value-added growth differ across sectors, too. If we found out that the rise in part-time employment is only due to the rise of part-time intense sectors, we would conclude that the phenomenon simply is a side-product of structural change and will disappear as soon as (or if) structural change stops. In contrast, if we found out that the rise in part-time employment goes beyond structural change we have to reconsider the economic and political motivation behind the phenomenon: Why is part-time employment more attractive than full-time employment? Shall politics and society react even stronger on employers' flexibility needs? How to raise the attractiveness of full-time employment, if this status is more desired from the political or social point of view?

The literature on the development of part-time employment can basically be divided into two branches: Studies of the microeconomic branch are based on firm survey data and focus on the determinants of part-time employment, the role of flexibility and the transition between part-time employment and other labour market states (Zeytinoglu 1992, Delsen 1998, Houseman 2001). The macroeconomic branch of the literature – which this paper contributes to – describes part-time developments by macro data and includes institutional settings or international comparisons (Buddelmeyer et al. 2008, Lester 1999). To analyse the influence of the sectoral change, several macroeconomic studies disentangle the growth of part-time employment into growth, sector and status effects, using deterministic shift share analyses (e.g. Walwei/Werner 1995, de Ruyter/Burgess 2000). They commonly find that the sector effect does not predominantly explain the rise in part-time employment.

Our paper augments this latter strand of the literature: we conduct a regression-analogue shift share analysis on a dynamic panel model for Western Germany. These panel regressions allow us (1) to give insight in significance levels and (2) include economic variables which shed some light on why the sector effect might play a significant role. We concentrate on factors of labour demand (factors of labour supply are given, for instance, by

Euwals/Hogerbrugge 2006, Buddelmeyer et al. 2008). Moreover, we do not focus on part-time employment alone, but use an integrated approach that further includes full-time and self-employment. With total employment being our reference, the empirical results for a single kind of employment reflects the deviations from the national average.

The paper is organized as follows: The next section describes the development of the employment patterns in Western Germany. Afterwards, we discuss factors of labour demand that might explain the development of total and of part-time employment, with special emphasis on sectoral differences. In the fourth section, the regression analogue shift-share model is described. In a two step procedure, it disentangles employment growth into the average growth effect, the sector effect and the status effect which is inherent in full-time, part-time, or self-employment as such. We extend the simple shift share model by economic variables, including lagged endogenous employment growth. To get consistent estimates we draw on the bias-corrected least squares dummy variable estimator. The fifth section presents the estimation results. They reveal a significant positive impact of the status part-time employment as well as of the sector Banking/insurance/business services. This effect is robust even when we account for economic variables. The final section summarizes the paper and draws some conclusions.

2 Employment patterns in Western Germany

We separate total employment into full-time, part-time, and self-employment.¹ We refer to the categories as kinds of employment or employment status. Part-time employment is not defined by a fixed number of working hours per week, but by information given by employers or employees in their declarations to social security or in the Mikrozensus, a yearly survey among 1 percent of the German population about their living and working conditions. Part-time covers every status with less than the establishment's customary working time. In 2005, full-time employees worked on average 1681 hours, part-timers worked on average 626 hours. Although for some people 35 hours per week is already part-time, the quite low

¹ For these three categories, the Institute for Employment Research (IAB) computes working time which is consistent to the German System of National Accounts by the Federal Statistics Office (DESTATIS). We focus on western Germany because in the early 1990s the transition of eastern Germany towards a market economy caused structural breaks in the variables referring to the sectoral change as well as to other economic variables

proportion of only 37 percent of a full-time equivalent is due to the number of marginal employees with very low working hours per week.

Table 1: Average yearly employment growth and average employment ratios, 1992-2005, percent

	growth	ratio*
Self Construction	2.6	0.9
Self Private, social, public services	4.3	1.9
Self Banking, insurance, business services	4.8	1.9
Self Trade, hotel & catering, transport	0.2	3.3
Self Agriculture, fishery	-4.5	1.6
Self Manufacturing, energy	-0.4	0.9
Self	1.1	10.5
Part-time Construction	4.0	0.6
Part-time Private, social, public services	4.9	9.2
Part-time Banking, insurance, business services	7.0	3.7
Part-time Trade, hotel & catering, transport	4.2	7.2
Part-time Agriculture, fishery	4.5	0.3
Part-time Manufacturing, energy	2.1	2.6
Part-time	4.6	23.6
Full-time Construction	-2.8	4.7
Full-time Private, social, public services	-0.7	16.5
Full-time Banking, insurance, business services	2.3	8.3
Full-time Trade, hotel & catering, transport	-1.0	14.9
Full-time Agriculture, fishery	-1.5	0.7
Full-time Manufacturing, energy	-2.5	21.0
Full-time	-1.2	66.0
Construction	-1.4	6.1
Private, social, public services	1.4	27.6
Banking, insurance, business services	3.8	13.9
Trade, hotel & catering, transport	0.5	25.4
Agriculture, fishery	-2.9	2.5
Manufacturing, energy	-2.0	24.5
All	0.4	100.0

Remarks: * share in total employment.

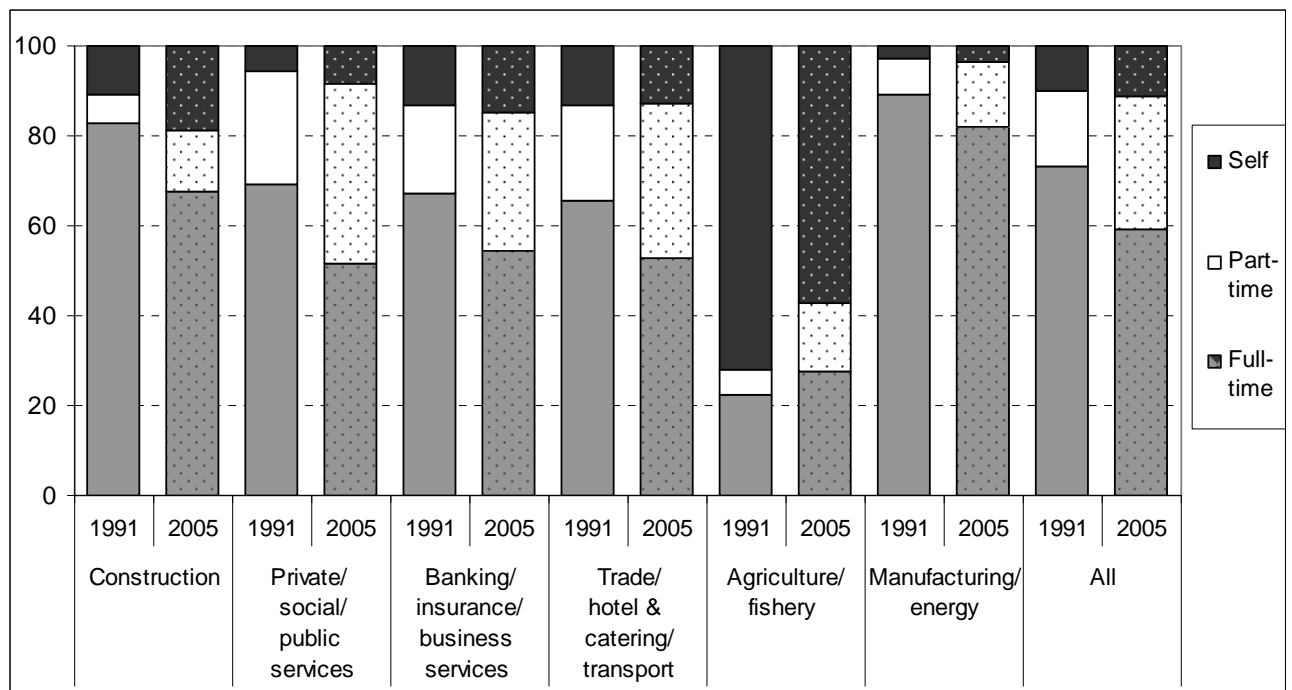
Source: DESTATIS, IAB (FB 4), own calculations.

As can be seen from table 1, total employment in Western Germany rose by 0.4 percent per year between 1991 and 2005. Part-time employment increased in all sectors and contributed with a yearly growth rate of 4.6 percent considerably to the overall development. In marked contrast, full-time employment only grew in the sector of Banking/insurance/business services and suffered sharp losses in the two sectors with the highest full-time ratios, Construction and Manufacturing/energy. Self-employment changed scarcely on average. On the sectoral level, however, very different growth rates can be observed in the growing sectors Private/social/public services and Banking/insurance/business services on the one hand and

Agriculture/fishery on the other hand. Since self-employment is the typical employment status in Agriculture/fishery, this substantial decline might be a normalisation of the employment structure towards the average.

Figure 1 gives an impression of the shares of full-time, part-time, and self-employment in total employment and in each sector. Already in the beginning of the 1990s, part-time employment was more common in the sectors Private/social/public services, Banking/insurance/business services and Trade/hotel & catering/transport with one fifth to one quarter of all employees working part-time. By the year 2005, this proportion had even increased up to 30 to 40 percent. Although part-time had become more important in all sectors, Construction and Manufacturing/energy still had significantly lower shares and still were sectors that first and foremost employed full-time workers. Self-employment was the typical employment status in Agriculture/fishery throughout the period under consideration.

Figure 1: Shares of full-time, part-time, and self-employment in total employment, 1991 and 2005, percent

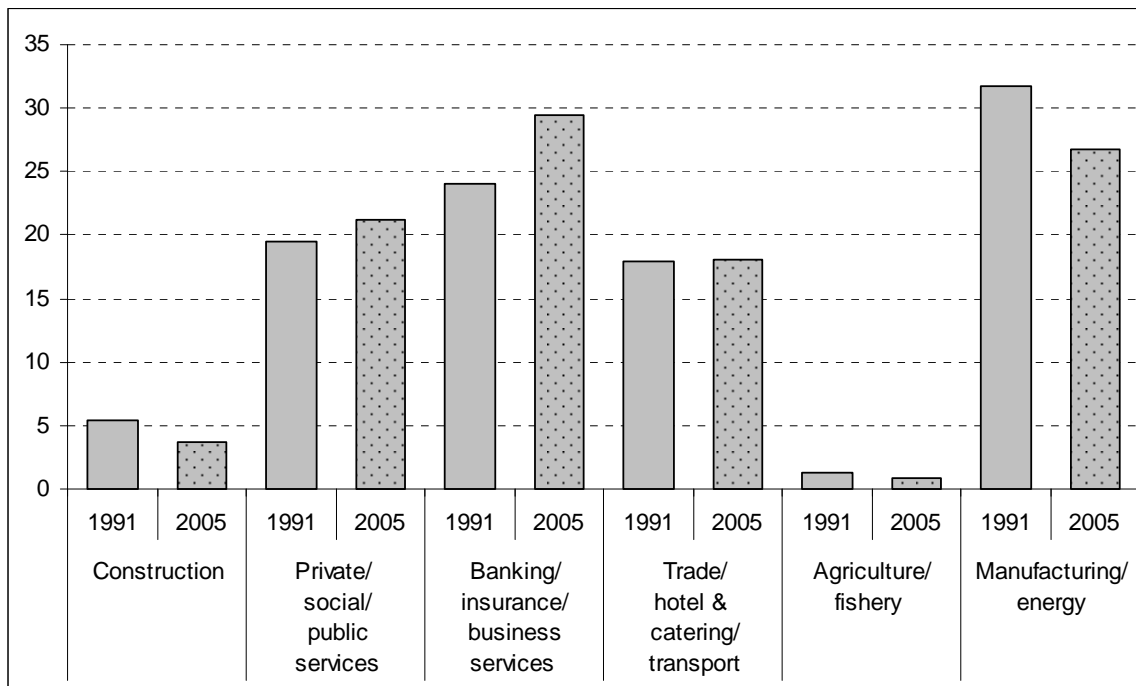


Source: DESTATIS, IAB (FB 4), own calculations.

Figure 2 provides an overview of the sectoral shares in total gross value added. The two most important sectors by that measure are Manufacturing/energy and Banking/insurance/business services with almost 30 percent each. They seem to have exchanged shares in total gross

value added and thus their ranks. The increasing shares of Private/social/public services and Banking/insurance/business services at the one extreme and the decreasing shares of Construction and Manufacturing/energy as well as the diminishing importance of Agriculture/fishery on the other extreme underline the structural change towards tertiary sectors.

Figure 2: Share of sectoral gross value added in total gross value added, 1991 and 2005, percent



Source: DESTATIS, own calculations.

Obviously, part-time employment grew in every sector. However, the part-time status was typical of prospering sectors, whereas declining full-time employment was rather present in shrinking sectors. Thus, there were reasons that caused part-time employment to increase within sectors and reasons between sectors that caused (part-time) employment to grow. The following section addresses these factors in more detail.

3 Factors of labour demand

We analyse full-time, part-time (and self-) employment within the frame of total employment. As a consequence, we first have to ask for determinants of labour demand independent of employment status. As standard text books (e.g. Ehrenberg/Smith 2005) teach, firms employ

workers as long as productivity is higher than labour costs. In our empirical model, (average) productivity and wages are combined as unit labour costs. The more flexible production technology is the more important get prices of other input factors, such as capital or energy costs. However, if capital and labour are no perfect substitutes but complements to a certain degree, higher capital stock or – as a proxy – asset investment could foster labour demand, too.²

Beyond this factor of general labour demand, other factors refer explicitly to the demand for part-time or full-time labour. We conceive those factors given in the – mostly microeconomic – literature as economic and institutional determinants.

Economic determinants

Among the economic reasons for part-time employment, Zeytinoglu (1992) and Wanger (2006) describe higher flexibility as the most outstanding. Following Osterman (1987), flexibility is one of three aspects that companies pay attention to when choosing their employment system. In an environment of rising competition and uncertainty, companies are urged to find flexible organisational forms, reducing buffers also with respect to labour (Marsden 1999). Part-time employment is easier and less costly to vary. Thus, it is a suitable tool to adjust (1) to the business cycle and (2) to market shocks in general.

First, companies need to adapt flexibly to the business cycle. By reducing working hours, they can easily adjust labour to the necessary volume of work – without the costs of dismissal and re-hiring or recruiting in the next upswing. According to this strategy, full-time jobs would be reduced into part-time jobs in economic downturns. Wanger (2006) asked German firms in 2004 how their part-time jobs had evolved during the past 12 months. Half of the firms said that they had transformed full-time jobs often or sometimes. Among the shrinking firms this share was three quarters.

Besides, part-timers can be offered a full-time job after they have proved suited (Buddelmeyer et al. 2008, Houseman 2001). This kind of tenure might be used more often in recessions when companies hire with caution anyway. As a consequence, part-time reacts less or even countercyclically on cyclical fluctuations (Buddelmeyer et al. 2008, Lester 1999). Thus much of the response of labour demand to the cycle is due to the changed composition of full-timers and part-timers within total employment.

² Institutional factors, such as taxation and social security may have an influence if employers actually carry the burden. Since the investigation of institutions on labour market outcomes in general is not the purpose of that paper, we will neglect those variables in the empirical analysis.

Second, the adaptation of labour might become urgent with any kind of market shock. In the United States, part-time employment is mostly used to support the team in peak-time hours of the day or week and to provide assistance during hours not fully covered by full-time shifts (Houseman 2001). In Germany, this feature might have become more important since the 1990s because the regulation of opening hours has been eased several times.³ Part-timers have weaker preferences to work according to a regular schedule. They are more willing to work at unusual times or bundle working hours and have another day off when less labour is needed. Thus, part-time employment is less costly to vary (Friesen 1997).

Another major economic reason for part-time might be labour cost differentials. Owen (1979) and Montgomery (1988a, empirically: 1988b) derive the rationale for hiring part-timers when fixed labour costs are low and variable labour costs are high.⁴ Lower hourly wages are a necessary assumption in labour demand theory to make part-time work attractive to employers at all. Indeed, median hourly earnings of part-timers were just 83 percent of the full-time equivalent in Germany in 1995 (OECD 1999). In the United States, large differentials between full-timers' and part-timers' compensations especially occur when additional benefits are taken into account (Houseman 2001).

On the other hand, part-time employment has disadvantages. Firms in Germany name higher costs for the workplace, equipment, and administration as well as higher effort for communication among the team members as the most important (Wanger 2006). Moreover, companies tend to spend less on firm- and job-specific training on part-timers (OECD 1999, Euwals/Hogerbrugge 2006). Although training investment would be the same for full-timers and part-timers, the latter leave less time for the training to bear fruits for the employer. In addition, part-timers tend to have less job tenure, also making training investments more risky. As a consequence, employers might prefer full-timers when firm- and job-specific knowledge is essential. Furthermore, production of a certain capital intensity can imply fixed hours of operation which may require full-time employees rather than part-timers (Euwals/Hogerbrugge 2006).

³ Opening hours have been prolonged from 7-18.30 to 6-20 o'clock, the more conservative treatment of Saturdays has ceased, and trade has become allowed on four Sundays per year. Even more liberal opening hours can nowadays be negotiated by the German Länder. But this most current law came into force off our period of consideration. Of course, opening hours reflect a combination of economic and institutional determinants of flexible labour demand.

⁴ For the interaction of full-time and part-time employment see Bonlier/Fon/Goldfarb (1990).

Institutional determinants

There are two laws in Germany that explicitly support part-time employment: In companies with at least 15 employees, employers must agree to employees' wishes to reduce working time if the employee has been working in the company for at least six months and if there are no reasonable operational counter-arguments. The second law eases the transition of older employees from working life into retirement. Under certain circumstances, more than 55-year old workers can decide to work part-time or bundle their working time in the first half of the contract period and get earlier retired in the second half. The Federal Employment Agency subsidises this employment-retirement transition scheme.

Another institutional condition refers to the burden of social security contributions. Rice (1990) found that part-timers in Great Britain had become a more powerful substitute for full-timers, especially young ones, because average hourly wage costs by employment status tremendously changed after social contribution legislation had been modified. High social contributions might have been a reason for the substantial increase in part-time employment in Germany as well. Our data contains not only employment covered by social security but also marginal employment with a flat contribution rate paid by the employer and no automatic access to the public pension system. New laws changed the registering modalities and eased the prerequisites for marginal employment.

As a last institutional factor, the degree of unionisation might have a negative impact on part-time employment (Dawkins/Norris 1995, Houseman 2001). At least, a falling degree of unionisation has been observed parallel to the increase in part-time employment.

Sector specialities

The factors mentioned above are of different importance with regard to sectors. If industry matters, we have to take a close look at the characteristics of sectors with respect to (part-time) employment and answer two further questions: First, why is part-time employment more attractive to some sectors than to others? And second, why did exactly those part-time intense sectors gain importance in terms of gross values added as well as employment? The second question refers to the reason of structural change which we assume as given in our analysis.⁵ We shortly elaborate on the first question.

The sectoral classification provides a useful summary of firms within similar fields of activity. Firms of a sector usually face similar working conditions and competition. As a

⁵ For a German comprehensive summary of theories of the sectoral change see Knottenbauer 2000.

conclusion, they might search for similar employment patterns, at least in the broad disaggregation of full-time and part-time employment.⁶ Thus, sectoral employment patterns arise because the advantages and disadvantages of part-time employment are not equally important across sectors.

Although flexibility to adjust to peak business hours or the business cycle has become an important feature in every sector, additional flexibility needs which are due to longer opening hours are wider spread in the sector of Trade/hotel & catering/transport. Although wage differentials and different social contributions burdens are binding to all sectors, they may be more important in Trade/hotel & catering/transport again. Not randomly is the share of marginal employment higher in this sector, especially in the gastronomy where jobs are low skilled and easily divisible.

Disadvantages of part-time employment, especially when working hours must be adequate to machines' operating hours and when technology-specific knowledge is essential, would occur more probably in Manufacturing/energy. Moreover, physical labour is more often required in sectors as Manufacturing/energy and Construction and is done by men who are usually full-timers.

Another sector-specific feature is firm size. Especially the law supporting part-time employment applies to firms with more than 15 employees. Wanger (2004, 2006) observed that the number of applications to part-time employment as well as the number of part-timers got higher when firm size increased. Large firms, however, are typical of Manufacturing/energy.

Finally, the degree of unionisation differs across sectors. In Germany, the share of firms bound to collective agreements is highest in Construction and lowest in service sectors (Kohaut/Ellguth 2008) which coincides with the lowest and highest part-time employment ratio.

To summarize, even though firms and employment decisions may differ within sectors there seem to be plausible arguments that (part-time) employment growth differs between sectors, too. As a consequence, part-time employment could have risen simply because part-time intense sectors became more important in the course of structural change.

⁶ Of course, firms still differ within sectors. They may have different organisational forms which may influence the individual firm's decision for full-time or part-time employment. For a general discussion of the usefulness of sectoral dummy variables see Sako (2008).

4 Model specification and estimation strategy

Several studies addressed the relationship between part-time employment and the structural change by separating the sector effect via deterministic shift-share analysis (Dawkins/Norris 1995, Walwei/Werner 1995, Burgess et al. 1996, Smith/Fagan/Rubery 1998, Wolf 1999⁷, de Ruyter/Burgess 2000). They usually find a much smaller sector effect than growth or status effects. Thus, factors inherent in part-time employment must have fostered the vivid development within sectors. Being deterministic such traditional shift-analysis does not give the opportunity of significance tests. Moreover, the status effect is often calculated simply as a remaining effect, where everything not sector or growth specific is aggregated. Thus, deterministic shift share analysis, however, faced much criticism (Knudsen/Barff 1991). As a consequence, it was transformed into a regression analogue shift-share approach by Patterson (1991).⁸ This modern kind of shift-share analysis has been the methodological basis of various studies (Möller/Tassinopoulos 2000, von Wachter 2001, Blien/Haas 2005).

Following this tradition our basic specification is a simple regression model with yearly employment growth ge_{ijt} by status i and sector j in year t as dependent variable and dummies for the cross-sectional units (D_{ij}) and time (D_t) as explanatory variables.

$$(M1a) \quad ge_{ijt} = \alpha_t D_t + \alpha_{ij} D_{ij} + \varepsilon_{ijt}$$

The time effect α_t reflects the overall development of the economy in that year that is caused by trend or cycle. As we have learned from the literature section, part-time is supposed to react less on cyclical fluctuations. Such specialties are then captured by the cross section effects α_{ij} . They reflect time-invariant influences of employment status and sector on the growth of employment in that cross section. ε_{ijt} is the residual.

In our empirical analysis we separate three status categories: full-time employees, part-time employees and self-employed. For the second cross-section dimension we identify six economic sectors (see table 1). The observation period is from 1991 to 2005. Eventually, we define 18 cross-sections (3*6) that we observe over 15 years, calculating 14 growth rates. Our panel data therefore contains 18*14=252 observations.

⁷ Wolf (1999) uses the dominating occupation of an employee instead of economic sectors. She argues that occupations are more closely related to working time patterns than are sectors.

⁸ For an overview of the development of shift-share analysis and an application see Wolf (2002).

The model (M1a) is plagued by perfect collinearity. To interpret the estimated coefficients as deviations from the average development, we do not exclude one cross section dummy as a reference category but restrict the weighted sum of cross section effects to be zero. As weights we use the average sector and status specific employment shares (Kennedy 1986):

$$(W1) \quad w_{ij} = \frac{\sum_{t=1}^T \frac{e_{ij,t-1}}{e_{t-1}}}{T}$$

with e_{ijt} equals employment in status i in sector j in year t and e_t equals employment in all status and sector categories in year t . We write the first restriction as

$$(R1) \quad \sum_{i=1}^I \sum_{j=1}^J w_{ij} \alpha_{ij} = 0$$

with i =status and j =sector.

Although we use overall cross section effects in Model 1a, we actually want to isolate the influence of either employment status or sector. We therefore further divide the estimated cross section effect $\hat{\alpha}_{ij}$:⁹

$$(M1b) \quad \hat{\alpha}_{ij} = \beta_0 + \beta_i D_i + \beta_j D_j + \varepsilon'_{ij}$$

Again, we eliminate perfect collinearity in model (M1b) by constraints that restrict the sum of properly weighted status-specific coefficients β_i and properly weighted sector-specific coefficients β_j to be zero for the macro-economy:

$$(R2) \quad \sum_{i=1}^I w_i \beta_i = 0 \quad \text{where} \quad w_i = \frac{\sum_{t=1}^T \frac{e_{i,t-1}}{e_{t-1}}}{T}$$

$$(R3) \quad \sum_{j=1}^J w_j \beta_j = 0 \quad \text{where} \quad w_j = \frac{\sum_{t=1}^T \frac{e_{j,t-1}}{e_{t-1}}}{T}$$

⁹ Of course in this simple setting the results would have been the same if we have included D_i and D_j in the first-step model. However, when including metric variables the results deviate between this two-step procedure and a direct estimation. Then we expect better explanatory power when we allow for more flexibility by 18 parameters in the first step instead of only 3+6=9. The significance levels differ already in the simple model because in the second step we estimate 10 parameters out of only 18 observations.

In addition, we weight the regression equations (M1a) and (M1b) by $\sqrt{w_{ij}}$. Through this the sum of sector and status specific growth rates shall equal the average of the Western German economy.¹⁰ As a side-effect the weighting helps us to avoid heteroscedasticity.

As already mentioned this regression analogue shift-share analysis allows us to include metric explanatory variables in addition to the dummy variables. Thus, we can analyse what is behind the explanatory power of the status and sector dummies D_i and D_j . The idea is to detract as much information out of the dummy variables as possible. Variable selection is based on the determinants of labour demand and sectoral change as described in section 3.

The sector effect shows the change in the sectoral composition of the economy, in general the shift from the secondary towards the tertiary sectors. It is reflected by the shares of sectoral gross value added gva_{jt} in total gross value added gva_t . We include the growth rate $ggva_{jt}$ of that share:

$$ggva_{jt} = \frac{(gva_{jt} / gva_t) - (gva_{j,t-1} / gva_{t-1})}{(gva_{j,t-1} / gva_{t-1})} \cdot 100$$

The related coefficient is expected to have a positive sign. The more a sector grows above average, the faster employment in that sector increases.

Capital-intensive production and economical operating hours may influence the demand for full-time and part-time employment. Capital intensity, however, distorts the estimations because it is extraordinarily high in Banking/insurance/business services. In this sector, immovables add to the capital stock but require almost no employees. We choose the growth rate of asset investment gin_{jt} instead. Data on this variable is only available by sector, not status. Therefore, we capture only an average impact on employment growth per sector. The sign of that impact can be either positive or negative depending on whether the income effect or the substitution effect of investment prevails.

Moreover, sectors differ by unit labour costs. This variable portrays the dependence of labour demand on costs and productivity. It measures labour costs including social contributions per employee in relation to real labour productivity. Unit labour costs are given as an index. We use the first lag $ulc_{j,t-1}$. The coefficient is expected to be negative: The higher unit labour costs by sector, the higher are labour costs related to productivity, the less labour will be demanded, and growth of employment in that sector will decline.

¹⁰ The square root is used because OLS estimation has a quadratic structure.

Working time wt_{ijt} in our equation shall test to what extent employers choose between employment and hours worked. We use data by status and sector, thereby controlling for the obvious correlation between the decline in average yearly working hours per capita and the increase in part-time employment. We include working time by status and sector as growth rate gwt_{ijt} :

$$gwt_{ijt} = \frac{(wt_{ijt} - wt_{ij,t-1})}{wt_{ij,t-1}} \cdot 100$$

Although the literature on substitution between employment and working time has not come to a clear result (Marti 2001, Wanger/Spitznagel 2004), we expect the coefficient to have a negative sign. One explanation is in the institutional framework. Since our data contains marginal employment and marginal employment was nerved by law, employment shall rise faster if working times grows at a lower rate. This means that working time and employees are substitutes in the short run. There is a restriction to that interpretation for self-employed, of course. They usually work many more hours than employees, however, labour demand theory does not hold for this decision.

As a fifth variable we include a structural deviation effect. What impact does it have on employment growth in a certain status and sector whether an employment status was established above or below average in that certain sector? In order not to distort the average by the sector in question, we have excluded that sector when calculating the average. e_{ijt} is total employment in status i and sector j at time t .

$$sd_{ijt} = \frac{e_{ijt}}{e_{jt}} - \frac{\sum_{\substack{j=1 \\ j \neq j'}}^J e_{ijt}}{\sum_{i=1}^I \sum_{\substack{j=1 \\ j \neq j'}}^J e_{ijt}}$$

The sign of that deviation effect can be either positive or negative. A positive sign indicates divergence: If part-time employment in the finance sector, for example, is already above average, the growth rate of part-time employment in the finance sector will rise, further enlarging the difference from the average. Thus, different kinds of employment probably meet sector-specific needs (flexibility, divisibility of work, opening hours). This is why sectors tend to focus on kinds of employment that are advantageous and therefore typical of them anyway.

A negative sign indicates convergence: If part-time employment in the finance sector is already above average, the growth rate of part-time employment in the finance sector will

decrease, making the difference from the average smaller. Then the sector specific needs obviously do not exist or are completely met already (saturation).

The extended model is written as

$$\begin{aligned}
 (M2a) \quad ge_{ijt} = & \alpha_t D_t \\
 & + \alpha_{ij} D_{ij} \\
 & + \gamma gva_{jt} \\
 & + \eta gin_{jt} \\
 & + \delta ulc_{j,t-1} \\
 & + \lambda gwt_{ijt} \\
 & + \mu sd_{ijt} \\
 & + \varepsilon_{ijt}
 \end{aligned}$$

and estimated under restriction (R1).

Again, we decompose the remaining cross section effect under restrictions (R2) and (R3):

$$(M2b) \quad \hat{\alpha}_{ij} = \beta_0 + \beta_i D_i + \beta_j D_j + \varepsilon'_{ij}$$

Again, both models are weighted by $\sqrt{w_{ij}}$.

Finally, we expect contractual relations on the labour market and labour market regulations slow down the speed of adjustment to changed circumstances on the factor or goods markets. To account for this argument we include the lagged employment growth as explanatory variable, this means we specify a dynamic panel data model (M3a). Moreover, the Wooldridge test (Wooldridge 2002, pp. 274 ff., Drukker 2003) detects serial correlation of first order after estimating model (M2a). This serial correlation is also eliminated by including the lagged endogenous variable.

For model (M1a) and (M2a) we apply restricted weighted least squares dummy variable estimation. Since the disentangling models (M1b, M2b) are estimated from just 18 observations we use a bootstrap approach for statistical inference. Doing 10,000 replications we apply the widely used percentile method (Efron/Tibshirani 1986) to derive the bootstrapped confidence intervals.

For the dynamic model this is not an adequate procedure. The standard LSDV estimator of a dynamic panel model provides biased and inconsistent estimates for finite time horizon T and $N \rightarrow \infty$ (Nickell 1981). Several alternative estimators, which are consistent, have been discussed in the literature. Most of them are based on internal instrumental variables (Anderson/Hsiao 1982, Arellano/Bond 1991, Blundell/Bond 1998). These estimators need a

large number of cross sectional units N , as it is typical of micro panel data sets. In our case with just small $N=18$ but $T=14$ the various IV/GMM-type estimators can be severely biased and imprecise. This was shown for example by Judson/Owen (1999) in their Monte-Carlo study. For macro panel data sets they favour the bias corrected least square dummy variable (LSDVc) estimator (Kiviet 1995, 1999, Bun/Kiviet 2003, Bun/Carree 2006) as the appropriate estimation strategy. The idea here is to correct for the bias of the LSDV estimator by an approximation which is based on a consistent estimator like the Arellano/Bond GMM estimator. A Stata routine *xtlsdvc* for this estimator is provided by Bruno (2004, 2005). Furthermore, the routine uses a bootstrap approach for estimating the variance-covariance matrix of the estimated coefficients, which explicitly takes into account the autoregressive data generation process.

As a drawback in our context, *xtlsdvc* is not computable with properly weighted restrictions. However, the restriction as such does not influence the decomposition results because one can transform restricted and unrestricted estimates into each other (Suits 1984, Kennedy 1986). We only have to correct for the weights subsequently. However, since we use weighted cross section effects as endogenous variable in the second step, we can use the cross section effects just as they are calculated by *xtlsdvc*. The remaining constant deviation between coefficients after transformation will only enlarge the constant term in the decomposition estimation and therefore does not affect the estimation of the dummy coefficients (see appendix). The following disentangling model again is estimated under restrictions (R2) and (R3) with 10,000 bootstrap replications:

$$(M3b) \quad fe_{ij} = \beta_0 + \beta_i D_i + \beta_j D_j + \varepsilon'_{ij}$$

5 Estimation results

Estimation results of all three models can be seen in table 2.

5.1 Simple shift-share analysis

The simple shift-share analysis reveals a significant effect of upswing years 1992 and 1998 till 2000. The only negative significant effect is in year 2003, a year of unexpectedly bad economic performance.

Table 2: Estimation results

				1	2	3			
dependent variable:				LSDV (simple)		LSDV (extended)		LSDVc	
yearly percentage change of employment by sector and status				coeff.	sign.	coeff.	sign.	coeff.	sign.
1	lagged endogenous							0.4856	***
2	year	1992		1.6322	***	8.7762	***		
3		1993		-0.4903		7.9710	***	-0.8683	
4		1994		-0.1079		8.5907	***	0.4462	
5		1995		0.2919		8.7052	***	0.3920	
6		1996		0.1985		8.6358	***	0.0229	
7		1997		0.4119		8.7754	***	0.1792	
8		1998		1.5372	***	9.5354	***	0.8392	*
9		1999		1.5945	***	9.1980	***		
10		2000		2.2639	***	10.0799	***	0.8898	*
11		2001		0.7077	*	9.0292	***	-0.4465	
12		2002		-0.5188		8.0095	***	-0.7203	
13		2003		-1.2062	***	7.4706	***	-0.7380	
14		2004		-0.0455		8.6616	***	0.6500	
15		2005		-0.3581		7.9087	***	-0.5285	
16	cross section	Self	Construction	2.2371	**	2.4088	**		
17		Self	Private / social / public services	3.8571	***	4.8138	***		
18		Self	Banking / insurance / business services	4.4478	***	3.7324	***		
19		Self	Trade / hotel & catering / transport	-0.2137		-0.0233			
20		Self	Agriculture / fishery	-4.8394	***	-10.6890	***		
21		Self	Manufacturing / energy	-0.7537		1.2019			
22		Part-time	Construction	3.6135	**	6.1496	***		
23		Part-time	Private / social / public services	4.5321	***	3.2035	***		
24		Part-time	Banking / insurance / business services	6.6478	***	5.6362	***		
25		Part-time	Trade / hotel & catering / transport	3.8171	***	3.5906	***		
26		Part-time	Agriculture / fishery	4.1878	*	7.6331	***		
27		Part-time	Manufacturing / energy	1.7063	***	4.3349	***		
28		Full-time	Construction	-3.1787	***	-3.6842	***		
29		Full-time	Private / social / public services	-1.1201	***	0.5603			
30		Full-time	Banking / insurance / business services	1.9185	***	3.1862	***		
31		Full-time	Trade / hotel & catering / transport	-1.4451	***	0.9687			
32		Full-time	Agriculture / fishery	-1.8922		5.3536	*		
33		Full-time	Manufacturing / energy	-2.9294	***	-5.8058	***		
34	growth of share of gross value added					0.0728	***	0.0588	*
35	growth of asset investment					0.0789	***	0.0864	***
36	unit labour costs					-0.0888	***	-0.0521	**
37	growth of working time					-0.2765	***	-0.2120	**
38	structural deviation					0.1368	**	0.0914	
Decomposition: Restricted WLS									
dependent variable: cross section effects				coeff.	sign.	coeff.	sign.	coeff.	sign.
39	sector	Construction		-1.1688		-1.4369		-0.7611	
40		Private / social / public services		0.6180	**	1.3551		0.8164	
41		Banking / insurance / business services		3.2352	***	3.7310	*	2.0486	
42		Trade / hotel & catering / transport		-0.1586		1.3437		0.8546	
43		Agriculture / fishery		-3.8446		-4.8374		-2.6560	
44		Manufacturing / energy		-1.5548	**	-3.9706		-2.3838	
45	status	Self		0.9669		-0.0201		-0.0002	
46		Part-time		3.8471	***	2.9674	***	1.3149	***
47		Full-time		-1.4502	***	-0.9999	*	-0.4444	
48	w			-0.0002		-0.0007		4.9490	***

Remarks: *** (**, *): significant at the 1 (5, 10) percent level.

Source: DESTATIS, IAB (FB 4), own estimations.

All cross sections except for self-employment in Trade/hotel & catering/transport and Manufacturing/energy as well as full-time in Agriculture/fishery differ significantly from the average. With the signs of all part-time cross sections being positive, the estimation results confirm the tremendous upswing in part-time employment. On the other hand, all but one full-time cross sections show negative signs. This highlights the outstanding role of Banking/insurance/business services throughout the period under consideration. It was the only sector with rising full-time employment and it had the most influence on part-time employment as well.

When disentangling the cross section effect into sector and status effects, a lot of significance disappears due to fewer degrees of freedom. Nonetheless, the most influencing sectors keep their significance, with employment in Banking/insurance/business services and Private/social/public services growing significantly above average and employment in Manufacturing/energy growing significantly below average. This means that employment in Manufacturing/energy shrunk not only because of a high proportion of full-time. Even if this sector had had the same employment structure as all sectors on average, employment in Manufacturing/energy would have grown 1.6 percentage points below average growth.

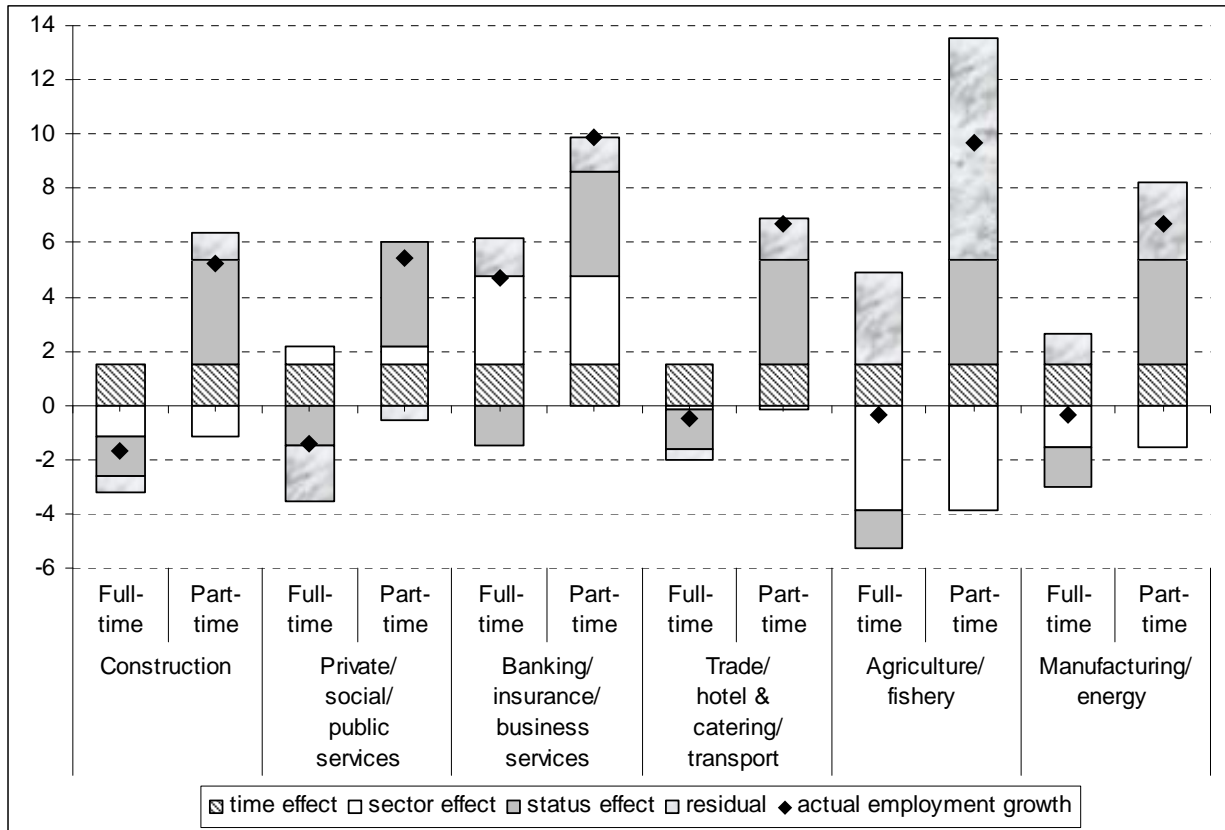
As expected, part-time has a large positive impact and full-time a negative impact. Both are highly significant. If part-time employment had been present in all sectors equally, it would have grown 3.8 percentage points above average. This is a large status effect that might be due to flexibility and other reasons mentioned in the literature overview. However, part-time employment even grew 4.2 percentage points above average – partly because it was overrepresented in growing sectors like Banking/insurance/business services. Thus, part of the rise in part-time is actually due to the dominance of this status in growing sectors, but this is not the crucial factor.

Figure 3 shows the decomposition of employment growth by sector and status effects in 1998 which is the middle of our period of consideration. A positive time effect of that year raises employment growth in all cross sections equally. However, it can hardly compensate for the negative status effect of full-time. Only the positive sector effect of Banking/insurance/business services is large enough to yield an increase in full-time employment. The positive part-time effect, on the other hand, usually more than compensates negative sector effects.

Obviously, sector as well as status influence employment growth. However, the status effect is often larger and dominates the sector effect. The regression analogue shift-share model

confirms the results of previous deterministic ones such as Walwei/Werner (1995) for Germany.

Figure 3: Simple shift-share analysis: decomposition 1998, percent/percentage points



Source: DESTATIS, IAB (FB 4), own estimations.

5.2 Extended shift-share analysis

The model extension by metric variables aims at giving some clue of what is behind the cross section effects. Looking first at the results for the dummy variables, economic boom years still have the highest coefficients.¹¹ Moreover, all metric variables have a significant influence on employment growth. The growth of shares of sectoral gross value added in total gross value added $ggva_{jt}$ explains a rising employment growth rate to some extent. The faster that share had grown, indicating a higher importance of a sector, the faster employment in that

¹¹ The intercept shifts according to the metric variables, heavily enlarging the coefficients of the years and making all of them highly significant. This cannot be interpreted in comparison to the simple shift-share analysis.

sector had grown. This result indicates that the change in the sectoral composition of the economy has a proportional impact on employment. Moreover, the growth of asset investment gin_{jt} positively influences employment growth. The income effect seems to outperform the substitution effect and/or capital and labour are not perfect substitutes. In addition, unit labour costs are an important factor. If the index of unit labour costs $ulc_{j,t-1}$ had risen by one point in the pre-period, employment growth would have shrunk by 0.1 percentage points.

Growth of working time gwt_{ijt} reveals a significant substitution effect in the short run. Part-timers in Manufacturing/energy, for instance, experienced the largest decrease of working time, whereas working time in full-time cross sections increased a bit. If working time by cross section had grown faster by one percentage point, employment growth in that cross section would have slowed down by 0.3 percentage points.

The structural deviation sd_{ijt} has a positive sign, indicating divergence. To give an example interpretation: Part-time employment is overrepresented in the sector Banking/insurance/business services. This positive deviation from the average is even enhanced slightly because it goes along with a further rising growth rate of part-time employment in Banking/insurance/business services by 0.1 percentage points. Therefore we suppose that part-time work meets specific needs of the sector Banking/insurance/business services, such as flexible working hours. In general, the deviation effect proves that certain employment schemes are more advantageous for some sectors than they are for others.

The metric variables do affect the cross section dummies, but all part-time cross sections keep their positive sign. The impact of the model extension is especially striking within the full-time cross sections. Some of them lose their significance. However, the most important full-time sectors – the rising sector Banking/insurance/business services and the shrinking sectors Construction and Manufacturing/energy – are significant and show the expected positive and negative sign respectively.

After the metric variables have explained a lot of the cross section variation, disentangling these effects leaves only a few dummy variables significant. However, the expected signs show up. Since the economic variables mostly vary across sectors, not status, they are able to capture most of the sector effect. Banking/insurance/business services is the only sector that remains significant. This result can be traced to the tremendous increase of the financial sector as well as to other market phenomena during the phase of the New Economy. The importance of business services such as IT engineering and consulting rose sharply. In addition,

outsourcing became a widespread strategy which mostly concerned business services, again IT services or facility management, for example.

The economic variables explain less of the status effect which the simple shift-share analysis had proved dominant anyway. Although the part-time effect diminished a bit it is still highly significant. Other things being equal, part-time employment grew 3.0 percentage points above average. The same holds for full-time employment – with the expected negative sign and significance at the 10 percent level.

5.3 *Extended shift-share analysis with lagged endogenous variable*

Roughly half of the employment growth in the pre-period is transferred into the current period. Due to the new metric variable, the years' coefficients shift again. With the exception of the structural deviation, the short term effects of all economic variables are significant. This remains true for the long term effects, too (table 3).

Table 3: Long term effects

dependent variable: yearly percentage change of employment by sector and status	LSDVc	
	long term effect	sign.
growth of share of gross value added	0.1142	*
growth of asset investment	0.1680	***
unit labour costs	-0.1013	***
growth of working time	-0.4122	**
structural deviation	0.1777	

Source: DESTATIS, IAB (FB 4), own estimations.

The parameters of the sector and status effects (table 2) are smaller than they had been without lagged employment growth. All but one do no longer differ significantly from the average. Thus, either much of the employment decision is made according to the experience in the pre-period or labour adjustment just needs time.

The economic variables and the lagged endogenous jointly are not able to capture the part-time effect which is still highly significant. This result justifies two conclusions: First, the growth of part-time employment in Western Germany was extraordinary. Second, this development can be traced neither to the prosperity of sectors with a high part-time ratio nor to economic arguments such as the adjustment process or labour costs. There are still determinants inherent in part-time that were not fully captured, flexibility or institutional

advantages, for example. However, these characteristics make the status of part-time deviate positively from the average.

6 Summary and conclusions

In this article, we analyze to what extent the increase in part-time employment and the decrease in full-time employment in Western Germany depend on the change of the sectoral composition of the economy or on status-inherent factors. Previous studies on this topic conduct deterministic decomposition analyses of employment growth. We use a regression approach, instead. In order to interpret the results as deviation from national average employment growth, we include not only full-time and part-time employment, but self-employment as well. Moreover, we extend the simple model by economic variables and lagged employment growth. Thus, we estimate a dynamic panel data model. The main results are the following.

First, part-time employment rose and full-time employment fell due to status inherent factors such as flexibility needs or adjustment costs. The part-time effect is outstanding. Second, the sectoral composition of the economy and its change towards service sectors supported the vivid increase of part-time and decline of full-time employment. But it did not dominate these tendencies. Third, much of the sector effect is accounted for by economic variables such as unit labour costs and a sector's share in total gross value added. Fourth, the negative impact of the growth of working time on employment growth suggests working hours and employment being substitutes in the short run. And finally, there seems to be hardly any adjustment process towards an average employment scheme.

Since our analysis confirmed that status inherent factors determine the development of employment schemes to a large degree, policy makers should be aware of these distinctions. They probably meet employers' needs better than traditional employment patterns. Moreover, they provide not only employers with flexibility but also parts of the labour force that have to reconcile work and other responsibilities. Therefore it helps increasing the participation rate and employment. However, part-timers face disadvantages in Germany, too (Rubery 1998): On average, they get fewer earnings, less training and receive less claims to the public pension system. From that qualitative point of view, the future task in science and politics shall be how to reconcile the pros and cons of the examined development.

7 Appendix: How to transform LSDVc fixed effects

The corrected least square dummy variable (LSDVc) estimation procedure is not computable in STATA with properly weighted cross section dummies and properly weighted restriction. However, as we disentangle this effect in the second step (M3b), we need cross section parameters as if we had used both proper weights and properly weighted restriction.

We derive our transformation algorithm from the model without lagged endogenous variable (M2a). It is the only one that can be estimated comparably, first, with the least square dummy variable (LSDV) estimator and, second, with the standard fixed effects estimator (within-transformation, FE). According to the Frisch-Waugh theorem these two strategies are compatible. They provide equal estimators for the parameters and equal predictions of the endogenous variable. Therefore, we set our starting point as

$$(1) \quad \hat{y}_{ijt}^{LSDV} = \hat{y}_{ijt}^{FE}$$

$$\sqrt{w_{ij}} \hat{\alpha}_t^{LSDV} + \sqrt{w_{ij}} \hat{\beta}_{ij}^{LSDV} + \sum_{k=1}^K \hat{\gamma}_{kijt}^{LSDV} x_{kijt} = \hat{c}^{FE} + \sqrt{w_{ij}} \hat{\alpha}_t^{FE} + \hat{\beta}_{ij}^{FE} + \sum_{k=1}^K \hat{\gamma}_{kijt}^{FE} x_{kijt}.$$

Because of the Frisch-Waugh theorem $\hat{\gamma}_{kijt}^{LSDV}$ and $\hat{\gamma}_{kijt}^{FE}$ are equal. We cancel them from the equation. This cannot be done with the parameters of the time dummies. Since the standard fixed effects model contains a constant one has to exclude one time dummy variable as the benchmark category. Further transformations therefore contain the constant value of that benchmark category. It is equal to the difference between the time dummies' parameters of the two estimation strategies. The next transformation step can then be written as

$$(2) \quad \sqrt{w_{ij}} \hat{\beta}_{ij}^{LSDV} = \sqrt{w_{ij}} (\hat{\alpha}_t^{FE} - \hat{\alpha}_t^{LSDV}) + \hat{c}^{FE} + \hat{\beta}_{ij}^{FE}.$$

$\sqrt{w_{ij}} \hat{\beta}_{ij}^{LSDV}$, the weighted cross section effect, is the endogenous variable in the second step estimation (M2b, M3b). In contrast to the isolated estimation of c^{FE} and β_{ij}^{FE} in the standard fixed effects estimation, LSDVc estimates $c^{FE} + \beta_{ij}^{FE}$ as combined measure. For the estimation of model M3b we do not have to adjust the implicit fixed effects. The remaining term $\sqrt{w_{ij}} (\hat{\alpha}_t^{FE} - \hat{\alpha}_t^{LSDV})$ is captured by the constant in model M3b. This is why it gets highly significant only in the LSDVc disentangling procedure.

To be complete, the following equation specifies the final transformation step.

$$(3) \quad \hat{\beta}_{ij}^{LSDV} = (\hat{\alpha}_t^{FE} - \hat{\alpha}_t^{LSDV}) + \frac{\hat{c}^{FE}}{\sqrt{w_{ij}}} + \frac{\hat{\beta}_{ij}^{FE}}{\sqrt{w_{ij}}}$$

8 Literature

- Anderson, T. W. / Hsiao, C. (1982): Formulation and estimation of dynamic models using panel data, *Journal of Econometrics* 18, pp. 67-82.
- Arellano, M. / Bond, S. (1991): Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations, *The Review of Economic Studies* 58, 2, pp. 277-297.
- Blundell, R. / Bond, S. (1998): Initial conditions and moment restrictions in dynamic panel data models, *Journal of Econometrics* 87, pp. 115-144.
- Dunn, E. (1960): A statistical and analytical technique for regional analysis, *Papers of the Regional Science Association* 6, pp. 97-112.
- Blien, U. / Haas, A. (2005): Service industries and regional development. An analysis for Eastern Germany with an econometric analogue to shift-share techniques, *The Service Industries Journal* 25, 8, pp. 979-997.
- Bruno, G. S. F. (2004): estimation, inference and Monte Carlo analysis in dynamic panel data models with a small number of individuals, *Contribution to the First Italian Stata Users Group meeting*, downloadable from the Internet on www.stata.com/meeting/1italian/bruno.pdf.
- Bruno, G. S. F. (2005): Approximating the bias of the LSDV estimator for dynamic unbalanced panel data models, *Economics Letters* 87, pp. 361-366.
- Buddelmeyer, H. / Mourre, G. / Ward, M. (2004): The determinants of part-time work in EU countries: Empirical investigations with macro-panel data, *IZA Discussion paper*, 1361, Bonn.
- Bun, M. J. G. / Carree, M. A. (2006): Bias-corrected estimation in dynamic panel data models with heteroscedasticity, *Economics Letters* 92, pp. 220-227.
- Bun, M. J. G. / Kiviet, J. F. (2003): On the diminishing returns of higher-order terms in asymptotic expansions of bias, *Economics Letters* 79, pp. 145-152.
- Burgess, J. / Gleisner, J. / Rasmussen, E. (1996): Male part-time employment in Australia and New Zealand: a comparative analysis, *International Journal of Employment Studies* 4, 1, pp.95-113.
- Dawkins, P. / Norris, K. (1995): The growth of part-time employment in Australia and the United Kingdom, *Labour Economics and Productivity* 7, 1, pp. 1-27.

- Delsen, L. (1998): When do men work part-time?, in: O'Reilly, J. / Fagan, C. (eds.): *Part-time prospects: an international comparison of part-time work in Europe, North America and the Pacific Rim*, London, New York, pp. 57-76.
- Drukker, D. M. (2003): Testing for serial correlation in linear panel-data models, *The Stata Journal* 3, 2, pp. 168-177.
- Efron, B. / Tibshirani, R. (1986): Bootstrap methods for standard errors, confidence intervals, and other measures of statistical accuracy, *Statistical Science* 1, 1, pp. 54-77.
- Ehler, J. (2005): Zur Entwicklung der Mini- und Midijobs, *Deutsche Rentenversicherung* 60, 6-7, pp. 394-412.
- Ehrenberg, R.G. / Smith, R.S. (2005): *Modern Labour Economics*, 9th ed., Boston.
- Euwals, R. / Hogerbrugge, M. (2006): Explaining the growth of part-time employment: Factors of supply and demand, *Labour* 20, 3, pp. 533-557.
- Franke, R. (2005): Gesamtwirtschaftliche Auswirkungen des technischen Wandels im Industriesektor. Eine Input-Output-Studie mit Endogenisierung des Konsums, in: Huber, G. / Krämer, H. / Kurz, H. D. (eds.): *Einkommensverteilung, technischer Fortschritt und struktureller Wandel*. Festschrift für Peter Kalmbach, Marburg, pp. 271-295.
- Friesen, J. (1997): The dynamic demand for part-time and full-time labour, *Economica* 64, pp. 495-507.
- Houseman, S. N. (2001): Why employers use flexible staffing arrangements: Evidence from an establishment survey, *Industrial and Labour Relations Review* 55, 1, pp. 149-169.
- Houseman, S. N. / Abraham, K. G. (1995): Labour adjustment under different institutional structures. A case study of Germany and the United States, in: Buttler, F. et al. (eds.): *Institutional frameworks and labour market performance. Comparative views on the U. S. and German economies*, London and New York, pp. 285-315.
- Judson, R. A. / Owen, A. L. (1999): Estimating dynamic panel data models: a guide for macroeconomists, *Economics Letters* 65, pp. 9-15.
- Kennedy, P. (1986): Interpreting dummy variables, *The Review of Economics and Statistics* 68, 1, pp. 174-175.
- Kiviet, J. F. (1995): On bias, inconsistency, and efficiency of various estimators in dynamic panel data models, *Journal of Econometrics* 68, pp. 53-78.

- Kiviet, J. F. (1999): Expectation of expansions for estimators in a dynamic panel data model, in: Hsiao, C. / Lahiri, K. / Lee, L.-F. / Pesaran, M. H. (eds.): *Analysis of panel data and limited dependent variables*, Cambridge.
- Klodt, H. / Maurer, R. / Schimmelpfennig, A. (1997): Tertiärisierung der deutschen Wirtschaft, *Kieler Studien* 238, Tübingen.
- Knottenbauer, K. (2000): *Theorien des sektoralen Strukturwandels*, Hochschulschriften 69, Marburg.
- Knudsen, D. C. / Barff, R. (1991): Shift-share analysis as a linear model, *Environment and Planning* 23, pp. 421-431.
- Kohaut, S. / Ellguth, P. (2008): Branchentarifvertrag: Neu gegründete Betriebe sind seltener tarifgebunden, *IAB Kurzbericht*, 16, Nürnberg.
- Leppel, K. / Clain, S. H. (1988): The growth in involuntary part-time employment of men and woman, *Applied Economics* 20, pp. 1155-1166.
- Lester, A. (1999): Labour demand and the economic cycle, *Reserve Bank of Australia Bulletin*, 2, pp. 35-38.
- Marsden, D. (1999): *A theory of employment systems. Micro-foundations of societal diversity*, Oxford.
- Marti, M. (2001): *Substitution between employment and working hours. An empirical analysis for Switzerland*, Bern.
- Möller, J. / Tassinopoulos, A. (2000): Zunehmende Spezialisierung oder Strukturkonvergenz? Eine Analyse der sektoralen Beschäftigungsentwicklung auf regionaler Ebene, *Jahrbuch für Regionalwissenschaft* 20, pp. 1-38.
- Montgomery, M. (1988a): Hours of part-time and full-time workers at the same firm, *Industrial Relations* 27, 3, pp. 394-406.
- Montgomery, M. (1988b): On the determinants of employer demand for part-time workers, *The Review of Economics and Statistics* 70, 1, pp. 112-117.
- Nickell, S. (1981): Biases in dynamic models with fixed effects, *Econometrica* 49, 6, pp. 1417-1426.
- OECD (1999): How do part-time jobs compare with full-time jobs?, *OECD Employment Outlook*, pp. 18-46.
- Osterman, P. (1987): Choice of employment systems in internal labour markets, *Industrial Relations* 26, 1, pp. 46-67.

- Owen, J. D. (1979): Working hours. An economic analysis, Lexington.
- Patterson, M. G. (1991): A note on the formulation of a full-analogue regression model of the shift-share method, *Journal of Regional Science* 31, 2, pp. 211-216.
- Rice, P. G. (1990): Relative labour costs and the growth of part-time employment in British manufacturing industries, *The Economic Journal* 100, pp. 1138-1146.
- Rubery, J. (1998): Part-time work: a threat to labour standards?, in: O'Reilly, J. / Fagan, C. (eds.): *Part-time prospects. An international comparison of part-time work in Europe, North America and the Pacific Rim*, London, New York, pp. 137-155.
- Smith, M. / Fagan, C. / Rubery, J. (1998): Where and why is part-time work growing in Europe?, in: O'Reilly, J. / Fagan, C. (eds.): *Part-time prospects. An international comparison of part-time work in Europe, North America and the Pacific Rim*, London, New York, pp. 35-56.
- Spitznagel, E. / Wanger, S. (2004): Arbeitszeitpolitik: Mit längeren Arbeitszeiten aus der Beschäftigungskrise?, *IAB-Kurzbericht*, 10, Nürnberg.
- Suits, D. B. (1984): Dummy variables: Mechanics v. interpretation, *The Review of Economics and Statistics* 66, 1, pp. 177-180.
- Wachter, T. v. (2001): Employment and productivity growth in service and manufacturing sectors in France, Germany and the US, *ECB Working Paper*, 50, Frankfurt.
- Walwei, U. / Werner, H. (1995): Entwicklung der Teilzeitbeschäftigung im internationalen Vergleich. Ursachen, Arbeitsmarkteffekte und Konsequenzen, *Mitteilungen aus der Arbeitsmarkt- und Berufsforschung* 28, 3, pp. 365-382.
- Wanger, S. (2004): Teilzeitarbeit: Ein Gesetz liegt im Trend, *IAB-Kurzbericht*, 18, Nürnberg.
- Wanger, S. (2006): Arbeitszeitpolitik: Teilzeitarbeit fördert Flexibilität und Produktivität, *IAB-Kurzbericht*, 7, Nürnberg.
- Wolf, E. (1999): Dynamik der Arbeitszeitstruktur: Welche Rolle spielt der Strukturwandel?, in: Lüttinger, P. (ed.): *Sozialstrukturanalysen mit dem Mikrozensus. ZUMA-Nachrichten Spezial* 6, Mannheim, pp. 119-148.
- Wolf, K. (2002): Analyse regionaler Beschäftigungsentwicklung mit einem ökonometrischen Analogon zu Shift-Share-Techniken, in: Kleinhenz, G. (ed.): *IAB-Kompodium Arbeitsmarkt- und Berufsforschung*, BeitrAB, 250, Nürnberg, pp. 325-333.
- Wooldridge, J. M. (2002): *Econometric analysis of cross section and panel data*, Cambridge, Mass., London.

Zeytinoglu, I. U. (1992): Reasons for hiring part-time workers, *Industrial Relations* 31, 3, pp. 489-499.