

Productivity Differences Between Western and Eastern German Establishments

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0 Abstract

The low productivity of eastern German enterprises is frequently seen as an essential reason for them failing to expand and consequently contributing little to easing the strain on eastern Germany's labour market. Using the data from the IAB establishment panel of 1997 it is possible to show that in eastern Germany's manufacturing industry productivity is on average 43% behind that of western Germany. Nonetheless considerable differences can be ascertained between the establishments in the two parts of the country. In accord with other studies it emerged that issues of company organisation and market position play a greater role in explaining the differences in productivity than issues of technical equipment in the establishment. There is a clear deficit of establishments which export and at the same time have a high level of productivity.

1 Introduction

Labour productivity is one of the key quantities for the development of the labour market. In addition to the level of value added it also determines the work input. Thus for example the volume of work falls to the extent to which the growth of hourly productivity exceeds that of production. In this case without a reduction in working hours the manpower requirements would decrease. One of the central tasks of labour market research is therefore to explain the development of productivity. The subject of this paper is the analysis of productivity differences between industrial establishments in western and eastern Germany. The basis of the paper is the IAB establishment panel, a survey with multiple topics which is repeated annually and uses a representative sample of German businesses (cf. for more detailed information, Bellmann 1997).

Eastern Germany's economy was integrated into the western German economy in 1990 by means of economic and monetary union as well as state unification. Suddenly eastern German establishments were exposed to competition on open markets. The obsolete capital stock, the uncompetitive products, the necessary reorganisation of company-internal processes and the loss of previous markets was expressed for most eastern German establishments in low productivity. What is a particularly striking result is the high level of unemployment (between 1992 and 1996 seasonally fluctuating at approx. 16%). The job deficit is clearly higher again (approx. 30%). New jobs will only emerge when eastern German establishments are integrated into the new markets and prove themselves to be competitive there. A necessary prerequisite for this would be a level of productivity roughly as high as that in western German establishments.

Since 1991 the productivity of eastern German establishments, measured as gross value added per hour worked in current prices, has risen and - with the exception of last year - has converged with the average value for western German establishments (cf. *Table 1*). However, a considerable lag in eastern German establishments continues to be detectable, and the catching-up process has slowed down. There is also the fact that from a high starting level western German establishments are also becoming more productive; for eastern German establishments it is therefore a matter of alignment with a movable goal.

Table 1: Development of productivity¹⁾ in eastern Germany 1991 - 1998

1991	1992	1993	1994	1995	1996	1997	1998
32.5	41.1	48.2	51.8	53.5	55.6	56.7	55.8

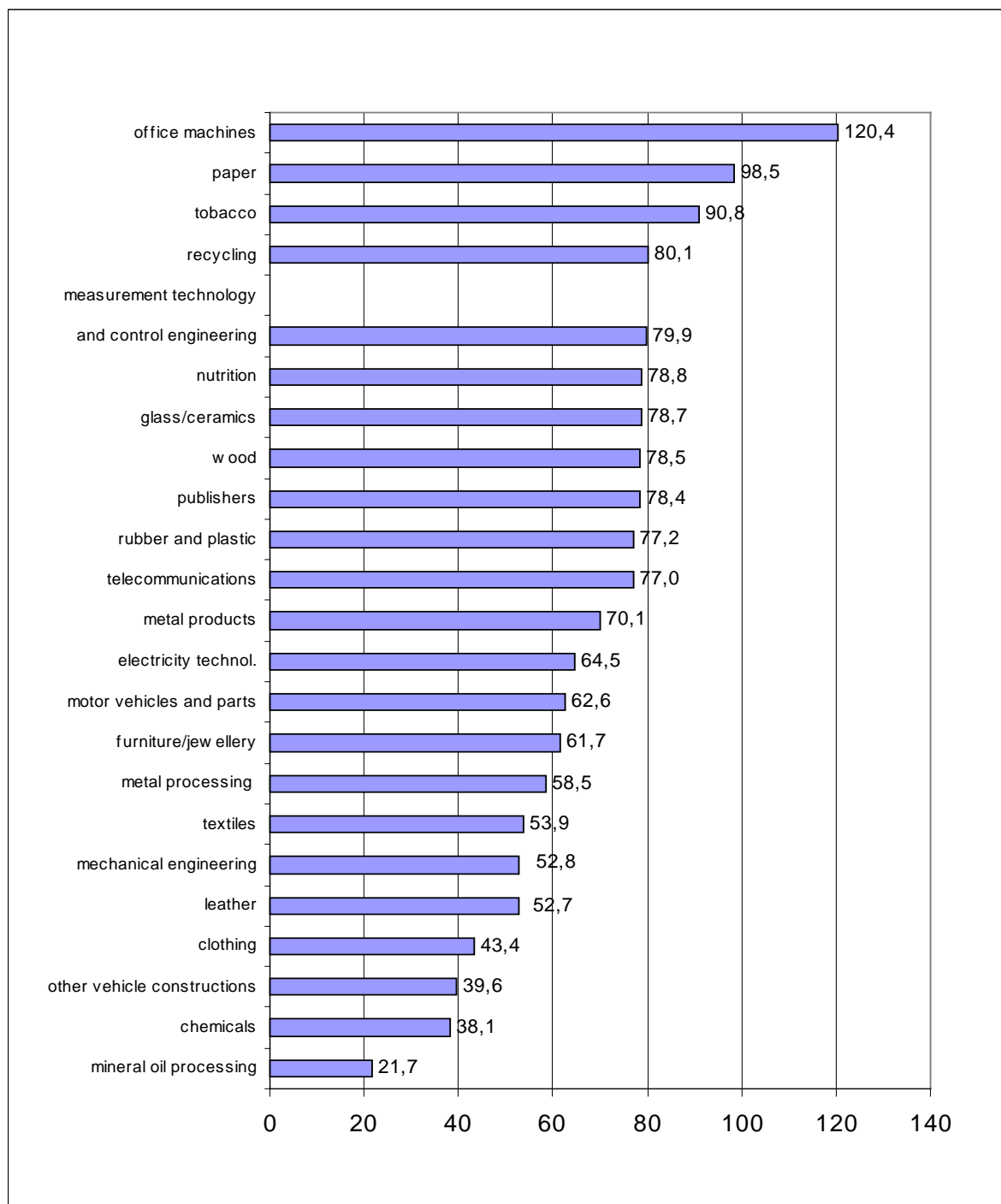
¹⁾ Nominal gross domestic product per hour worked (western Germany = 100)
Source: Federal Statistical Office, vol. 18 series 1.3. - Wiesbaden 1998

This paper deals with three issues. Firstly the extent of the productivity gap is disputed (cf. for example: Lay 1998, Müller 1999 and Felder/Spielkamp 1998). A frequently selected empirical starting point is the official statistics for the manufacturing industry, which, however, only cover establishments with at least 20 employees. Most of the establishments in both western and eastern Germany, though, have fewer than 20 employees also in the manufacturing industry. Furthermore in studies that do not take into account the volume of work, in other words the actual hours worked, but determine the gross value added per employee, or include price effects on the sales side (revenue) or the purchaser side (purchase price), obtain different, and in some cases very different, values for the productivity gap.

Secondly there is still very little information about the *heterogeneity* of eastern German establishments - as there is about western German ones, too. Is the business landscape in the new *Länder* divided into a few highly productive and modern branch establishments of western German and international groups on the one hand and a large number of establishments that only survive for a short time, businesses that are economically weakened and "new businesses set up from necessity" on the other hand? Is the business landscape in the old *Länder* in contrast homogeneously on the basis of universally high productivity? The average figures about productivity used in discussion give a first impression, but they say nothing about the heterogeneity within the particular partial economies.

At sectoral level the productivity of the eastern German manufacturing industry, seen in relation to the level in western Germany, ranged from about 20 percent in the oil processing industry, through a good 50 percent in mechanical engineering, to 120 percent among the manufacturers of office machinery. The productivity gap is about 44% in the eastern German service sector and 23% in the construction industry.

Figure 1: Sectoral productivity differences in eastern Germany's manufacturing industry in 1997



Comments: What is examined is the gross value added per employee in establishments with more than 20 employees (western Germany = 100)

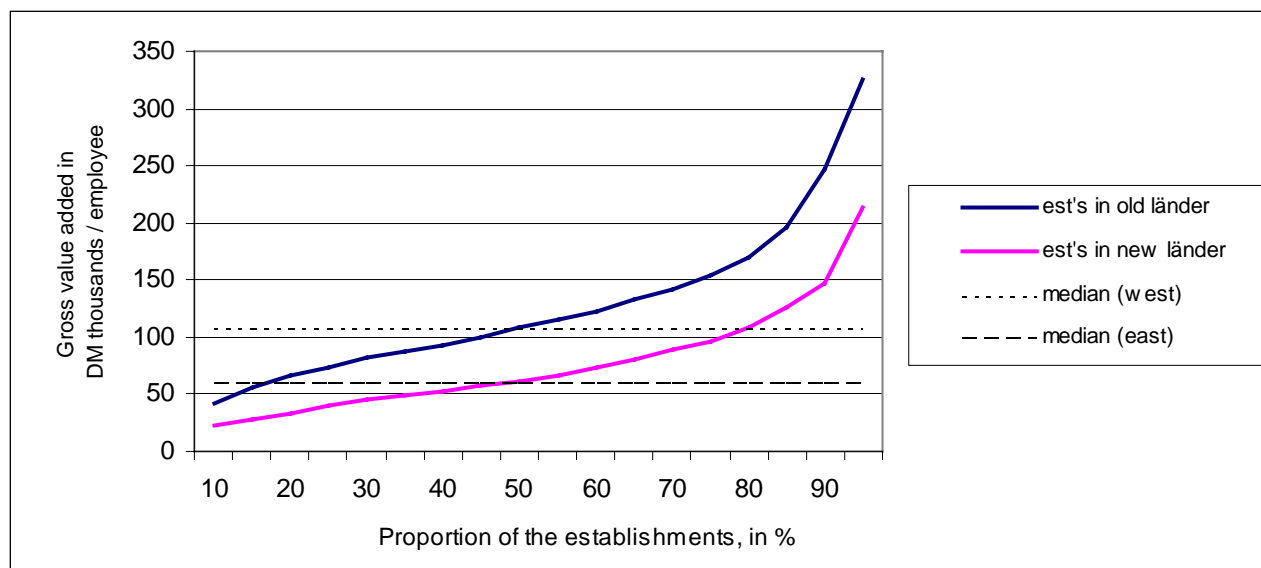
Source: Institut der deutschen Wirtschaft (Cologne Institute for Business Research) 1999a, p.5

Thirdly the *causes of the productivity gap* are disputed. Although in the meantime there are a number of hypotheses, they are generally not seen in relation to each other. As a result of its

diversity of topics the IAB establishment panel provides the possibility of testing several hypotheses comparatively.

2 The extent of the productivity gap

Figure 2: Gross value added per employee in eastern and western German establishments



Source: IAB establishment panel 1997 (2nd wave eastern Germany, 5th wave western Germany).

Figure 2 shows the productivity of eastern and western German establishments in the manufacturing industry. The graph shows the establishments beginning with the establishment with the lowest productivity up to the most productive establishment (with the exclusion of the best and worst 5%). The average eastern German establishment has a gross value added of approx. DM 61,000 per year per employee, which is equivalent to an east-west relation of 57.1% (western Germany: approx. DM 108,000 per year per employee).

It is also clear from *Figure 2* that at least some eastern German establishments (approx. 20%) are above the median value of western German establishments. Conversely only a fifth of western German establishments come off worse than the average eastern German establishment. It is therefore possible to detect not only poorer average values but also clear and widespread productivity deficits in establishments in the new *Länder*. Eastern German establishments thus demonstrate a similar distribution of productivity with a generally lower level of production.

Thirdly *Figure 2* gives an impression of the heterogeneity among eastern and western German establishments. Establishments in the old *Länder* are not less heterogeneous than those in the new *Länder*, as can be seen from the uniformity of the curve. With regard to the productivity of labour, it is therefore not the case that the business landscape in the east is exceptionally strongly differentiated and that in the west homogeneously at a high level.

3 Three hypotheses on the causes of the productivity gap between eastern and western German establishments

In this section the productivity differences of eastern and western Germany's establishments are considered in relation to *one* characteristic at a time. The results are, however, in accord with the multivariate analyses by Bellmann and Brüssig (1998) (which are not shown here).

- 1) First of all it is assumed that the lag in productivity is caused by the different composition of the stock of establishments in the new and the old *Länder* ("structural effect hypothesis"). What is striking is the large proportions of smaller establishments - which are known to have low productivity - in the new *Länder*, which are clearly greater than in the old *Länder*. This is a result of the structural change in the new *Länder* with some 550,000 new business start-ups (1990-1996, about 150,000 closed down in the same period), of the cuts in employment in almost all state-owned enterprises and the restructuring of state-owned enterprises in the privatisation process. At sectoral level the differences were considerable at the beginning of the economic transformation, but then the sectoral structure in the GDR in 1990 was roughly equivalent to that in the Federal Republic of Germany in 1970.

In the meantime the old and new *Länder* only differ slightly at industry level. In both eastern and western German establishments productivity is highest in the raw materials industry and clearly lower in the consumer goods industry. The eastern German productivity level varies between the industries and ranges from 52.5% in the raw materials industry to 58.2% in the capital goods industry.

On the other hand the establishment size structure in the manufacturing industry differs considerably in the old and new *Länder* with a predominance of smaller and medium-sized establishments in the new *Länder*. If one starts from the hypothetical assumption of an establishment size structure like that in the old *Länder*, the mean productivity only increases by approx. 5 percentage points because the productivity differences between east and west in the small establishment sizes are not as high as they are in the large and above all in the medium-sized ones.

- 2) In the *second hypothesis* the market position is assumed to be decisive for the productivity of an establishment (*market position hypothesis*). It is frequently argued that the progress made in productivity is not effective because the capacity utilisation in eastern German establishments is low, the demands of access to new markets are high and take time and because eastern German establishments are only able to make low revenue owing to reputation problems but on the other hand have to pay high prices. However, these factors can just as easily be the result of a productivity level that really is low. Indicators for this hypothesis are the utilisation of productive capacities, the share of the export market, as well as the proportion of the sales effected in the close vicinity.

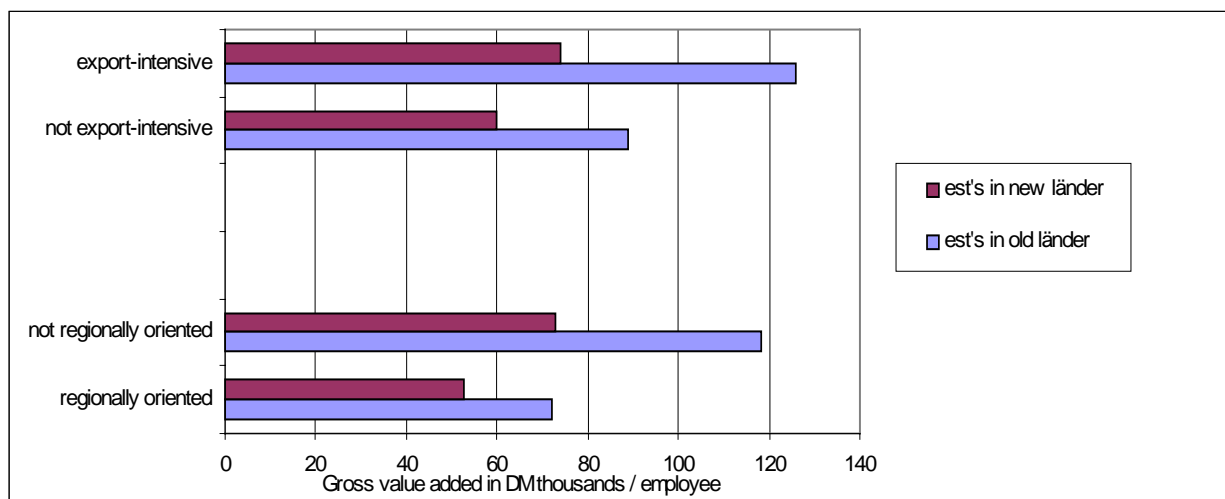
It can be seen that the productivity of the establishments without full capacity utilisation in the new *Länder* is only slightly poorer than that of the establishments working at capacity. Furthermore in 1996 the capacity utilisation rate of eastern and western German establishments differed only insignificantly.

What is informative on the other hand is a comparison of the export performance. Two thirds of eastern German establishments do not export at all; half of the establishments that

do export realise at most 12% of their sales abroad. In western Germany, however, two thirds of the establishments export, that is twice as many as in the new *Länder*, and they generally export more intensively as well: half of the western German establishments that do export realise at least a third of their total sales in export.

Figure 3: Market position and productivity in an east-west comparison of establishments in the manufacturing industry

* export-intensive = at least 17% of sales in export; not export-intensive = less than 17% of sales in export



Source: IAB establishment panel 1997 (2nd wave eastern Germany, 5th wave western Germany)

The productivity gap between eastern and western German establishments differs clearly if eastern and western German establishments are classified according to their market position. An establishment was classified as "export-intensive" if its level of export was above average in relation to the entire sample. The productivity gap is *greater* in the export-intensive establishments than in those that are not export-intensive (east-west relation of the export-intensive and not export-intensive establishments: 58.9% and 67.4% respectively). Although the eastern German export-orientated establishments on which "hopes are pinned" are productive within the eastern German comparison, compared with western German strong exporters they fall further behind.

If eastern German establishments succeed in gaining a foothold on export markets, they obtain on average only relatively low prices, which reduces the productivity in figures. Müller (1999) has attempted to quantify this effect and determines a productivity of eastern German establishments of 80%, under the assumption that eastern German establishments yield the same revenue and pay the same purchase prices as western German businesses. Just like weak export performance, low revenue can be a cause of low productivity if establishments wish to use a low price strategy deliberately to open up new markets. They can, however, also be the result of actual competition weaknesses. In a survey of eastern German metal and electrical establishments at least a quarter of the establishments interviewed reported that (too) high prices for location-specific outlays such as energy, water and sewage were factors that increased costs and reduced value added (cf. Hachmann, Kühn, Schuldt 1998, 42).

Obviously many eastern German establishments are not sufficiently well-represented on their foreign sales markets or their business developments are failing. That is at any rate what emerges from a survey carried out by the Cologne Institute for Business Research (Institut der deutschen Wirtschaft) (1999b). Last year the Cologne Institute for Business Research asked 71 Chambers of Industry and Commerce Abroad and Offices of Delegates of the German Economy about the reasons. The three most common replies are as follows:

- About 80 percent of the Chambers of Industry and Commerce Abroad say that the foreign business of eastern Germany's establishments frequently or often fails as a result of weaknesses in customer service, problems with foreign calls for tenders and overly high prices.
- Over 70 percent of the Chambers see shortcomings in marketing, about 60 percent see an insufficient degree of fame of eastern German products and inadequate knowledge of the markets.
- Almost 90 percent of the innovative businesses in eastern Germany have either reduced their planned advertising budget or cancelled it altogether.

Further negative consequences for eastern German establishments arise from the weak market position, and these can further intensify the productivity deficit of eastern Germany's establishments. These include the niche policy of the establishments which encourages a tendency towards single-product businesses. In the case of customer-specific products, however, there is frequently only a low ability to assert prices, in particular when the purchaser could switch to other suppliers (cf. Hachmann, Kühn, Schuldt 1998, 66ff.).

Productivity also depends on whether an establishment is an independent firm, a branch establishment or a head office. The gross value added per employee is highest in branch establishments in both eastern and western Germany. It is possible that it is the integration in a holding and the division of work between the participating establishments that enables branch establishments to yield high revenue with relatively little staff. In this context, however, deficits in the transport infrastructure - in particular the inadequate degree of development of motorways and the unsatisfactory national rail connections - prove to be an important locational disadvantage for eastern Germany's establishments.

- 3) In the third hypothesis to explain the productivity lag in the new *Länder*, a poorer level of technical equipment and deficits in the company organisation of work are taken as a basis ("company equipment hypothesis"). At the start of the economic transformation the production technology which was still obsolete and technologically less advanced was regarded as one of the main causes of the productivity gap at that time (cf. Birnie/Wagner/Hitchens 1993a, b). The central characteristic of company equipment is the *furnishing with production technology*, which was ascertained in the IAB establishment panel in the form of an assessment by the particular interview partner in the establishment. A positive correlation between productivity and technical equipment is to be expected.

What is remarkable is that *eastern German small businesses* often have a better opinion of their technical equipment than western German small businesses. The keen investment activity in the new *Länder* since 1990 has obviously led to differences in the production technology used no longer playing much of a role. As far as western German establishments are concerned it can be seen that the better the technical equipment is assessed in western German establishments, the higher the productivity is, too. The hypothesis about a positive correlation between productivity and technical equipment is confirmed. For eastern German establishments such a correlation can not be ascertained. This confirms available studies (e.g. Mallok 1996) which report that modern technology is

not enough, but only brings gains in productivity when it is embedded in appropriate company organisation (cf. Mallok 1996).

In order to reinforce the organisation aspect, the *personnel structure* of the establishment is now to be examined. The qualification structure of an establishment is referred to as an indicator for the organisation of the establishment. Two questions have to be answered: firstly, is there a difference in the personnel structures in eastern and western establishments, and secondly, is there a difference in the correlations between qualification potential in an individual establishment and productivity?

The most striking difference in the personnel structures of eastern and western German establishments in the manufacturing industry is the large proportion of skilled workers in eastern German establishments (cf. *Table 2*): over half of the employees were reported as skilled workers, whereas in western German establishments it was only a third. However, the proportion of blue-collar workers (skilled workers and unskilled workers) is just under two thirds in each case. Here the high level of formal training, which developed in the GDR before 1990 and from which eastern Germany's establishments are still living today, is reflected at the skilled worker level. On the basis of this data little can be said about the actual demands made of the skilled workers with regard to their activity, and their positions in the working organisation of the establishment.

The proportion of qualified white-collar workers is similar in total in eastern and western German establishments (25% and 19% respectively). There are, however, considerable differences regarding establishment size: the proportion of qualified white-collar workers in eastern German establishments with fewer than 200 employees is always below 20%, only in larger establishments is it between 27% and 30%. In western German establishments with more than 50 employees at least a quarter of the employees on average are qualified white-collar workers. In small and medium-sized enterprises in eastern Germany there is therefore not a surplus of qualified white-collar workers but - taking the establishments of the old *Länder* as a yardstick - more of a deficit.

Studies carried out by Wahse and Schäfer (1998) using the IAB establishment panel show that there are obviously problems in the "acquisition" of qualified white-collar workers. This could be attributable to the fact that

- it is important for eastern German establishments that especially their white-collar workers have experience in the fields of marketing and management. In practice, however, it is found that qualified white-collar workers - if at all - are often just recruited straight from university. The necessary in-plant and practical experience is not available sufficiently in these cases.
- hardly any job applicants can be registered in the west-east direction. The reason for this is in particular the income difference which still exists.
- the out-migration rate of qualified workers remains high.

Table 2: Personnel structure and productivity in the manufacturing industry

Proportion of the employees who are	Old <i>Länder</i>		New <i>Länder</i>	
	Proportion of employees in % (mean)	Correlation with productivity (Pearsons r)	Proportion of employees in % (mean)	Correlation with productivity (Pearsons r)
unskilled and semi-skilled workers	27.8	-0.065*	11.6	-0.054
skilled workers	32.6	-0.071*	51.7	-0.015
white-collar workers without training	5.0	-0.033	2.4	-0.047
qualified white-collar workers	25.1	0.314***	19.1	0.176***

Source: IAB establishment panel 1997 (2nd wave east, 5th wave west)

Remarks: ***/**/* significant at 1%/5%/10% level. The proportions of employees do not total 100% because trainees, working proprietors and (unpaid) family workers are not taken into account.

There are clear differences in the correlation between the qualification structure and productivity. The proportion of qualified white-collar workers in western German establishments is far more highly correlated with productivity than in eastern German establishments. The fact that more qualified white-collar workers work in western German establishments than in eastern German ones is therefore not decisive. They are above all - at least it appears to be so in figures - more effective for the productivity of the establishment, since here the proportion of qualified white-collar workers correlates with productivity with a value of 0.31, but only 0.18 in eastern German establishments (in each case significant at the 1% level). However, it can not be judged whether this correlation can be attributed causally to the qualified white-collar workers in the western German establishments or whether the number and deployment of qualified white-collar workers is a consequence of higher productivity. Nevertheless - together with the deficits of technical utilisation - there is a further indication for the assumption that the company-internal causes for the productivity gaps in eastern German establishments are to be found more in market position and organisatory problems than in problems associated with equipment.

4 Summary and outlook

The main results of the study can be summed up in four points:

1. Although the efficiency of an establishment with regard to productivity is very heterogeneous in both the old and the new *Länder*, in the manufacturing industry a widespread productivity lag can nevertheless be registered in eastern German establishments. This lag is approx. 43% on average (1996). As a result of this size and spread, the productivity gap in eastern Germany must be regarded as a considerable barrier to the improvement of the labour market situation in the new *Länder*.
2. The causes of the productivity lag could be followed in this study only in selected aspects. It emerged, however, that issues of company organisation play a greater role than issues of

technical equipment. The latter is even assessed as better in eastern German small enterprises than in western German ones. In eastern German establishments advantageous technical equipment is not connected with high productivity - unlike in western German establishments. Furthermore the proportion of qualified white-collar workers, in other words those workers who are often responsible for issues associated with business strategy and the organisation of the establishment, correlates in western German establishments more highly with productivity than it does in eastern German establishments. This refers to the significance of "soft factors" for the still incomplete reorganisation of eastern Germany's establishments.

3. There are also considerable differences in the market position between establishments in eastern and western Germany. What is striking is the deficit of establishments in the new *Länder* which export and are at the same time highly productive.
4. The results agree to a large extent with more recent studies on the extent and causes of the productivity gap. Owing to its unique variety of topics and its longitudinal character, the IAB establishment panel provides further possibilities of analysis. What is particularly interesting is the connection already mentioned at the start between the growth of productivity and production. The influence of production on the development of productivity, which has already been ascertained at economy-wide and sectoral level and has become known as the Verdoorn Law, must also be examined at the level of individual establishments. Conversely, the progress of productivity stimulates sales and employment. However, the increase in sales must be strong enough to exceed the employment threshold. In this respect the worry is legitimate that a growth that is too low compared with the progress of productivity reduces the number of jobs.

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