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## Explaining the East German productivity gap: the role of human capital

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# Explaining the East German Productivity Gap – The Role of Human Capital

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**Kiel Working Paper No. 1310**

**Explaining the East German Productivity  
Gap  
- The Role of Human Capital -**

by

**Dr. Joachim Ragnitz**

January 2007

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## **Explaining the East German Productivity Gap – The Role of Human Capital<sup>1</sup>**

### **Abstract**

The paper concentrates on the question whether the low level of productivity in East Germany can be explained by deficits in the stock of human capital. It is shown that figures on “formal” qualifications yield a too optimistic view on human capital endowments; in fact, the effective stock on human capital in East Germany is lower than in West Germany when differences in job activities are taken into account. One reason is the dominance of non human capital-intensive industries as a consequence of locational decisions in the past. Another reason is a low human capital intensity within the different branches which is a consequence of specialization within affiliated firms. In the next years human capital endowment of the East German economy will further deteriorate as a result of selective migration and unfavorable educational attendance of the younger cohorts. This impedes a fast convergence in productivity between East and West Germany.

**Keywords:** Productivity, East Germany, Human Capital

**JEL:** J24, O47

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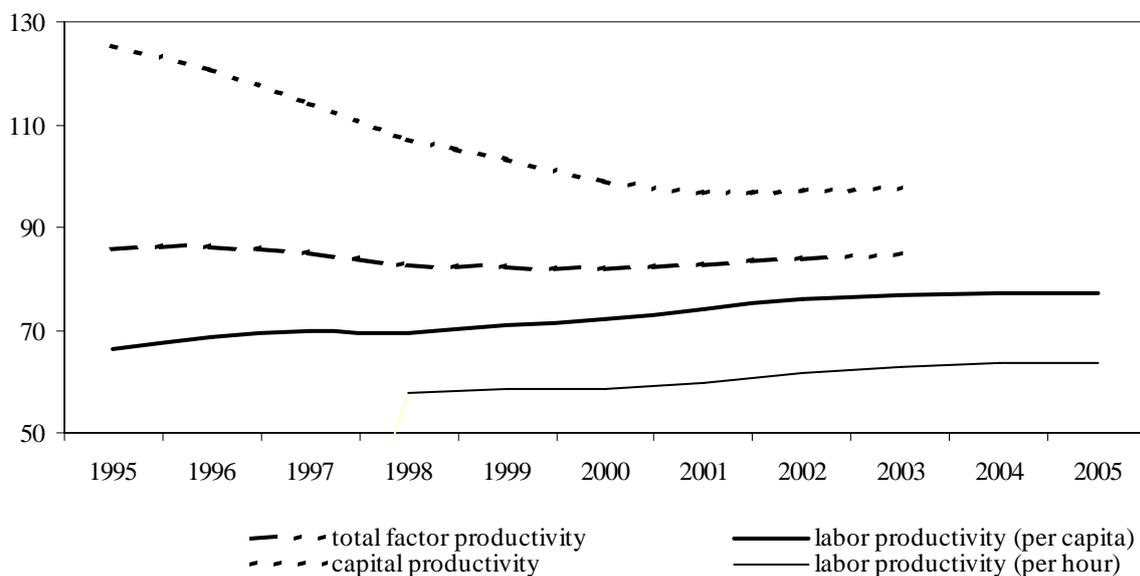
<sup>1</sup> I would like to thank Alexander Kubis, Simone Scharfe and Lutz Schneider (all IWH) as well as several discussants at the Verein für Socialpolitik Meeting in Bayreuth (September 2006) for helpful comments. However, the usual disclaimers apply.

## *Introduction*

One major problem of the East German economy is low productivity. This is true at least in comparison to West Germany, which is generally seen as a yardstick for economic performance in the former GDR. Although one might think of the former communist countries in Eastern Europe to be a more appropriate reference (indeed, compared with these, productivity in East Germany is fairly high), it is widely accepted that equal institutional conditions as in West Germany would favor a fast convergence process towards the West (Burda/Funke 1993). Further, also in political terms („equalization of living conditions“) West Germany is generally taken as reference. Contrary to that, productivity convergence has been rather slow for some time. Only in the beginning of the transformation process (that is: 1991 to 1995) strong productivity increases were observed, being a consequence of retrieving modernization in existing firms, the establishment of new plants and the improvement of capacity utilization in existing firms. Since 1997, however, convergence speed is far lower as neoclassical convergence theories propose (Barro/Sala I Martin 1991, Uhlig 2006).

Generally, productivity is measured as labor productivity. Calculated as GDP per employee, labor productivity is actually at 77% of the West German level; calculated as GDP per working hour, however, it is only 64%, especially due to a lower extent of part-time work in East Germany. But, from an economic view, other productivity measures are also relevant, and only in part these show a similar picture. Capital productivity, for example, was much higher in East Germany than in West Germany during the 1990ies, and even today it is still at about 97% of West German levels. One reason for this is, that, for some time at least, a lack of capital was compensated by a higher input of labor. However, as the underlying data for capital stock also include public infrastructure where West Germany is better equipped, it seems to be more appropriate to look at the private sector only. Indeed, in industry (defined as manufacturing and construction sector), capital productivity, is only 70% of the West German level which is in accordance with the hypotheses of a continuing productivity gap. Total factor productivity (determined as the residual of a growth accounting procedure) lies at 83% for the whole economy (thus including the public capital stock) and at 67% in industry alone.

**Figure 1:** Productivity development in East Germany



Source: Federal Statistical Office Germany 2006; own calculations.

### *Explanations for the productivity gap – A review of the literature*

The productivity of a national economy or a region is a complex measure that is determined by a variety of different factors. Additionally, in empirically oriented studies there is the problem that many of these variables cannot be measured directly, and, even more, many of them are highly correlated which makes it difficult to identify the “true” reasons for a low productivity level. Existing work for the explanation of the productivity gap of the East German economy therefore suffers from the fact that the underlying productivity-relevant factors cannot be separated clearly. This has resulted in a variety of different attempts to explain productivity, and so far no generally accepted explanation can be given.

This paper is to add one more possible explanation that was neglected in the past, that is the role of human capital. So, it is behind the scope of the analysis to find an all-comprehensive explanation for the East German productivity gap. For this reason, after a brief survey of the literature, different indicators of human capital are suggested and compared in the light of the existing data; it is shown, that the East German productivity gap can partly be explained by a lack in human capital if this is appropriately measured.

In the primarily empirically oriented literature on the explanation of the productivity gap of the East German economy the following factors are been worked out as substantial causes:

- industry structure: One of the characteristics of the East German economy is a high share of industries that typically reach only a low productivity level. Strikingly above all stands the predominance of the construction sector and the high share of household services, both

compared to West Germany. By calculation, from this sectoral composition of the economy in the aggregate a low productivity level results though productivity in the different sectors is not really low compared to the West. However, this effect must not to be over-estimated, as at least in the manufacturing sector only about 4 percentage points of the productivity gap can be explained by differences in (sectoral) structure.

More interesting are the reasons for the specific industry structure in the New Laender; normally transformation-specific effects and the structural effects of high transfer payments are mentioned. Additionally, initial productivity lags were more pronounced in sectors that normally inhibit a high productivity as the isolation of the GDR prevented the firms in these industries from applying the newest technologies. And some authors (Klodt 1999, Snower 2006) even conclude that the due to strong subsidization in East Germany partially unprofitable productions could survive, leading to the high share of those typically low-productive sectors.

- size structure: A similar arguments holds for the size structure of the East German economy as more firms than in the West have only a small number of employees. Typically, these smaller firms reach only a low productivity level, for example because size advantages in production cannot be exploited or financing bottlenecks prevent from a more innovation-oriented market strategies. At least in the manufacturing sector the size structure seems to explain the productivity gap relative to the West nearly completely. However, firm size is not an independent factor of explanation, as it commonly reflects other productivity-relevant factors, e.g. size-specific capital intensity or the stock of knowledge capital.
- functional structure: With the re-building of the East German economy many West German and foreign firms invested in the New Laender to make use of specific locational advantages (e.g. low labor costs, high subsidization or a low level of bureaucracy). Typically, only pure manufacturing plants were built up, while those segments of the value added chain that were of strategic relevance and commonly exhibit a high productivity remained at the existing locations (e.g. administration, research and development). As far as this is reflected in the statistically measured value added, productivity in East Germany is lower (though productivity in functionally comparable firms would be not far apart).

However, empirical studies show that subsidiaries of foreign enterprises have a higher productive than the average East German firm. Therefore, the functional structure argument is not really convincing with respect to explaining the low level of productivity but only in explaining the size of the productivity gap.

- capital intensity: Generally, capital intensity is considered the most important variable to explain labor productivity. Indeed, on an overall economic level the capital stock per employee is only 80% of the West German value, which seems to explain the lower level of productivity nearly completely. The major reason for this are lower labor costs in East Germany, which favors labor to capital. However, aggregate figures do not tell the whole story

as they do count also the public capital stock which is rather small in the East; it is a better way to look at the sectoral capital intensities which are not really lower than in West Germany. In manufacturing and construction, capital intensity reaches a level that is about 4% higher than in West Germany, as the effect of low labor costs is over-compensated by the subsidization of capital. Therefore, the lower productivity in this sector (78.8% of West German values) cannot be explained by a smaller capital intensity

- innovation activities: Firm productivity depends on the success of launching new products on the relevant market; therefore innovative enterprises are considered to be more productive. East German firms in the aggregate show lower innovation activities than West German firms, partly because of a lack of R&D-intensive larger firms in East Germany, partly due to branch-specific effects (concentration on markets with low R&D-intensity), partly due to the above-mentioned “extended workbench”-argument. This structural effects can result in a lower R&D-level on the macroeconomic level though on the level of individual comparable firms differences in innovative activities might be far lower. Indeed, a general innovation lag in East Germany cannot be detected if branch and size differences between East and West Germany are taken into account.

Surprisingly, however, the productivity gap between East Germany and West Germany is bigger for innovative firms than for non-innovative firms (Czarnitzki 2003). One reason for this could be that innovative activities need much time to bring about consecutive market success.

- infrastructure: Complementary infrastructural facilities – in East Germany still poorly developed – are considered to be a productivity-increasing factor. However, this argument is not really convincing in explaining the productivity gap of East Germany as there are sufficient locations in East Germany with good infrastructural conditions. Further, the impact of infrastructure in developed economies with a high infrastructure stock must not be overestimated.
- networks and creation of spatial clusters: Different from Western Germany, East German firms seem to be weakly integrated in efficient firm networks – thus productivity increasing spillovers cannot be used sufficiently. However, the empirical literature in this field is ambiguous, as some studies indicate that there is a high tendency to cooperation in Eastern Germany. Additionally it is still unclear, if the integration in networks really results in higher productivity (Günther 2004, 2005).
- Price differences: Productivity comparisons usually refer to nominal productivity (adjustments in prices normally refer to comparisons in time, not in space). As far as East German firms realize lower sales prices than West German firms in consequence of cost advantages (labor costs), insufficient market power or explicit low-price-strategies, their turnover is lower. If this isn't compensated for by price advantages for inputs, the result will be lower productivity. Estimations for the late 1990's indicate that the price advantage (respectively the price-related

disadvantage for the turnover) of East German firms compared to West German producers accounted for around 10%.

As it is seen, the literature yields a number of different arguments to explain the productivity gap. However, so far the literature does not answer the question whether the productivity gap of East Germany can be explained by differences in the endowment with human capital. The following analysis will add some new ideas to the discussion, though it must be realized that still some more research work has to be done.

*Insufficient endowment with human capital as a source of the productivity gap?*

Theoretic considerations suggest that human capital is a important factor for growth, as it allows for more innovation activities and a better understanding of newly created knowledge from elsewhere in the world. Therefore, deficits in the endowment with human capital can impede long run convergence processes. This view is at least partly supported by empirical studies with aggregate and with individual firm data.

Empirical productivity analysis' for East Germany in principle support the argument of a positive impact of human capital endowments on productivity. Regression models using the IAB-establishment panel for the manufacturing sector show that a large share of high-qualified employees influences productivity levels in a positive way (Table 1; similar results by Bellmann et al. (2006)). However, the explanatory power of the estimation is rather low which might be due to the omission of relevant variables.

**Table 1:** Regression on labor productivity for the manufacturing sector in East Germany

	standardized coefficient	t-value
(constant)	4470.907	1.296
Western ownership	893.603	10.386
Foreign ownership	1842.653	12.809
Share_skilled labor	1240.770	11.359
Share_university	2535.525	17.016
Share_management	-1648.733	-7.192
Share_qualified_staff	1444.846	8.884
Size of enterprise U20	4153.577	2.697
Size of enterprise U50	4166.545	4.276
Size of enterprise U100	4238.950	4.599
Size of enterprise U500	4265.416	6.989
Individual enterprises	1476.366	1.787
Subsidiary	1762.586	3.038
Dummys (industrial sectors)		

a dependent variable: productivity 2004. R<sup>2</sup>=0,10

Source: Own calculation; IAB-establishment panel.

Indeed, these results should be interpreted carefully as the measurement of the factor human capital brings about several problems. Typically, the endowment of a region with human capital is measured by the level of formation (respectively: years of educational attainment) of the employed persons. According to this approach, human capital deficits cannot be detected in East Germany – a

consequence of the comparative high educational level of the former GDR, which continues to have an effect up to today (see Table 2).

**Table 2: Structure of human capital (employable population)**

indicator	Percentage of highly trained employees				Percentage of low qualified employees				
age group	25-35		25-65		25-35		25-65		
federal state	year:	1991 <sup>a</sup>	2002 <sup>a</sup>	1991	2002	1991 <sup>a</sup>	2002 <sup>a</sup>	1991	2002
Brandenburg		29.6	23.3	32.3	30.6	3.4	5.2	8.2	5.1
Mecklenb.-Western Pom.		27.6	25.8	31.6	28.4	3.4	7.1	9.1	8.2
Saxony		29.6	29.6	30.8	30.1	2.7	3.6	6.5	4.0
Saxony-Anhalt		29.0	21.8	29.4	26.1	4.1	5.1	9.4	6.3
Thuringia		30.3	28.7	30.5	30.0	1.8	4.9	7.0	6.9
East Germany		29.4	29.9	31.0	30.2	4.5	6.5	8.6	6.9
East Germany <sup>b</sup>		29.3	26.4	30.8	29.2	3.0	4.8	7.8	5.7
West Germany <sup>b</sup>		20.9	27.8	19.1	22.7	12.4	13.5	21.2	17.0
Germany		22.9	28.2	21.8	24.3	10.6	12.2	18.3	14.8

<sup>a</sup> Estimated values for expected human capital indicators.

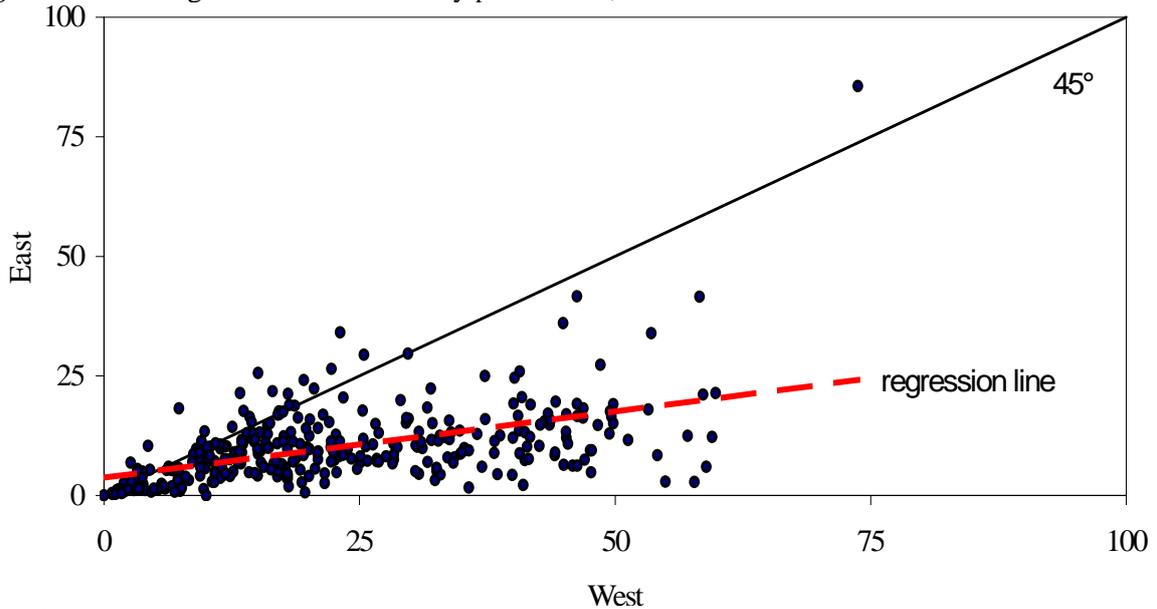
<sup>b</sup> without Berlin.

Source: Own calculation; Microcensus 2002.

In 2002, the share of high qualified (graduates, engineers, master craftsmen) in the population aged 15 to 65 (=potential labor force) in East Germany (30%) was still 7.5 percentage-points higher than in West Germany while the share of less qualified persons was only 5.7%, that is 10 percentage points lower than in West Germany. So, from the viewpoint of labor supply, East Germany is well equipped with (technical) high qualified human capital. However, due to the transformation process in East Germany it is questionable whether this indicator is really good in measuring the human capital endowment in East Germany. Technical graduations that were achieved in the former GDR cannot always be compared with analogous West German education achievements; this is even more true with respect to qualifications that were needed to support the political system. Additionally, many qualifications acquired in the GDR might be devaluated through the change of the political and economic system, temporary unemployment or lowbrow employment, leading to an overestimation of the real stock in human capital (a problem that is hard to solve empirically).

With regard to productivity, however, it is not the potential of qualified labor that is relevant but the qualifications stock in the number of effectively employed persons. But even in the group of employed persons the share of university graduates is still 1.5 percentage points higher than in West Germany; for skilled labor, the respective figure is even 8 percentage points. Consequently, the share of less qualified in the total number of employees in East Germany is 7.7 percentage points lower than in the western part (cf. figure 2 and 3). Insofar the structure of labor supply and effectively realized labor demand seems to be similar.

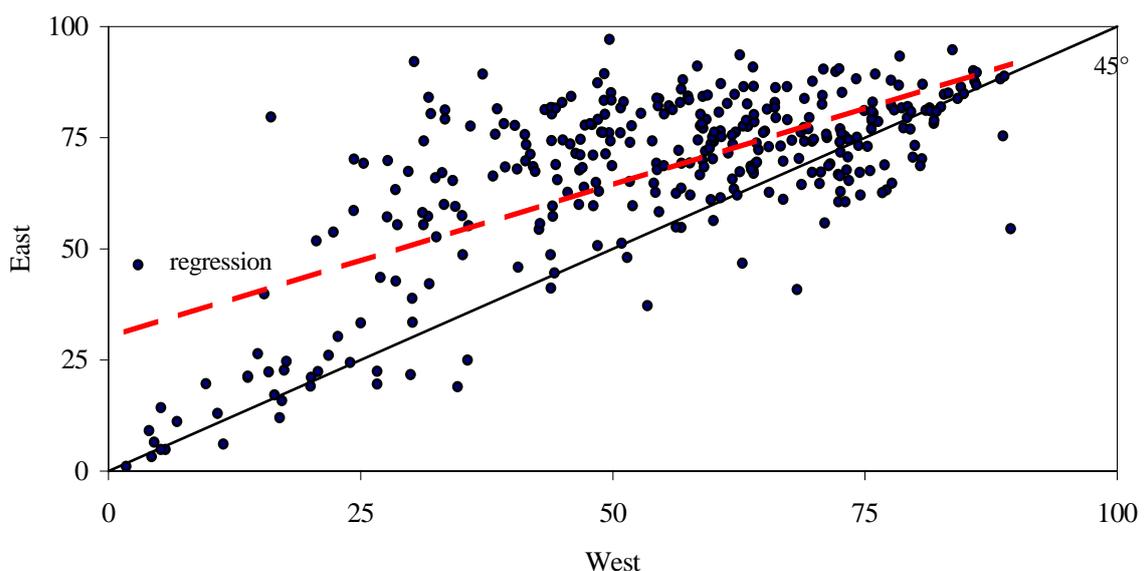
**Figure 2:** Percentage of unskilled labor by professions, 2004



Source: Bundesagentur für Arbeit; own calculations.

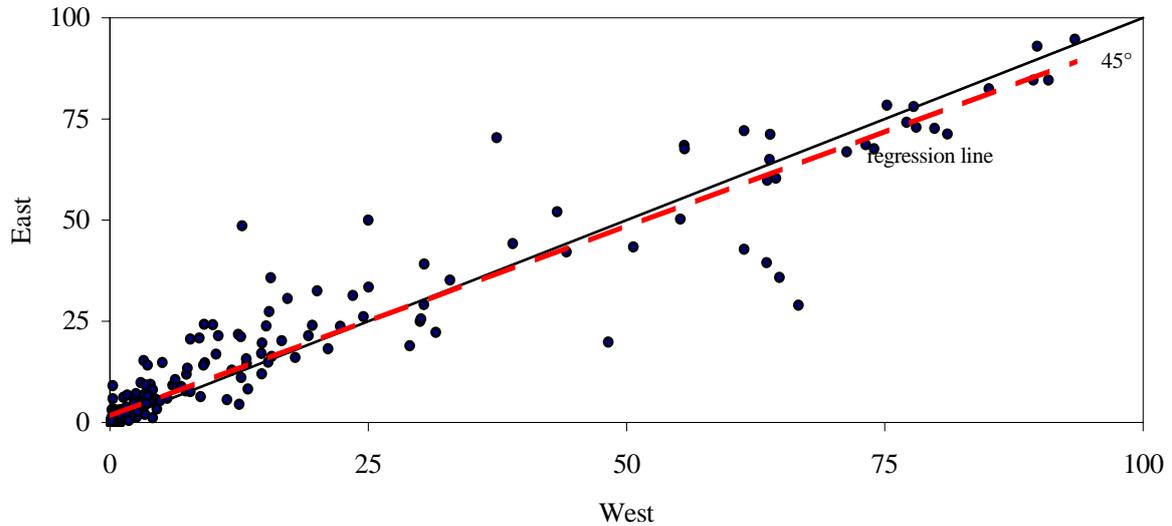
But the question is if the labor force is really employed accordant to their educational achievements. If West Germany is taken as a yardstick, it can be shown that a considerable share of the East German human capital is not employed according to its formal level of education, which therefore reduces the reachable productivity level. This means that jobs for less qualified labor are more often given to better qualified labor in East Germany. This generally effects „average” skilled employees with a finished professional training. Compared to West Germany, 15% of all employees with a finished professional training are employed under their formal level of qualification in East Germany.

**Figure 3:** Percentage of medium skilled labor by professions, 2004



Source: Bundesagentur für Arbeit; own calculations.

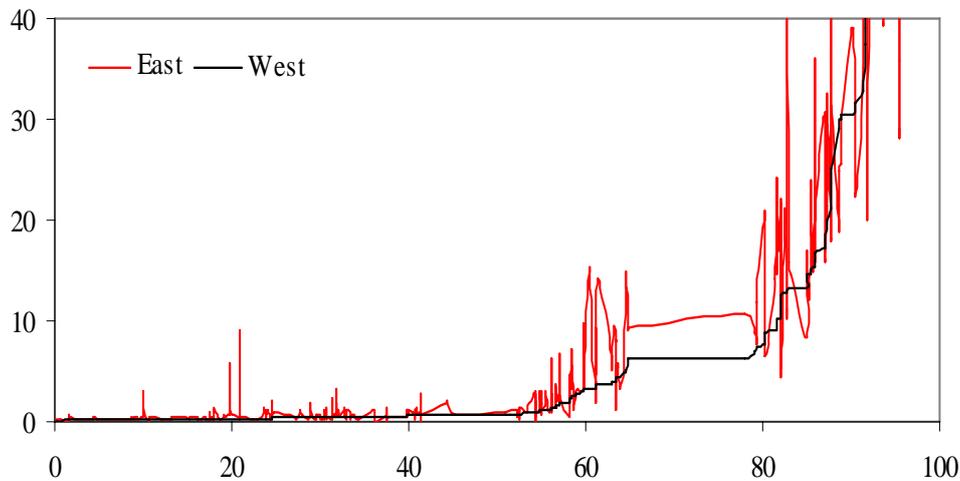
**Figure 4:** Percentage of high skilled labor by professions, 2004



Source: Bundesagentur für Arbeit; own calculations.

Looking at university graduates in East Germany, the same phenomena – although in a minor form - can be discovered. All in all it can be shown, that in the western part the share of university graduates is higher; but the differences are generally very low (cf. figure 4). Looking more precisely on the data shows that professions carried out by high-qualified persons in West Germany are normally reserved for university graduates in East Germany, too. However, in the East a considerable number of university graduates is working in fields usually carried out by less-qualified persons in West Germany. This becomes more significant when the scale of the figure is adjusted (cf. figure 5). Overall this affects – measured with comparison to West German conditions – around 17% of all university graduates.

**Figure 5:** share of employees with a university degree by professions (sorted by high qualified labor shares in West Germany), 2004  
 - weighted with number of employees (East) -



Source: Bundesagentur für Arbeit; own calculations.

#### *Alternative Indicators of Human Capital*

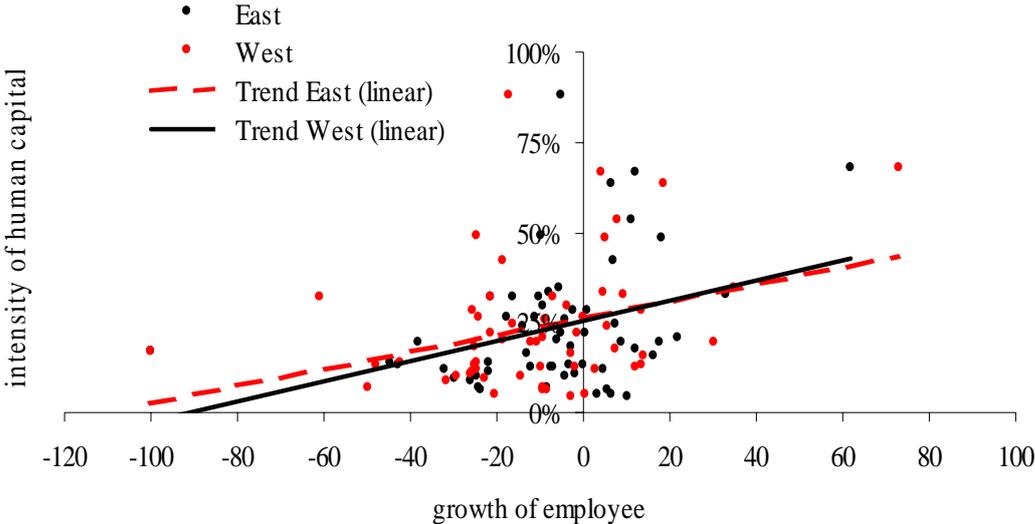
As already mentioned, the text built on a comparison of technical educational achievements so far, which is of only limited use for a description of the situation in East Germany. A better concept is it to determine the stock of human capital with the help of the present kind of employment. In the following some – more descriptive – findings shall be illustrated; regression analysis' aren't yet possible as a result of missing data, as a combination of human capital data with firm-data on productivity is needed (for example the LIAB of the Institute of labor research, Nuremberg).<sup>2</sup>

The following analysis is based on data that include information about the educational achievement and the effective profession of all employees in East and West Germany (disaggregated by branch). Combining this data with classifications on human capital intensity of the different professions (HRST-classification), it is possible to achieve results about the effective human capital intensity in both parts of the country independent of formal qualification. Looking at the endowment of East and West Germany with the so determined human capital endowment in production, it can be shown that – in contrast to the results received by data on formal qualifications – in East Germany a human capital gap really exists. Looking further only at the professions typically carried out by high qualified persons (university degree or master craftsmen), 25.1% of all working places in East Germany are estimated to be high qualified, compared to 27.8% in West Germany. Since 1998 – with an increasing human capital intensity in both parts of the country – the differences between East and West Germany are slowly decreasing. When disaggregating by branches it can be shown that the increase of the share of high qualified persons in both parts of the country is accomplished mostly by a strong growth of the human capital intensive branches; this effect is even stronger in East Germany (cf figure 6). Human

<sup>2</sup> A more detailed study using these data will be presented soon.

capital intensity would have decreased in Eastern Germany, if there hadn't be a structural change in favor of human capital intensive branches of the economy. This is not only a consequence of the decline of employment in the construction sector. Altogether there is a weak but positive correlation between human capital intensity and growth of employment during the period 1998-2004 which is merely identical in East and West Germany. Insofar this reflects the trend to a more human capital intensive production structure, which is typical for a high income country.

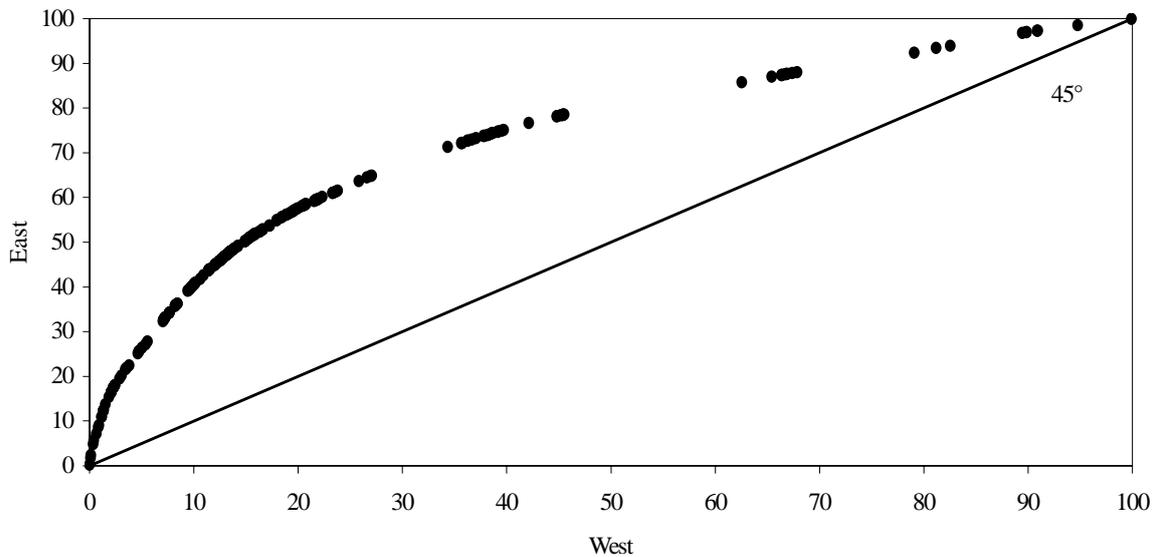
**Figure 6:** Employment Growth by human capital intensity (1998-2004)



Source: Bundesagentur für Arbeit, own calculations.

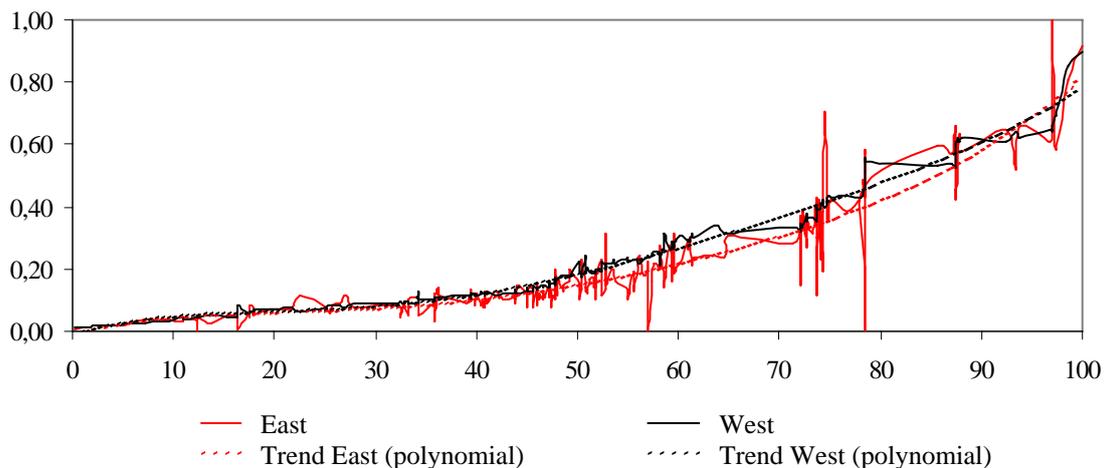
The reasons for the still lower human capital intensity of production in East Germany can on the one hand side be seen in the specific branch-structure (higher weight of industries with typically lower share of high qualified employees, cf. figure 7), on the other hand side in a lower share of high qualified employees in most industries (cf. figure 8). Indeed, both arguments are equally important for the situation: With the same structure as in West Germany, aggregated human capital intensity would be 94.5% of the western value (instead of 90.4%). The illustration below points this out: branches with weak human capital are overrepresented in the eastern part. Conversely this implies that 5.5% of the overall gap in aggregated high qualified intensity is a result of a lower share of high qualified labor within the branches.

**Figure 7:** Share of industries in East Germany 2004  
 - cumulated shares, sorted by HRST -



Source: Bundesagentur für Arbeit; own calculations.

**Figure 8:** High qualification professions by industries 2004  
 - weighted by number of employees (East) -



Source: Own calculation.

This becomes even more apparent when disaggregating by industries: There are less job opportunities for high qualified persons in nearly all branches in the eastern part. Though, in general, qualification needs seem to be similar (rank correlation 0.896) - branches employing high qualified labor are typically acting in the same way in East Germany - the share of employees with high qualifications on average is lower than in West Germany (c.f. trend line in figure 8). This is at least typical for branches with a „mean” number of high-qualified employees.

It is not easy to find an convincing explanation for these results. Most plausible are the following arguments:

- The economic structure significantly reflects the „after-transition-history”, especially the higher share of the construction sector (9.0% vs. 2.6%) with a typically lower share of high

qualified employees (7.2% in comparison to 27% in the total) and inversely the lower presence of high qualification services and industries. Overall it can be observed that West Germany is showing a weak but clearly positive correlation between branch-specific human capital intensity and the share of this branches in the total ( $R^2 = 0.16$ ); in East Germany, however, this context is less developed ( $R^2=0.10$ ).

- The lower human capital intensity in East Germany might also reflect an market-driven adjustment-process. In expectation of a shortage (quantitative or qualitative) of skilled labor qualification-intensive industries did not settle down in the East so often. Here it can be argued that agglomeration advantages of different locations in combination with spillover-effects are becoming more and more important for human capital orientated branches. Correspondingly human capital intensive branches are showing a higher spatial concentration. As these advantages were more significant in the western part at time of unification, the new Laender weren't attractive enough, leading to the special industry structure we can observe now.
- That human capital intensity within East German branches is low can either be the result of an intra-sectoral specialization (which cannot be identified by using aggregated statistics) or a disproportionately high presence of downstream productions in East Germany (the extended workbench-argument). One indication for the latter is that within the manufacturing sector – where foreign investors were most important – human capital intensity is only at 76% of the West German value, compared to 90% in the economy as a whole. A more pronounced analysis in the so called „Fortschrittsberichterstattung Ost“ („East German progress reports“) of major research institutes showed that East German industrial firms are indeed characterized by a higher share of workers (c.f. to employees) compared to those in the West (cf. table 3); furthermore semi-skilled labor and lower skilled employees have a higher share. It fits in this picture that the productivity level of the industry is clearly below the western value.

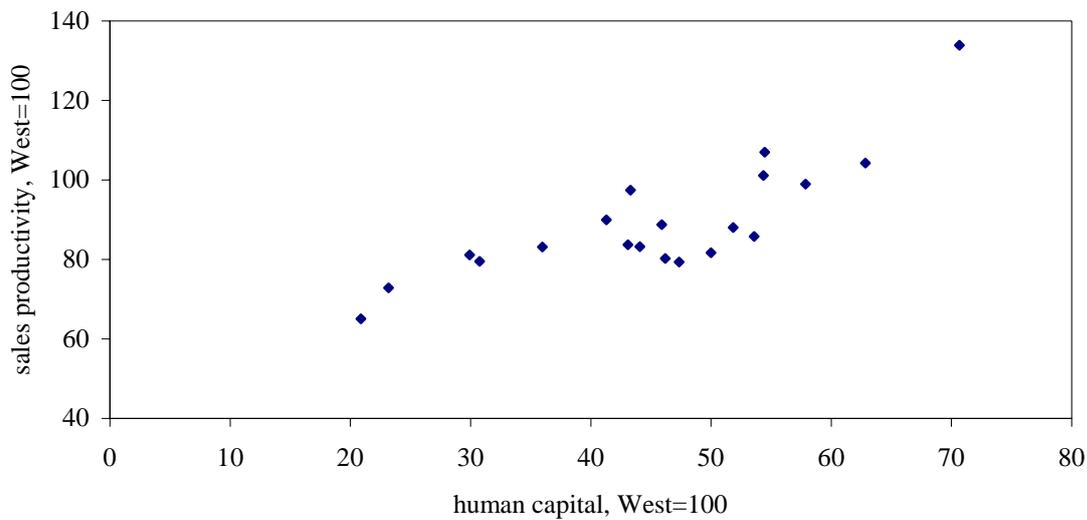
**Table 3: Functional Structure of Employment in the East German Industry, 2001**

	workers	therefrom: high-skilled	therefrom: semi-skilled	employees	therefrom: high-skilled	therefrom: low skilled
East	70.6	44.7	43.5	29.4	31.0	22.0
West	62.0	49.4	33.6	38.0	39.0	16.0

Source: DIW/IAB/IfW/IWH/ZEW (2002).

Finally, a significant (positive) correlation can be found between the relative (compared to West Germany) human capital intensity indicator calculated above and relative (sales-) productivity, when branch-level data are used (no firm data are available at the moment) (cf. figure 9). Industries that employ a significant higher share of qualified labor, have a higher productivity compared to their West German counterparts. This is in line with theoretical considerations and leads to the conclusion that the possibilities of further productivity advances relative to the West are restricted.

**Figure 9:** Sales productivity and human capital intensity by industries, 2004



Source: Statistisches Bundesamt; own calculations.

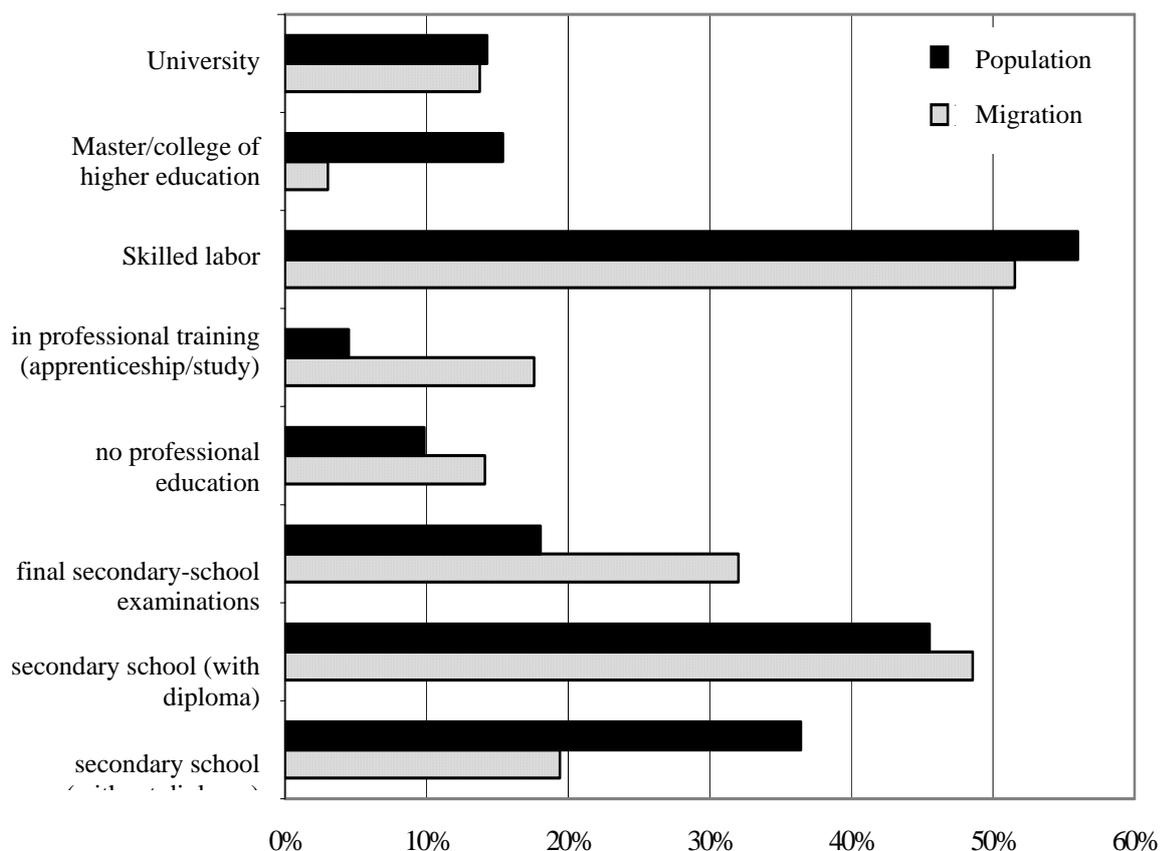
#### *Deterioration of human capital endowment – Consequences for the convergence prospects*

So far, the analysis led to the result that though there is a high potential of skilled labor in East Germany, this is not well exploited by existing firms because of a lack of human capital intensive branches and lower human capital intensity within industries. This view is supported by the fact that lots of employees work below their level of qualification. With the help of the above mentioned correlation between productivity and human capital endowment, these facts can help to explain the productivity gap between East and West Germany, though, of course, many other factors are also important.

However, there are signals that the relative good endowment with high qualified human capital in East Germany is eroding. This is on the one hand a result of (net-)migration from East to West Germany, on the other hand a consequence of the insufficient educational attendance of younger people.

Schneider (2005) shows, that migrations flows between East and West Germany are highly selective: Migration from East to West Germany is mostly done by young good qualified persons. Around 45% of the migrants emanate from the group of 18-30 years old persons; most of them for reason of professional training or starting their professional career (cf. figure 10). This can be identified by looking at the group „in professional training”, which is disproportionately high represented in the migration group compared to overall population. Less qualified people are disproportionately low represented within this group.

**Figure 10:** Structure of migrants in education (in relation to population)



Source: Schneider (2005).

Further, migration into the New Laender is insufficient in quantitative size to compensate for the migration-induced human capital loss (cf. table 4). This – and not the differences in the structure of migrations flows – is the main source of the deterioration of the human capital base caused by migration from East Germany.

**Table 4:** Age structure in emigration and immigration of East Germany - 1999-2003, annual average, absolutely and in percent -

Age	Emigration		Immigration	
	in thousand	in percent	in thousand	in percent
< 18	29,0	15,7	18,6	16,1
18 - 25	54,6	29,5	24,6	21,4
25 - 30	29,6	16,0	17,6	15,3
30 - 50	55,2	29,8	36,6	31,8
50 - 64	11,0	5,9	10,2	8,9
> 64	5,6	3,0	7,6	6,6
Aggregate	185,0	100,0	115,2	100,0

Source: Federal Statistical Office Germany 2004, FS 1/1.2; Schneider (2005).

**Table 5:** Balance of migration in relation to the respective age- and education-group in East German - 1999-2003, annual average -

<b>Education</b>	<b>Age:</b>	<b>18-25</b>	<b>25-30</b>	<b>30-50</b>	<b>50-64</b>	<b>&gt; 64</b>
no professional education		-2,5%	-2,9%	-1,8%	-0,1%	0,0%
in professional training (apprenticeship/study)		-1,7%	-7,4%	-	-	-
Skilled labor		-3,3%	-1,0%	-0,3%	0,0%	0,1%
Master/college of higher education		-	3,0%	0,5%	0,2%	0,3%
University		-	-2,5%	-0,3%	0,0%	0,2%

Source: Schneider (2005)

**Table 6:** Percentage of Migration in relation to the respective age- and education-group in East German - 1999-2003, annual average -

<b>Education</b>	<b>Age:</b>	<b>18-25</b>	<b>25-30</b>	<b>30-50</b>	<b>50-64</b>	<b>&gt; 64</b>
no professional education		4,1%	5,9%	4,0%	0,6%	0,1%
in professional training (apprenticeship/study)		3,2%	20,1%	-	-	-
Skilled labor		6,0%	2,6%	0,9%	0,3%	0,2%
Master/college of higher education		-	1,4%	0,3%	0,1%	0,1%
University		-	7,2%	1,3%	0,4%	0,4%

Source: Schneider (2006).

The second cause for the deterioration of the human capital base is the (actual) educational attendance of the East German youth. A comparatively high number of pupils leave the school system without any graduation certificate. Additionally, many young people don't find a regular vocational training position as a result of too small a number of training firms or even as a result of missing basic educational preconditions, leading to a refusal by the firms. And, finally, the quotas of people entering the tertiary education system is lower than in West Germany.

As a result of these developments, the share of high qualified person in overall East German population in the age-specific cohort of the 25-35 years old persons has decreased between 1991 and 2002 by 3 percentage points, while the size of this cohort was increasing by 7% in the western part (cf. table 2). However, the share of less qualified persons in this cohort has increased in both parts of the country, but in East Germany more than in West Germany. Nevertheless, the level of the less qualified younger people is still lower in East Germany, mainly due to structural differences (lower share of immigrants). A present study, undertaken by IWH and ifo Dresden, used this background to project the development of labor supply and demand by qualifications. It showed that, if keeping the educational attendance of the East German population constant, the human capital endowment will increasingly deteriorate. As labor demand decreases with the ongoing population decline and a depressed increase of incomes, unemployment in the group of less qualified labor will not decrease much, while with respect to high qualified labor, demand surpluses will occur. This also implies that a fast convergence in productivity levels cannot be expected in the near future, if it is not possible to reverse the development of the human capital supply (and: human capital demand).

### *Conclusions*

This article concentrated on the question to which extent the low level of productivity in East Germany can be explained by deficits in human capital endowments. It could be demonstrated that East Germany, in view of effective fields of employment, has a low human capital intensity, and that existing human capital is often employed below its true level of qualification. One reason is the dominance of non human capital-intensive industries as a consequence of locational decisions in the past. Another reason is a low human capital intensity within the different branches which is a consequence of specialization within affiliated firms.

In the next years human capital endowment of the East German economy will further deteriorate as a result of selective migration and unfavorable educational attendance of the younger cohorts. This impedes a fast convergence in productivity between East and West Germany. For economic policy the means that professional and advanced training measures have to be paid more attention. Further policy could attempt to avoid this human capital gap with help of a selective investment promotion strategies, leading to (selective) migration into the New Laender. But all in all it is still hard to recognize how convergence in living conditions can be realized in a foreseeable future.

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