Staggering along: wages policy and investment support in East Germany

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1. Introduction

Capital and labour are the two most important economic factors and their efficient use is a basic condition for economic transformation to be successful.

The East German communist system always had problems with the optimization of capital use because the labour theory of value denied, on ideological grounds, the necessity for paying interest as the price of capital use. It was only at a late stage, with the introduction of the new economic system for planning and directing the economy (NÖSPL) in 1963, that the necessity for a "production fund levy" to prevent the wasteful use of capital was recognized. The levy introduced was, however, not high enough to achieve this aim. The GDR economy continued to be hopelessly inefficient.

One would have hoped that introduction of the market economy would make things right at last. The market economy, by allowing the prices of capital and labour to reflect their relative scarcities, provides sufficient motivation to use these most important factors of production efficiently. Alas, the reality turned out to be altogether different. Instead of capital costs being allowed to increase in East Germany, subsidies were introduced after unification which pushed these costs down to negative levels. The subsidies made the situation even worse than it had been before the introduction of the NÖSPL. And the share of wages in the manufacturing sector was driven up until it reached a value of well above one, far higher than the most ignorant propagandists of the labour theory of value would have demanded. This paper is concerned with the dangers economic development in the New Länder has been exposed to as a result of the distortions in relative factor prices.

2. The uneven upswing

The quarterly value of private *per capita* investment in East Germany is today higher than that in West Germany (Figure 1). The real growth rate of gross domestic product in the New Länder is about 8%. Capacity utilization in industry is up to 75% and only a third of the firms are working short-time.[1] While at the beginning of 1991 almost

three-quarters of the firms had complained about sales problems, by spring 1994 only every fourth firm still saw sales as a basic problem.[2] It seems that the long awaited economic upswing in the New Länder is finally under way.

Figure 1. Gross private investment *per capita*

[in thousand DM per quarter]
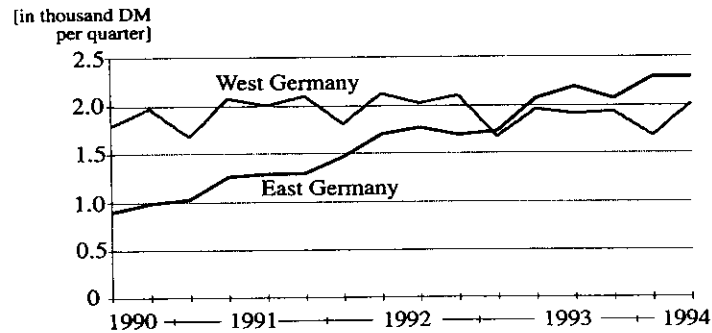
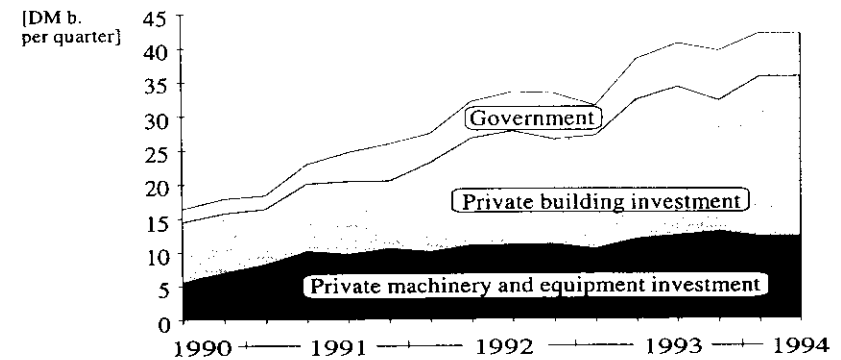Source: Statistisches Bundesamt, Fachserie 18, Reihe 3, Tab. 1.2.6, second half 1994.
Notes: Gross private investment is made up of investment in machinery and equipment and building investment in the firm sector.

While these results are promising, it should not be overlooked that East Germany's upswing is largely the result of a public transfer programme which is unparalleled in the course of history. East Germany's annual absorption of economic resources exceeds its GDP by DM 200 bn, DM 150 bn of which are public transfers from West Germany. Up to the summer of 1995 the accumulated net amount of public transfers shifted to the East approximates DM 800 bn. Measured on a *per capita* basis, each year East Germans receive transfers from the West that equal nearly three times the Polish disposable income.

In addition, after the initial collapse of the economy in 1990 and 1991, growth started from a very low level, and it largely bypassed the labour market. Aggregate employment today is 40% less than it used to be. In manufacturing, four out of five jobs have been lost. Saxony, which was once Europe's most industrialized region, now has a lower share of manufacturing jobs than Portugal or Ireland. Economic growth primarily reflects an isolated upswing in the construction industry. The manufacturing sector is lagging hopelessly behind.

Figures 2 and 3 illustrate the structural bias in East Germany's development. Figure 2 shows that investment has mainly taken place in private building activity and that the growth in investment reported in Figure 1 can only to a very limited extent be attributed to an increase in investment in plant and equipment. The latter type of investment has been almost stagnant since 1991, even though it includes the large amount of investment undertaken by the public energy producing utilities whose inclusion in the private investment category is not unproblematic. Figure 3 compares the developments in employment and output in the construction and manufacturing sectors. It shows that employment in manufacturing has declined to about one fifth of the pre-unification level while employment in construction has increased by about 60%. An equally large wedge has been driven between the respective output figures.

Figure 2. The investment pattern in the New Länder

[DM b. per quarter]

Source: Statistisches Bundesamt, Fachserie 18, Reihe 3, Tab. 1.2.6, second half 1994.

Figure 3. The split in the development of the manufacturing and building sectors

%
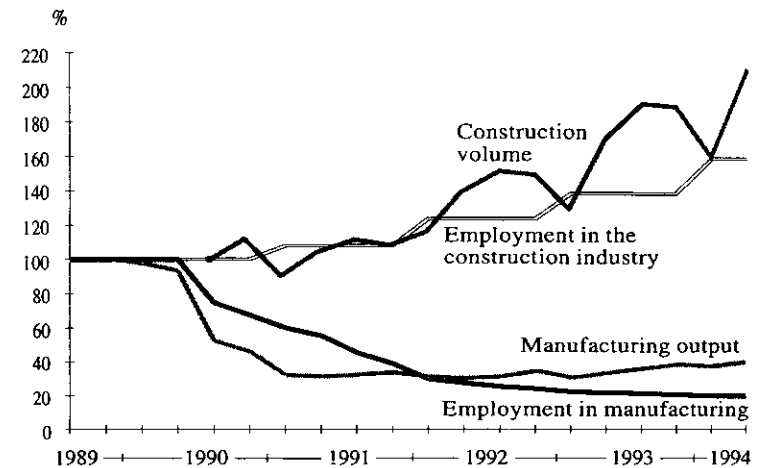
Sources: Employment: Statistisches Bundesamt, Wiesbaden and Berlin; DIW, calculations of the working group "Federal and state employment calculations" of the Statistisches Bundesamt. Construction volume: information from the DIW, Berlin, August 1994. Manufacturing output: Statistisches Bundesamt, Fachserie 4, Reihe 2.1, Tab. 6.1.
Notes: All third quarter 1989 values are set at 100% with the exception of the construction volume. The construction volume was set at 100% in the third quarter of 1990 as there were no data available for earlier periods.

While some part of the observed disparities may be a natural implication of the need to correct the distortions from which the communist economy suffered, the magnitude of the disparities is quite surprising. It gives rise to the suspicion that the economies of the New Länder are suffering from deep-seated development problems which do not show up in the aggregate figures. The distortions in the factor prices, mentioned at the start of the paper, can provide an explanation of these problems. The combination of high wages and capital subsidies acts as a strong stimulus for the housing industry. It ensures that there is both a big demand for rental housing and low production costs in this sector which supplies the most capital intensive of all goods. The construction boom could be a response to this stimulus. In the industrial sector the scales tend to tip in the other direction. Here, the high wages are not a significant determinant of demand because industrial goods face interregional and international competition and because domestic demand is diffused elsewhere. The high wages, on the other hand, exercise upward pressure on costs which the capital subsidies have been unable to offset except where investment is extremely capital intensive.

In the following sections more light will be cast on the problem of the distortion in factor prices. An attempt will be made to quantify the distortion, to assess the economic consequences, and to suggest policy alternatives that would permit a better balanced development in the New Länder.

3. The wages problem

The analysis begins with the wage cost. It is not necessary to be an economist to understand that wage developments have been a major factor in the problems of the New Länder. Figure 4 compares the time path of gross hourly wages in the East German manufacturing industry with the respective wages in West Germany, which have been set at 100%. The relative growth in East German wages up to 1996 is already largely determined, because it has been fixed in a collective agreement between unions and employers.[3] The wages for some international competitors are shown as well as those in East and West Germany. All wage rates were calculated in terms of the exchange rates current in the respective years since the purpose of the comparison is the assessment of East Germany's competitive position. To a good degree of approximation the figures can also be interpreted as purchasing power parity comparisons when wages are defined in terms of internationally traded goods. The figures do not, however, offer a wage comparison in terms of consumed commodities which also include non-traded goods. As is well-known from the findings of Balassa (1964), real wages in terms of consumption goods differ significantly less than real wages in terms of traded goods.

It can be seen that, before unification, East German wages were about 7% of those in West Germany, and that wages in the other former Eastern Bloc countries have since then remained at about this level. The wage rate in DM units quadrupled after the currency conversion and the real appreciation associated with it. In the wage negotiations that followed, a time schedule was agreed to which, assuming a constant level for West German wages, was equivalent to an 1100% increase in wages in six years, or to an annual average rate of increase of 51%. By 1993 the wage levels in the USA and Italy had already been exceeded, and Norway, Sweden and Austria were also overtaken in 1993. Only Japanese wage levels, which rose from 65% of the West German level to 85% between 1990 and 1994, primarily because of the appreciation of the Yen, have not yet been reached.

Figure 4. Growth of wages in the New Länder compared with international competitors
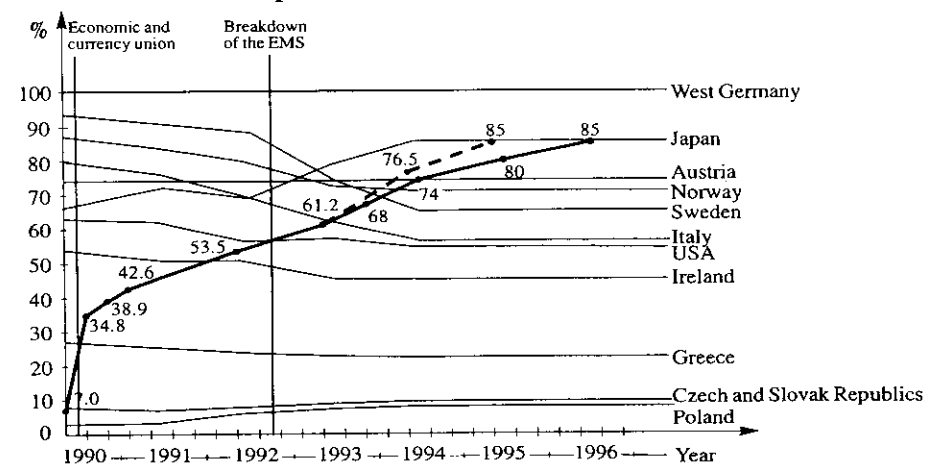
Sources: Czech Statistical Office, Selected economic and social indicators, 4, 1993; Deutsche Bundesbank, Monthly report, August 1994, p.92*; OECD, Main economic indicators, July 1994; Sinn and Sinn (1993, p.198f.); Statistisches Bundesamt, Fachserie 16, Reihen 2.1 and 5, various years; Statistisches Bundesamt, Berlin office, Abt.IX: data series from the reformed East European countries.

Notes: The curves show the gross hourly wage rates, including non-wage labour costs in the industrial sectors of particular sectors of particular countries. Annual averages are given for both the growth rate of wages and the exchange rate changes, 1990 to 1994. *Status quo* forecasts for the foreign countries are shown for the second half of 1994 onwards. The wage path shows the wage levels fixed by negotiation, including that of 1993, up to 1996. The wage path originally agreed to in spring 1991 is shown by the dashed section.

Only part of the wages paid out in the New Länder is earned there. Total wages in the manufacturing sector in 1993 were still almost 80% higher than the value added in that sector (Table 1). The explanation for this can only be that part of the wage bill was being financed by capital consumption or by government subsidy.

Table 1. The share of wages in value added in the East German manufacturing sector

Year	1991	1992	1993
Share of wages	243%	202%	177%

Sources: Statistisches Jahrbuch 1993, p.207; Wirtschaft und Statistik, July 1994, p.410; cost structure survey by the Statistisches Bundesamt 1992 and information from the Statistisches Bundesamt, September 20th, 1994.

Notes: The wage rate is defined as the quotient of gross income from employed labour and the net value added at factor costs. Because the cost structure survey for 1993 is not

yet available, the 1992 value added was extrapolated using the net output index and the wage information in Figure 4.

The destruction of four-fifths of industrial employment in East Germany can primarily be attributed to the wage policy chosen. This policy cannot possibly be rational. Valuable human resources remain unused, the re-integration of the unemployed into the production process is made more difficult, and the stability of the social order is endangered, with the possibility of all those frightening consequences that have horrified television viewers all over the world.

3.1. The failure of trade unions and employers' organizations

The wage policy does not reflect the operation of market forces, it is the result of a process of corporatist decision-making that should never have been accepted by the policy-makers in this form. The wage negotiations had been concluded in spring 1991, even before there had been any privatization worth mentioning, and before there could have been any responsible decision makers on the management side.

At West German taxpayers' expense, and to the astonishment of the East German trade unions, West German trade union and employers' representatives negotiated the wage increases for East Germany. The chief aim of the negotiators on both sides was to link access to West German markets to wage equalization and the establishment of what they called "fair" competition. They would not tolerate a low cost competitor - a "tiger" in their own parlour - under any circumstances. Even if today they are dismayed by the heap of rubble they have created and protest that this was not at all what they wanted, it is now absolutely clear who was responsible for the disaster in the labour market.

The break-up of markets in the east, the unexpectedly bad condition of the East German production plants, the environmental damage, the poor work attitudes, and whatever else is introduced as an argument in defence of the decisions, are far less significant than the effects of the wage increases of over 1100% that resulted from the currency conversion and the subsequent wage negotiations. Work attitudes have long since improved and fences could have been erected around the contaminated areas. Energetic restructuring could have improved the condition of the plants, if only there had been realistic chances of successfully competing with western firms at prices that covered costs. In addition, the markets lost in the east could have been replaced by new ones in the west if it had been possible to set prices that were attractive and appropriate to the quality of the goods supplied. The wage increases have destroyed all these chances. Before unification more than 40% of GDR exports were sold on western markets. These markets, too, like those in the east, have "collapsed" for East German firms as a result of the dramatic price increases needed to cover increased production costs.

3.2. Competitive wage determination and migration

This development would never have occurred if the firms and workers directly affected had themselves carried out the wage negotiations. An equilibrium would have been achieved between labour supply and demand and only as many people would have lost their jobs as could have found attractive alternative employment in East or West Germany. There would certainly have been a lot of migration to the west, but the people who migrated would only have been those who could expect an increase in wages sufficient to cover the subjective and objective costs of moving. From an efficiency point of view, it is just these people who should have moved. This is also true of those highly skilled workers whose departure from East Germany is often regarded with disapprobation. If wages in both east and west result from the interaction of supply and demand, and thus equal the corresponding marginal productivity level, there is no reason to mistrust individual decisions to migrate, whether made by the skilled or the unskilled.

People can migrate much more quickly than physical capital. There is nothing wrong about many people moving to the west temporarily until such time as a productive capital stock has been built up. This kind of migration can be observed today and it might have been even bigger if wages had been determined competitively. Large scale migration could have helped to reduce the massive efficiency losses that occurred with the unification process.

If the firms and workers directly affected had agreed on competitive wage levels, a great many wages would have been lower than those determined by the negotiators of the West German unions and employers. But far more people would now be receiving wages because more jobs would have been saved and more capital attracted than at present. The sum of all wages would, in all probability, have been even higher in the near future despite forgoing the excessive wage rises. Existing knowledge about the elasticity of the demand curve for labour indicates that restraining wages by 1%, even with a given capital stock, leads to an increase in employment of about 2%. This implies that employment could have been quadrupled, and total wage income doubled, if the wage rate had not been raised to twice the original level in early 1991 when the negotiations took place.

It is true that, despite the positive income effect, the income of many East German families would have been lower. With lower wage rates, the social services paid for by the west, such as unemployment benefits and pensions, would also have been lower and the number of family members who found jobs would not have increased in every household. However, the loss of income could have been mitigated or offset by giving the East Germans the opportunity to have shares in the Treuhand assets as has been recommended elsewhere.[4] Section 5 will discuss the possibilities that are still available for a compensatory asset policy. Such possibilities can still exist if the wage policy is moderated, because the value of the firms would increase as a result of such a moderation.

It is often argued that competitive wage determination would not be economically efficient because of the various external effects of the resulting migration. In particular, it is asserted that migration from east to west would lead to diseconomies of agglomeration. This argument is not convincing since it is unclear whether the agglomeration effects can be qualified as distortionary external effects and in which direction they go. The following points must be taken into account in any evaluation of the agglomeration argument.

- Agglomeration effects are often of a private pecuniary nature and cannot be classified as Pareto-relevant externalities. Private agglomeration effects do not distort migration decisions.
- Whether (temporary) migration to the west causes any negative agglomeration effects in the east at all is questionable, given the hopelessly congested road network there. Without an adequate, efficient infrastructure it cannot be said, a priori, to be unreasonable if some part of the population, and thus some of the traffic, shifts to the west.
- Migration may also result in positive agglomeration effects in the west which must be offset against the possible negative ones in the east.
- Migration to the west has positive effects with regard to the acquisition of knowledge. People who migrate can acquire knowledge about modern production processes and the rules of a market economy at no cost to themselves, which they and other East Germans can profit from.

Whatever a more detailed analysis would show about the net effect of the externalities, this effect is, in all probability, of secondary importance. The enormous changes in wages that have occurred in the east dwarf all the more sophisticated theoretical arguments that come to the economist's mind.

3.3. Productivity oriented wages policy?

Many observers have recently pointed to a rapid increase in East German labour productivity, arguing that this increase justifies more optimism concerning the future development of employment than Figure 4 suggests.[5] Figure 5 shows that there has indeed been a large increase in the productivity of labour in the New Länder. It rose from 18% of the West German level in 1991 to 54% by the first half of 1994. The change in unit wage costs - the quotient of labour productivity and wage rate - has been particularly encouraging. They have fallen from 151% of the western level to only 108.5%. These figures make it appear that, although the East German economy is not yet fully competitive, it will not be long before it reaches this happy state. In this respect, the development of wages does not appear to have deviated from the "cost neutral" or "productivity oriented" wage policy to the extent that the previous analysis suggested.

Figure 5. Comparison of labour productivity and unit labour costs in East and West Germany (manufacturing sector)
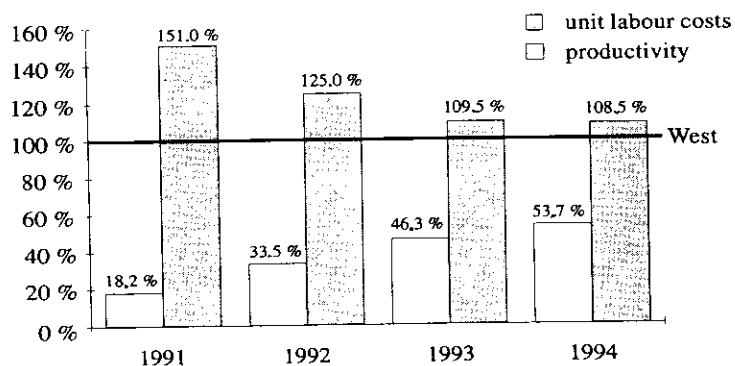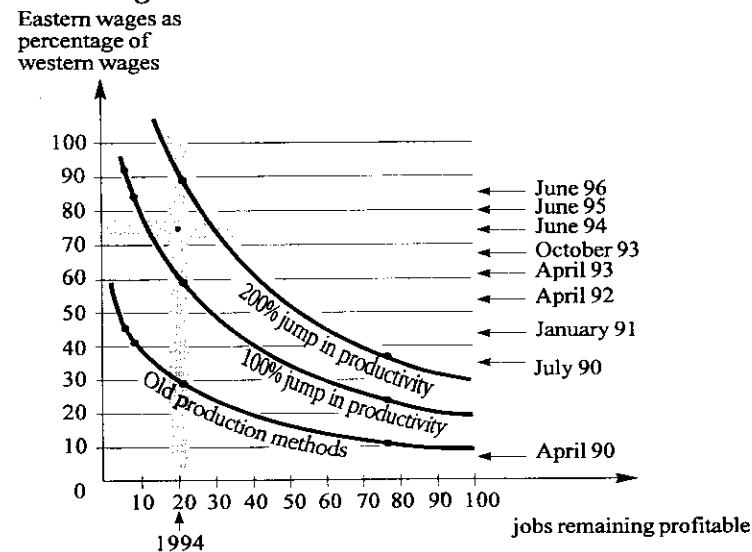

Sources: Labour productivity: Statistisches Bundesamt, Statistisches Jahrbuch, p.206f.; Statistisches Bundesamt, Wirtschaft und Statistik, industrial sector figures, various monthly reports; unit labour costs: iwd, 37/1994, 15.9.94, p.1.
Notes: East/west relative labour productivity and unit labour costs in the manufacturing sector. Labour productivity = net output value/number employed. Unit labour costs = gross wages and salaries including employee contributions to social insurance/sales revenue. For another definition of unit labour costs cf. endnote 7.

Alas, appearances are deceptive. Changes in labour productivity and unit labour costs can provide information about deviations from the rules of a productivity oriented wages policy only when the level of employment is held constant. This condition was certainly not met in the New Länder. A rise in wages in itself results in an increase in measured average productivity even when productivity has not actually improved, because the low-productivity jobs lost are no longer included in the sample. Under competitive conditions, the wage rate always equals the marginal productivity of labour; i.e., the productivity in the worst of the profitable uses. When the wage rate increases the number of profitable

work places shrinks and both marginal and average productivity rise. Average productivity may rise faster, slower, or at the same rate as marginal productivity. The Cobb-Douglas function, which provides the theoretical basis of the productivity oriented wages policy, assumes that the average and marginal productivities increase at the same rate. Under this assumption, any given rise in wages would result in an equal increase in average productivity so that unit labour costs for the remaining jobs stay constant. The 1100% increase in wages that is supposed to take place from 1991 to 1996 would, therefore, induce an increase in productivity of exactly 1100%. There is, of course, no basis for assuming that a Cobb-Douglas assumption could actually be an approximation of the distribution of productivities over the original jobs in the New Länder. Nevertheless, this consideration shows how absurd it would be to read anything in the way of an all-clear for the wage problem from the data shown in Figure 5. The data may reflect a movement along the labour demand curve rather than a shift of the curve itself.

Figure 6. The marginal productivity of labour in the East German manufacturing sector

Sources: Akerlof et al. (1991, Tab.8); Statistisches Bundesamt, Fachserie 16, Reihe 2.1, various years; Sinn and Sinn (1993, p.203).

Figure 6, which shows alternative marginal productivity curves for the East German manufacturing sector, provides information about the distribution of productivities over the jobs originally available in the New Länder. The lowest curve is based on input-output data used in a study by Akerlof et al. (1991) and recalculated by Sinn and Sinn (1993). The other curves reflect alternative assumptions about possible increases in productivity. On each curve all jobs are assumed to have the same percentage increase in productivity. Wage rate rises that, according to Figure 4, have occurred, or will occur in future, are shown at the side of the diagram.

It is evident that the competitiveness of the East German manufacturing industry could essentially have been maintained at the GDR level of wages, which in terms of the exchange rate, was only 7% of the West German level. Conversely, almost none of the

jobs could have been retained at 1994 wages if there had been no increase in productivity. Given that 20% of the jobs were retained at the 1994 wage level it follows from the data provided in Figure 6 that actual productivity must have increased by 140%. This is a gratifyingly large increase over a period of only four years, but it is still nowhere near big enough to offset the increase in wages. The 960% increase in wages that occurred from 1989 through 1994, together with the productivity increase of 140%, means that average unit labour costs have risen by almost 400%. If the GDR had chosen the exchange rate so as to make its unit labour costs equal those in the west, this same percentage measures the amount by which the wages policy and the currency conversion have raised unit labour costs above the West German level and reduced East Germany's competitiveness.[6] Comparing this percentage with the unit labour cost overhang of only 8.5% identified in Figure 5 shows very clearly the falsity of the conclusions drawn from a superficial interpretation of the productivity statistics.[7]

The growth of productivity implied by the increase in wages and the reduction of employment in Figure 6 certainly is an overestimation of what has really occurred, because a considerable share of the 20% of jobs retained owes its continued existence to government subsidies rather than to high productivity. Correcting for this bias indicates that the actual growth in productivity is well under 140% and that the unit cost overhang relative to West Germany is even more than 400%. This strengthens the impression that relationships in the East German labour markets are still a very long way from being balanced, healthy or normal.

4. Public support for investment

Since the wages policy largely destroyed East Germany's competitiveness, massive public support was necessary to preserve at least some of the existing firms and investment opportunities. Table 2 gives an overview of the major support programmes. The programmes are run by the federal government and the West German Länder, and, for the most part, comprise an investment allowance, an investment grant, and special depreciation provisions.[8]

The investment allowance, which is now 5%, will be retained until the end of 1997. It is tax free and can be applied for after completion of an investment project. Firms owned.by East Germans received an augmented allowance of 20% until the end of 1994. The allowance does not apply to investment in building and construction. Allowances of approximately DM 10 bn had been paid out up to the end of 1993.

The investment grant is part of the common "Improvement of the Regional Economic Structure" programme. It has no time limits and, in principle, also applies to structurally weak areas in West Germany. It is between 15% and 23%, depending on the type of investment. The grant lowers the base for tax depreciation and, thus, will be taxed over time. Unlike the investment allowance, it is also given for commercial building projects, though housing investment is ruled out. Grants of approximately DM 20 bn had been paid up to the end of 1993.

The special depreciation allowances of 50% immediate write-off are set out in the Fördergebietsgesetz (Area Support Law). They apply in principle to all commercial investment, including the building of private rental housing. They supersede the accelerated depreciation method which is already permitted for rental housing and in the commercial sector, and can only be complemented by the normal linear depreciation. Investment for housing modernization is an exception. This investment is not only allowed the 50% depreciation in the first year, but can also be fully written off in only

10 years. Normally, investment in housing modernization can only be depreciated linearly over 50 years.

Table 2. Major investment support measures in the New Länder

Support measure	Conditions
Investment allowances Movable and depreciable fixed assets. Tax free. Can only be made in the year after the investment. No private automobiles or aeroplanes. The assets must stay in the support area for at least three years.	Purchased or produced in the period : 31.12.1992-1.7.1994: 8% 30. 6.1994-1.1.1997: 5% Firms mainly owned by East Germans received an extra allowance of 20% for the first million spent on investment *per* financial year until the end of 1994 (only in the manufacturing and trade sectors). From 1.7.1994 an allowance of 10% for investment of up to DM 5 million for all firms with a maximum of 250 employees (only in the manufacturing and trade sectors).
Investment grants within the common "Improvement of the regional economic structure" programme Taxable (Choice as income in the first financial year or as reduction in purchasing cost. The latter is only taxable through reduced depreciation.) Investment in the industrial and trade sectors (investment in plant and buildings) and in regional infrastructure. Application before the start of the investment project required. The Länder decide about the assistance and its level. No grants for automobiles, ships, or aeroplanes.	Highest rate of the assistance: Establishments 23% Extensions 20% Adjustment and basic restructuring 15%
Special depreciation provisions For fixed and movable assets as well as for expansion and extension of buildings.	Up to 31.12.1996: special depreciation allowance of 50% on purchase or production costs for income tax purposes. The allowance can arbitrarily be spread over the first five financial years and can be used in association with a linear depreciation in the following years. For modernization of old buildings the residual value after claiming the special depreciation of 50% can be written off completely within only 10 years.

In addition to the support measures mentioned, there are a great many other provisions which give preferential treatment to investments in the New Länder. These include measures to promote exports and sales, environmental programmes, programmes to promote research, temporary exemption from taxes on non-income value (trading capital and net worth taxes), and many more.

Measures to improve the liquidity position of East German firms should also be mentioned. The most important of these are summarized in Table 3. All these measures involve some reduction in interest rates. Their special feature, however, is that they attempt to push back the borrowing constraints imposed by the market so as to make it easier for new firms to gain a foothold in the market economy. The equity assistance provisions are very popular as they have a relatively high subsidy component.

Quantitatively, however, the most important are the ERP advances guaranteed with the support of the EU. Up to the end of 1993 approximately DM 30 bn of these had been allocated.

Table 3. Liquidity aid for investors in the New Länder (selection)

Support measure	Conditions
Equity capital assistance Equity-like loans allocated. Own funds should be at least 15%. Medium sized firms (*e.g.* maximum 250 employees). Standard highest loan *per* applicant: DM 700,000. Own funds can supplement the investment amount by up to a total of 40%.	No normal bank sureties. In the case of insolvency the loan is a secondary liability. Redemption free period. Low interest payment in the first 6 years. For example, loans made in August 1993 had the following conditions: 1st-3rd year: 0%; 4th year: 2%; 5th year: 3%; 6th year: 5%; 7th-10th year: 7.0% to 8.0% interest. After the 10th year reassessment for the residual period. Additional costs 0.5%. Loan payout: 100% minus 2% handling charge.
Subsistence basis loans of the European Recovery Programme (ERP) For financing investment and inventories within three years after the establishment of a firm or setting up in a profession. Maximum annual turnover DM100 million.	Maximum loan: DM 2 million for a max. 50% of investment costs. Period: 15 (20) years for investment in plant (building investment). Effective interest rate: 6.14% (April 94) adjusted according to the capital market conditions for new allocations. No risk of interest rate changes during the loan period.
Programme of the Reconstruction Loan Corporation (KfW) for medium-sized firms For small and medium sized firms in trade and industry with less than 1 billion turnover and for the professions. Usual bank sureties.	Fixed interest rate: effective 6.99% (April '94). Loan period: 10 years maximum. Redemption free: 2 years maximum Maximum loan: DM 10 million. Maximum share of loan in the investment: 75% with turnovers of under DM 100 million, 67% for turnovers higher than this.
Housing modernization programme of the Reconstruction Loan Corporation (KfW) For private individuals, firms, corporations, and incorporated public law institutions. For financing, modernization, and reconditioning of rental housing. Complete ban on accumulation using public funds.	Effective fixed interest rate (first 10 years): 6.14%, for housing blocks 5.10% (Sept. 1994); after that capital market interest rates. Redemption free: 5 years maximum. Loan period: 25 years maximum. Maximum loan: DM 500/m².

4.1. Negative cost of capital in the east

The results of detailed capital cost calculations are given in Table 4 to illustrate the magnitude of the incentive effects of the support measures. The table refers to different types of investment and has separate sections for East and West Germany.

The capital cost of an investment asset is defined as the minimum real pre-tax rate of return this asset must produce to be worth undertaking, given the nature of the tax/subsidy system and the market rate of interest. For the calculations in Table 4 it is assumed that the investor uses 25% equity capital and 75% debt capital, where the real pre-tax rate of interest is 4.5%. The inflation rate is 3%. Interest payment on borrowed

capital is tax deductible and both real and financial assets are subject to income and wealth taxes.

The cost of capital is exactly what its name indicates. It does not include the cost of risk or the cost of other factors of production. Depending on the degree of risk involved with the investment, investors will typically add a risk premium to the figures given in the table.

The investors considered are those in the highest income tax brackets who have income from other sources high enough to enable them to claim a full loss offset. All essential aspects of the German tax system are taken into account, including the tax depreciation rules. (The first number in the brackets is the actual life span, the second is the depreciation time.) The calculations for the cost of capital in East Germany also took into account the support measures shown in Table 2.

The calculations show that the support given to industrial investment is extremely large. It results in a reduction in the real cost of capital from +3.1% to -5.1%. Even when there is an economic loss of 5.1% on own and borrowed capital every year, a typical investment project with a life span of 12 years can still be financed profitably.[9]

The effects of the support measures are not as large for building investments, but they are still considerable. The cost of capital for commercial buildings falls to zero and is negative for renovating old buildings if the property is resold after 10 years. The resale, calculated in the model at recursive prices, leads to a renewal of the depreciation base although the seller does not have to pay a tax on realized capital gains. This effect is particularly beneficial for modernization investments. The first purchaser can fully write off his expense within 10 years, and the second purchaser can also make a full depreciation, albeit over a longer period. This double depreciation is the main reason for calculating the cost of capital at -0.5%.

Table 4. The cost of capital in East and West Germany
(in *per cent* of the capital invested) - full loss offset

Type of investment	West	East
Industrial investment (12 / 12)	3.1	-5.1
Commercial building (40 / 25)	2.1	0.0
New rental housing (70 / 40)	1.5	1.3
New rental housing with resale after 10 years (70 / 10 + 50)	1.3	1.0
Modernization of old buildings (50 / 50)	2.0	0.5
Modernization of old buildings with resale after 10 years (50 / 10 + 40)	1.9	-0.5

Notes: The investment in industrial assets and in commercial building is made by a corporation, investment in rental housing and modernization of old buildings by a professional private lessor. It is assumed that profits are fully paid out and that taxes are paid at the top personal marginal income tax level. The investor initially finances the property with 75% debt capital and 25% equity capital. With industrial investment the debt is paid off in proportion to accounting depreciation. For building investment, there is an annuity loan paid off at 1% *per annum*. The real pre-tax cash flow of the investment property is assumed constant throughout the asset's life. With a given expenditure on buying the property, the cash flow levels are calibrated so as to make the net-of-tax return on own capital on each property equal to the net-of-tax return of a capital market investment. All the actual provisions of the German tax law are taken into

account (trade tax; net worth taxes; real property tax; land transfer tax in the case of resale; tax depreciation for new industrial and rental housing buildings, with optimal switch to linear accelerated depreciation for the former). The real interest rate is 4.5%, the inflation rate is 3%. Alternative investments are subject to net worth and income taxes. The bracketed figures in the first column show the life span/the tax depreciation period. The following support measures for East Germany were taken into account. Industrial investment: investment allowance 5%; investment grant 23%; immediate write-off 50% in addition to linear depreciation; exemption from the net worth tax for one year. Modernization investment: immediate write-off 50%, full depreciation within 10 years. The resale after 10 years to an investor of the same type occurs at recursively determined prices. For the purchaser, "West German" tax provisions are assumed.

The sheer size of the effects of the investment support shown in Table 4 provides confirmation for the interpretation of the economic developments in East Germany given at the end of Section 2. While industry is in an ambiguous situation because it enjoys high subsidies, but suffers from high wages, the building sector clearly enjoys a net advantage. Here the support measures are fully effective because they are enhanced by the demand effect of high wages rather than weakened by the high cost effect. Obviously, the current modernization boom can largely be explained by the factor price distortions.

There is no question about the need for supporting the establishment of new firms in the New Länder with public funds. The external effects of setting up new firms are clearly positive. New firms provide the basis for the establishment of networks of firms, whose all-round benefits cannot be included in advance in the profit calculations of the vanguard firms because Arrow-Debreu type forward markets do not exist (Sinn and Sinn, 1993, p.235 ff). The setting up of new firms can also be interpreted as experiments in the penetration of unknown territory, the results of which are made available to other firms free of charge (Thimann and Thum, 1993). New firms are vehicles by which western know-how is transported to the east and can be imitated by many others.

There is also no question that the liquidity measures set out in Table 3 are components of a rational policy for promoting economic development. East German investors have only a limited amount of own equity capital because the publicly owned assets in the GDR were not distributed to the population at large following unification (Sinn and Sinn, 1993, Chs.III-IV). They have, thus, very little that can be used as core capital. In addition, the slow progress made in clarifying the question of property rights hindered borrowing on those assets that are available.

All of this does not imply, however, that the specific kind of support chosen is not to be questioned. Does it really make sense only to support the use of capital in the New Länder and to give this support predominantly in the form of depreciation allowances?

4.2. No loss offset

The generous depreciation provisions applicable in the New Länder are not very helpful from the point of view of East German founders of new firms. East German firm owners certainly do benefit from the investment allowances and grants, but they do not normally have high enough incomes from other sources to enable them to make use of the accelerated depreciation provisions. Accelerated depreciation combined with a high debt equity ratio implies a negative taxable income. This negative income can be used for tax reductions if, and only if, a sufficient amount of taxable income from other sources is available, a condition which is not normally met in the New Länder. The Treuhand firms, privatized by means of management buyouts, and the communal housing associations are also affected by this problem. Even if some of them have high balance sheet values, they

normally do not have the profits that can be used to offset their tax losses. They can only carry forward their losses to later periods of surplus, but, with a positive rate of discount, this is nowhere near the same as an immediate loss offset.

The cost of capital figures in Table 4 were calculated under the assumption of a full loss offset. They are valid for existing West German firms that have expanded to East Germany and can carry over tax losses there to the parent company. Table 5 extends the analysis to the typical East German firm. For purposes of comparison, the Table 4 results are repeated in the first two columns of Table 5 where, for housing investment, only the more favourable case of resale after 10 years is considered. The third column in Table 5 is new. It refers to a firm whose marginal investment is entirely financed by borrowing and which, thus, is unable to offset losses immediately against income from other sources. The tax losses are, however, carried forward to future years when the projects are making profits and can thus be completely claimed. No intermediate sale of housing properties is assumed because this would not be worthwhile, given that the depreciation provisions cannot be used. This firm can be considered as an extreme example of an impecunious East German firm which is attempting to set up in the market economy under the most adverse conditions.

The results show that a negative cost of capital is still to be reckoned with in the case of industrial investment. The effects of the investment allowances and grants come into full play and the short life span ensures that the replacement of loss compensation by carrying losses forward does not bring with it any major cost of capital disadvantages.[10] However, the situation with regard to housing investment is less favourable. The allowances and grants are not available for this type of investment while the tax depreciation can only be made use of much later during the asset's life span. The 50% immediate write-off is irrelevant, because even the normal tax depreciation cannot be utilized. Because there is no loss offset, an East German investor faces capital costs 3.7 percentage points higher for new housing construction and 5 percentage points higher for modernization than his West German counterpart who invests in the East. Even if the West German investor were not eligible for the special East German depreciation allowances, an East German investor who has access to the full subsidy programme, would still have capital cost disadvantages of 3.4 and 2.6 percentage points, respectively.

Table 5. Capital cost disadvantages without loss offset and with only borrowed capital
(*per cent* of capital employed)

Type of investment	Loss compensation		No loss compensation, with support and carrying forward losses
	without support	with support	
Industrial investment	3.1	-5.1	-1.2
Commercial building	2.1	0.0	2.9
New rental housing	1.3 (resale)	1.0 (resale)	4.7
Modernization of old buildings	1.9 =(resale)	-0.5 (resale)	4.5

Notes: The first two columns repeat the results of Table 4; *i.e.*, they refer to the case with 75% borrowed capital and complete loss offset against other income. The third column gives the capital costs for the case of 100% debt finance and no loss offset

against other income, but with full loss carry forward. The support measures shown in Table 2 are, in principle, once more available.

The results not only raise doubts about the efficacy of the special depreciation provisions but they also question the appropriateness of the German tax law in the special case of the New Länder. The western investors, with their ample opportunities for offsetting losses against other income, have such large capital cost advantages over the new investors in the east, who mostly are without resources, that to speak of a fair competition would be absurd.

94% of the Treuhand sales were to western purchasers and only about one third of the natural restitutions were made to East Germans. The tax system should certainly not contribute to the preferential treatment for West Germans by giving them better investment opportunities and a better chance of purchasing modernized buildings as well. The cancellation of immediate write-offs and the introduction of accurately targeted support measures for East Germans, to compensate for the fact that, at present, they have no opportunity to offset their losses, are among the most urgently needed reforms for the New Länder.

4.3. The metamorphosis of capital

The factor price distortions associated with the support schemes constitute an even more serious problem than the absence of a loss offset. The kind of support provided does not simply assist new firms or generally help to transfer knowledge. Rather, in almost all cases, only the use of capital is promoted. If all firms had the same fixed capital/labour ratio this would not be a problem. However, this is not the case. Not only do sector specific capital intensities differ, within a sector or a firm there are normally numerous alternative production processes, with different capital intensities, which a firm can choose. Since the support measures promote the use of capital, they stimulate the substitution of capital for labour in production processes.

The essential function of a firm is to produce goods and services by combining labour and capital. Wages policy in the New Länder has seriously disrupted this process by providing strong incentives to save labour. The capital subsidies have intensified this effect. Subsidizing the transfer of knowledge and the setting up of new businesses can certainly be justified, but just providing support for capital use makes no sense in a country that suffers from mass unemployment.

The effects of the factor price distortion on a typical investor, who has to select from various production processes, each using different combinations of capital and labour, are illustrated in Figure 7. The isoquant passing through points A, E and D shows those combinations of capital and labour that allow the production of a given level of value added. It is assumed that the available technologies are of the putty-clay type; i.e., there is full substitutability ex ante, but fixed factor proportions ex post. The straight lines are isocosts. The isocost line passing through A represents the competitive wage/capital cost ratio and total factor costs just equal to the given value added level. In what follows, it is assumed that the private cost associated with this isocost line is constant, and measures the maximum amount the investor is able to finance.

The economic significance of the policy chosen for East Germany can be easily seen from Figure 7. Raising wages above the competitive level has pivoted the isocost line from position BA to position BC, thus making it impossible to produce enough value from position BA to cover costs.[11] Investments can no longer be made without assistance, and added to cover costs.[11] Investments can no longer be made without assistance, and public investment subsidies are introduced to compensate. If it is assumed that a capital subsidy is chosen which is just sufficient to enable the profit threshold to be reached

again, then there is a solution like that at point D. Here, given the private costs that the investor can finance, there is a combination of factors of production which generates the output needed to cover these costs. Normally, a point like D is to the left of C. If, however, as in the East German case (Table 4), the cost of capital is negative, then it must be to the right of C. The figure relates to this case.[12]

Figure 7. Factor prices and alternative support measures
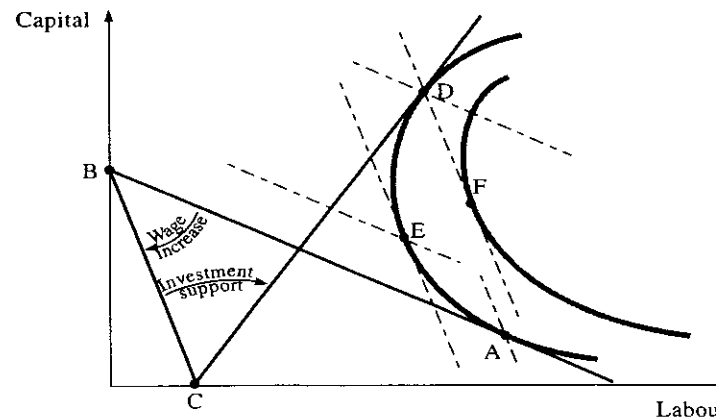
Mathematical explanation: The influence of the support measure on the investment decision of a firm is considered in this and the next section. C, K, L, r, and w are the financable private costs of production, the amount of capital used, the amount of labour used, the competitive cost of capital and the competitive wage rate. The wage policy raises the wage rate above its competitive level by λ. The support programme lowers the cost of capital below the interest level r by σ_K and lowers the wage cost below the wage rate $w(1 + \lambda)$ by σ_L. The alternative production processes with which a given level of value added can be produced are given by the production function $f(K,L)$. The problem of the firm is to $\max_{K,L} f(K,L) - C$, $C = K.r.(1-\sigma_K) + L.w.(1+\lambda)(1-\sigma_L) = const.$ The government's problem is to optimize σ_K and σ_L, subject to the constraint that $f(K,L) \geq C$ a nd knowing the firm's behaviour. If the government does not want to subsidize wages ($\sigma_L = 0$) it chooses a suitable value $\sigma_K > 0$ (point D). If it wishes to minimize the fiscal cost of the subsidies regardless of the kind of subsidy, it chooses $\sigma_K = \sigma_L > 0$ (point E). If it wants to minimize the economic cost of production it makes $\sigma_K = 0$ and chooses σ_L so that $1 - \sigma_L = 1 + \lambda$ (point A).

What is unusual about this solution is the choice of a process on the ascending part of the isoquant.[13] This would normally not occur because positive factor prices can be assumed. However, in the topsy-turvy world of East Germany, capital changes character - it becomes a good not a factor, and the relevant section of the isoquant is, in fact, the graph of a partial production function. Capital is no longer a negative element in the production process which the firm tries to minimize because it has to pay the capital owners for its use. Instead it has become a positive element because it is paid for by the state. The fact that the firm receives a net payment for the capital used means that, from

the firm's point of view, it is rational to find ways of using more capital, even if this also means using more labour.

5. Policy alternatives

The one-sided subsidization of capital cannot be a rational support strategy, especially when it is taken to such an extreme that projects with negative returns to capital are profitable for the investor. The growing number of written-off ruins on the outskirts of East German cities and the armies of unemployed workers are the outward signs of a factor price distortion that could not have been more severe even under the communist system.

Figure 7 shows that there are better support policies available. The isocost line parallel to BC that passes through D is the geometric locus of the points that the investor could finance if he received the subsidy which brought him to point D as a lump sum, or if the subsidy were replaced by a revenue neutral, equal percentage subsidy on both capital and wage costs. With such a policy the investor would choose to produce at point F which is on a higher isoquant and uses a combination of labour and capital that results in more value added, larger profits and a higher level of employment without costing the government more.

The efficiency benefit from subsidizing capital and labour equally could be used to reduce the amount of the subsidy instead of to increase profits. Such a possibility is shown at point E. Here the subsidy is high enough for the profit threshold to be reached, but it is less than that needed to support the use of capital alone (point D). The saving is measured by the distance between the two lines parallel to BC that pass through points D and E.[14]

Using the term "value added preference" Necker (1991), the president of West Germany's employers' association, has suggested switching over to equal subsidies for capital and labour instead of a subsidy on capital alone.[15] The advantages of this suggestion are obvious.

5.1. Wage subsidies?

It would clearly be even better to subsidize labour alone instead of capital, because it is wage costs and not capital costs that are too high. The existence of mass unemployment indicates that wage rates are well above the opportunity cost of labour.[16] In such a situation second-best considerations indicate that the efficiency of factor use would rise if subsidies were used to lower firms' wage costs to the level of the opportunity cost of labour. In Figure 7 this means pivoting the isocost line BC around B in a counter clockwise direction until the point of tangency A is reached. Under the assumptions made, this point represents the competitive solution where there is no factor price distortion. In terms of the distorted factor prices which exist in the market, point A is, of course, on a higher isocost line than E, indicating that the fiscal cost of subsidies is higher. At first sight, it therefore seems that the same objections could be made to this solution as were made to the one-sided subsidization of capital. It should be noted, however, that the private costs of using labour are not equal to the social costs, and that from a social point of view point A, and not point E, represents the true cost minimum.

Wage subsidies have been suggested by a number of well known economists[17] but they are not understood by the general public because the efficiency aspects are usually not comprehended. (There is a curious aversion to the term "wage *subsidy*" and a liking for "investment *support*" which to many people sounds much more positive. If the terms

"job *support*" and "capital *subsidy*" were used instead, the impressions would be reversed without materially changing anything.)

One reason given for rejecting the suggestion is the fear that the wage subsidies would mainly be used to finance intramarginal jobs and would prove to be ineffectual. In contrast, the investment support measures are seen as being limited to marginal uses of capital. This fear is certainly exaggerated, because wage subsidies could also be limited to marginal, newly created jobs. Admittedly, there is the possibility that the new jobs would destroy old ones, but this is no more likely than the possibility that new capital would drive out old capital. The distinction between marginal and intramarginal subsidies does not permit any discrimination to be made between wage subsidies and capital subsidies.

The situation is similar with the argument that wage subsidies would encourage trade unions to demand higher wages than they otherwise would. This argument is correct, but it applies to all subsidies that increase employment. The increase in the demand for labour increases the trade unions' scope for demanding wage increases, regardless of what has caused the increase in the demand for labour. Of course, capital subsidies are different inasmuch as their contribution to the creation of new jobs is smaller. It would, however, be perverse to read an advantage into this defect. Exactly the same incentive for the unions to demand higher wages would be implied by a capital subsidy large enough to create the same number of jobs as a wage subsidy.

From an efficiency point of view, the most important argument against wage subsidies relates to the migration problem. Wage subsidies lower the wages that the firms pay and increase the wages that the workers receive. Given the nature of Germany's social insurance system, the latter determine to a large extent the level of social welfare payments which, in practice, act as stay-put premia and artificially reduce incentives to migrate to the west. Wage subsidies actually make the potential labour force in the east higher than it should be from an efficiency point of view in the transition period during which an efficient capital stock is being built up. A subsidy policy that failed to question the level of the stay-put premia and tried to eliminate unemployment in the east completely would not be optimal and would create too many inferior jobs.

To avoid this problem, it would be essential to limit the stay-put premia along with the wage costs. At the very least, the increases planned for pensions and unemployment benefits up to 1996 could be set aside.

Even if it were possible to design efficient wage subsidies in this way, it is no longer possible to turn the wheel in the opposite direction. Investment support has been in place for some years and will, in principle, continue until the end of 1996. It would not be possible to alter fundamentally the conditions of the support during this period without creating uncertainty for the investors and, thus, causing more damage. It is, however, questionable whether another major support programme should be set up again after 1997. The government coffers will some day be empty and the market must be left eventually to its own devices.

5.2. Treuhand shares instead of wages

It is also too late now to suggest, as Sinn and Sinn (1993) did[18], that people be given shares in the Treuhand firms in return for their agreeing to forgo wage increases (the social compact). The main errors in the unification policy were the failure to make use of the opportunity to distribute endowments in the form of Treuhand shares to the East Germans and the acceptance instead of the massive factor price distortions. The suggestion made was directed towards correcting these mistakes. In essence, the Treuhand was to set up joint-ventures with potential investors and to distribute its own shares to

the East German population in exchange for wage restraint. The wage restraint would have ensured higher values for the old capital brought in by the Treuhand and, assuming competitive privatization bids, the wage rises forgone would have been more than compensated by the share allocations.

This suggestion is illustrated in Figure 8 which presents the marginal product of labour curve in an abstract form. (Figure 6 presents an empirical version of this curve using numerical values.) The wages policy raised the wage rate above the competitive level w by BD implying a shortfall of employment equal to HI. Reversing this procedure, and lowering the wage rate by BD, would have reduced the income of those still employed at the higher level of wages by BCED. The profits of the Treuhand firms, today only measuring ACB, would have risen by the same amount. The Treuhand could have claimed these profits on behalf of the East German people, because it would have been able to negotiate better conditions for the joint-ventures. Treuhand profits would not, however, have risen only by BCED but also by the additional amount shown by the triangle CFE because more jobs would have remained profitable. Quite apart from the fact that the holders of the extra jobs would have been receiving wages, equal to EFIH, not available to them with the policy actually introduced, the deal would have been very well worthwhile for the East Germans as a whole. The Treuhand shares would have given them dividends larger in present value terms than the wages people who have secure jobs would have lost by wage restraint.

Figure 8. Property or wage
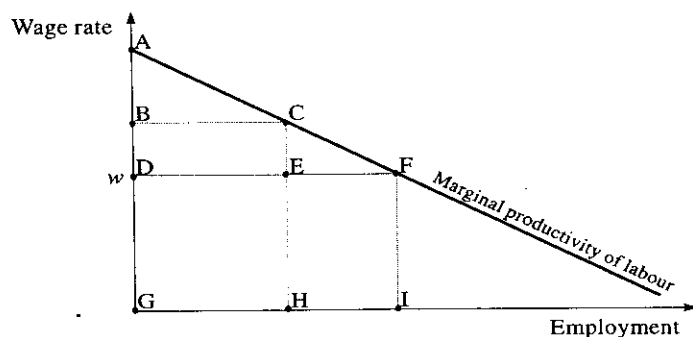
There could have been an income disadvantage only in so far as wage restraint would also have lowered social transfers from the west, but this disadvantage could have been avoided by using the public funds saved to benefit the new citizens in other ways. The overall effect of the policy would have been a Pareto improvement. It would have been possible to make things better for the majority of East Germans without putting a greater burden on the government budget, and without taking asset values or profitable opportunities away from the present owners of the Treuhand firms.

If, as was suggested, the social pact had been introduced in 1991 when the wage negotiations took place, the value of the Treuhand firms would today have been very much higher. A parallel shift in the wage path (cf. Figure 4) by only one year would have resulted in a saving of wages per job of around DM 18,500.[19] In terms of the 1.5 million jobs that the Treuhand investors agreed to retain (knowing the current wage policy), this would have implied an aggregate annual loss of wages of DM 30 bn. The value of the Treuhand firms would have increased by at least this amount, and could then

have been retained in the form of shares for the East German people. Every additional year of postponing the wage increases would, once again, have brought with it the same increase in value.[20] Postponing the equalization of wages until the year 2000 would have enabled the Treuhand to distribute an additional amount of much more than 150 bn, that is, more than three times the amount that it actually received from all of its cash sales (about DM 50 bn).

5.3. The remaining opportunities

The time is past for both wage subsidies and the social compact. It is nevertheless not possible to sit back with folded arms and do nothing. It is all too obvious that the conditions necessary for self-sustained growth are not being met.

The key problem is the level of wages in the New Länder. All policy suggestions must be judged by their ability to deal with this problem. It is not sufficient simply to demand that wages fall. Opposition to such a suggestion would be so large that it would almost certainly not be a politically feasible solution. A real solution would have to ensure that no social group is disadvantaged.

Today, there are only two opportunities available. The first involves the privatization of the assets still owned by the government. Almost half of the housing stock in the New Länder dates from the time of the GDR. Leaving aside the large stock of community owned housing, and subtracting the restitution cases, there are still approximately 2.3 million housing units in government hands. The majority of these are the much despised concrete housing blocks, but recent information shows that it is possible to renovate these buildings to standards approaching those in the west at prices that are quite affordable.[21] The value of the old buildings, which could be available for distribution, is certainly not inconsiderable.

Introducing these distribution measures into a political compact with unions and employers which reconsiders wages policy now depends on the tactical skills of the new federal government. The question of whether the housing is to be given away to the tenants, or whether public companies are to be formed whose shares can then be given away, can be left aside for the moment. It is not possible for the compact to be a legal contract, but it can be a political programme with an appropriate legal basis that is accepted by the big political parties and by the unions and employers. Part of such a programme could be to turn the Treuhand property company (TLG) into a public company, as has been suggested by the economics ministry, and include its shares in the distribution stock. The Treuhand property company at present still has more than 70,000 properties that it intends to sell.

A second, even more important opportunity, one which would be a good complement to the first, rests with the unions and employers themselves. They could attempt to break up the blockage which is holding back the economic upswing, by themselves introducing wage differentials for insiders and outsiders, based on investment wage models. The insiders are those who have kept their jobs despite the high wages. The outsiders are the unemployed, whose interests are largely neglected in the wages policy. A shrewd wages policy, which recognizes the insiders' position of power but nevertheless hopes to create jobs for the outsiders, would be to agree to a general fall in wages combined with compensation for the insiders.[22] This could take the form of company shares whose value equals the losses caused by the wage reductions. The insiders would lose nothing, the outsiders would have jobs and their daily bread, and the firms would enjoy higher profits. These profits could then be used to finance even more jobs.

The basic idea behind this suggestion can again be illustrated by Figure 8. With the agreed wage level BG, employment cannot be greater than GH. Reducing wages by BD

increases employment by HI. The insiders receive shares whose present value is equal to the cash value of the wages saved in their jobs, *i.e.* BCED. Despite the fact that the shares are given away, those who already have equity in the firm lose nothing. On the contrary, they gain an increase in capital income of CFE. The unemployed also benefit. They are excluded from the share distribution, but they get jobs which bring them a wage income of EFIH.

This concept is clearly related to the idea behind the social compact discussed above. The major difference is that it is still realizable today. The negotiating partners are the unions and the representatives of the privatized firms and both can gain benefits for their members in relation to the current *status quo*.

6. Concluding remarks

The jump start has got the New Länder moving, but the road to prosperity is a very long one. The course East Germany is on is a winding one and contains many hidden dangers. The high wages are acting as brakes and investment support is pushing down hard on the accelerator. Accelerating and braking together, however, can result in dangerous skids when tricky corners have to be negotiated. Such a procedure cannot have a favourable outcome.

The market economy only operates efficiently when the correct, cost-minimizing, production decisions are made, when factor prices are determined by the interaction of supply and demand and, thus, reflect the relative natural scarcities of the factors. This must be recognized as soon as possible. Support for investment cannot compensate for the wage settlements negotiated by the unions and employers, because you cannot fight unemployment with depreciation ruins. Before very long the politicians will have to face up to hard reality and try to do something about it.

Endnotes

1. Ifo-Wirtschaftskonjunktur, 7/94, T.17.
2. Hummel *et al.* (1994, p.23).
3. More and more firms have left the Employers' Federation so that they will not have to apply the agreement. As a result, it seems likely that the wage curve will become flatter in future.
4. Sinn and Sinn (1993); the proposal was made in the first edition of this book which appeared in 1991.
5. See *e.g.*, Burda and Funke (1993).
6. For the problems involved in calculating the effective exchange rate level *cf.* Sinn and Sinn (1993, pp.82-84).
7. Another aspect that must be considered in interpreting the unit labour costs given in Figure 5 relates to the definition of unit labour costs itself. The values given measure the wage costs *per* unit of sales revenue. Comparing east with west on this basis results in an underestimate of the competitive disadvantage of the New Länder, where production is less vertically integrated and the relation of sales revenues to value added is higher than in the west. The problem can be avoided if unit labour costs are defined as wage costs *per* unit of value added, that is, as labour's share in national income. A comparison of labour's share given in Table 1 with the corresponding share for West Germany gives unit cost overhangs of

178%, 122%, and 94% for 1991, 1992, and 1993, instead of 51%, 25%, and 9.5% as shown in Figure 5 (calculated on the basis of information from the Statistische Bundesamt on September 22nd, 1994).

8. *Cf.* also Funke and Willenbockel (1991/92), Hummel *et al.* (1994), and Richter *e al.* (1994).
9. In qualitative terms, the results confirm the calculations of the Ifo Institute reported by Richter *et al.* (1994, p.36), which were based on the model of King and Fullerton. The method used here differs from this model in that it assumes a constant real cash flow over the life of the property instead of a declining balance cash flow. In addition, the calculations reported in Tables 4 and 5 include other assets as well as asset resales at recursively calculated prices.
10. The calculations in Tables 4 and 5 hold for the assistance rules that applied or January 1st 1995. Until December 31st, 1994, East German investors in the manufacturing and trade sectors enjoyed a special investment allowance of 20% (*cf.* Table 2). This is equivalent to a reduction in the cost of capital by 3.8 percentage points.
11. The figure illustrates the problem in qualitative terms. Nothing is said about how much the isocost line is pivoted by the wage rise.
12. At first sight it might be supposed that another solution is equally possible where the point of tangency with the isoquant is to the right of A, in its "south eastern" range (not depicted in the figure). However, such a solution would involve minimizing rather than maximizing value added. (Notice in this context that all points to the left and above the isocost line can be financed by the firm since they involve lower private costs than points on this line.) Point D represents the minimum public outlay for subsidies subject to the constraint that only capital is subsidized and that the firm just reaches its break-even level.

    Points below D could be reached with a given rate of subsidy if the firm was able to reduce its employment of labour after the subsidy was granted. However, the above assumption of a putty-clay technology rules out this possibility.
13. Normally the prior knowledge of the positive signs of factor prices makes it possible to isolate the south-eastern boundary of the isoquant area as an efficiency boundary. Special mathematical functions like CES or VES functions may, in the relevant range, yield good approximations of this boundary. However, the limiting properties of these functions cannot be taken as a description of the technology sets actually available. Unlike these mathematical functions, isoquants do not exist for very large or very low factor intensities; isoquants are always inward bending beyond some critical values of these intensities. Although these regions of the isoquants are usually not considered since positive factor prices can be assumed, they become relevant in the New Länder because of the negative cost of capital there.
14. In the case of a permanent subsidy, the vertical distance between the two lines would measure the present value of the saving. The horizontal distance between the two lines is the saving in terms of working time.
15. *Cf.* also Franke (1994).
16. A more precise analysis, which interprets the opportunity cost of labour as the value of the West German marginal product of labour minus the marginal migration cost, can be found in Sinn and Sinn (1993, p.184, ff).
17. *E.g.* Akerlof *et al.* (1991), Begg and Portes (1993), Engels (1991). Rabe (1993) gives a broad overview of the problem.
18. The suggestion had already been made in the first edition published in 1991.

19. According to the DIW-Monthly report 7/93, average gross wages and salaries in the first quarter 1991 were DM 1,543. This is equal to an annual income of about DM 18,500.
20. The small discounting effect in the period considered is abstracted from here.
21. Good quality renovation can be carried out for less than DM 1500 *per* square metre. With current prices for new housing at between DM 3500 and DM 4500 *per* square metre, the amount available for distribution can be estimated at DM 1000 *per* square metre, or a total of around DM 132 bn, even when a value adjustment of between DM 1000 and DM 2000 is made.
22. *Cf.* Sinn (1993) where a similar proposal for West Germany has been developed.

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