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German Labour Markets after Unification

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GERMAN LABOUR MARKETS AFTER UNIFICATION

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German Labour Markets After Unification

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Abstract

This paper contains a description and analysis of the labour market in East Germany and an econometric evaluation of some effects of German unification on the West German labour market. At the outset, recent developments of employment and unemployment in East Germany are summarized together with an attempt at evaluation of the sources of joblessness. Moreover, wage determination and wage dynamics are discussed at some length. It is investigated to what extent wage theories can contribute to an explanation of wage formation in East Germany. Finally, a macroeconometric rationing model based on the smoothing by aggregation–method is applied to obtain some educated guess estimates of effects stemming from increased imports of East Germany from West Germany for example.

1 Introduction

What happened on the East German labour market and why? How is the West German economy affected by the developments in East Germany?

These are basically the questions this paper is dealing with. More specifically, the aim of the next section is a quantitatively oriented stocktaking of the magnitude and sources of joblessness in East Germany. Since this paper is written especially for a foreign audience, we present a somewhat more detailed description. In principle, three sources of the underutilization of labour are identified: (i) Layoffs due to failures in organizing and planning, inherent in the system, as well as to political impediments (2.2),

[1] Paper to be presented at the CEPR workshop on "German Unification and European Integration", November 23, 1991 at Bonn. I am grateful to G. Heidbrink and P. Winker for able help with the simulation experiment and to H. Kopp for her outstanding assistance in preparing this paper. Moreover, this paper benefitted from comments by B. Fitzenberger, G. Heidbrink, W. Scheremet, W. Smolny, and P. Winker.

(ii) layoffs due to a change in demand and supply conditions (2.3), (iii) unemployment due to obstacles to East German structural change (2.4). Section 3 is devoted to an analysis of wage formation in East Germany. Some explanations are offered for the tremendous wage inflation. In section 4 we make use of a macroeconometric rationing model in order to highlight some guess–estimates of the spillover effects from unification on the West German economy.

2 Development of the Labour Market in East Germany in 1990/91

The aim of this section is a quantitatively oriented stocktaking and analysis of the labour market development in East Germany. [2]As data material about the five new federal states is still sparse and subject to considerable errors in measurement, "quantitatively oriented" is, of course, an ambitious aim, meaning a rough assessment of some orders of magnitude (including a few suppositions) rather than an econometric study.

2.1 Underutilization of Labour in East Germany

To begin with the development of unemployment in East Germany, table 1 shows various aspects in this respect. Within a year, the number of the registered unemployed has more than doubled [column (1)]. The first three quarters were characterized by a high surplus of flows of people into unemployment over the number of outflows from this status and thus by a long duration of unemployment, while the flows into and out of unemployment nearly balanced in the second quarter of 1991 [columns (2) and (3)]. A clear discrepancy at the expense of outflows is experienced in the third quarter of 1991.[3] Likewise, the number of short–time workers clearly increased in the second half of 1990, while it persisted on an almost constant level of nearly two million persons in the first half of 1991. Its decrease as well as the slight decline of unemployment in September 1991 is mainly due to the growing share of commuters which doubled roughly from December 1990 until September 1991 and amounts to some 450,000 persons at the end of the third quarter of 1991. The extent of the working hours lost in connection with short–time work can be calculated from the data provided by the Federal Office of Labour. This statistics classifies short–time workers on a monthly basis according to the percentage of working hours lost.[4] The weighted average yields a loss of working hours of approximately 44 p.c. in September 1990, which increased to 52 p.c. in January 1991 and to over 56 p.c. in the middle of 1991. The short–time workers multiplied by the percentage of working hours lost will then yield an estimated value for full–time unemployed workers as converted from short–time workers, this value entering into the calculation of the corrected unemployment rate in column (8) which amounts to well over one million in the second quarter of 1991.

An important number of persons leaving unemployment take part in work–creating measures (WCM) or in qualification within their further vocational training (FT).

[2]This section, though new, draws on Franz (1991b).

[3]Decline in employment is favoured by dismissals in the electrotechnics and metal industry, possible from July 1, 1991, and the fact that the "waiting status" for the Civil Service (see further below) expires on September 1, 1991.

[4]Amtliche Nachrichten der Bundesanstalt für Arbeit (ANBA), current annual issues (e.g. 6/1991, p. 959).

Table 1: Unemployment in East Germany (Quarterly Figures)

Quarter	Registered unemployed (1000)	In-flows[a] (1000)	Out-flows[a] (1000)	Short-time workers[b] (1000)	Participants in WCM and FT[c] (1000)	Early retirement or transitory pension[a] (1000)	Unemployment rate p.c. official[d]	Unemployment rate p.c. corrected[e]
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
90/3	359	346	43	1293	22	225	4.1	13
90/4	589	311	114	1736	85	300	6.7	19
91/1	784	358	192	1926	190	400	8.9	26
91/2	841	270	236	1961	370	375	9.5	28
91/3	1053			1467			12.0	

a) Values accumulated by the end of quarter;

b) average quarterly numbers;

c) WCM = work–creating measures, FT = further vocational training, average quarterly numbers, cf. text for explanations;

d) as a percentage of the number of employees, quarterly average;

e) cf. text for an explanation of the method of calculation.

Source: Amtliche Nachrichten der Bundesanstalt für Arbeit (ANBA); information by the Institute for Labor Market Research (IAB); own calculations (see text for details).

Whereas monthly figures of the number of those engaged in WCM[5] are available, the participants in FT are shown in labour market statistics only as flow quantities, in the form of "entries into further vocational training". In 1991, these entries increased almost continuously, amounting to well over 80 thousand persons in June. To find out the number of participants in FT – necessary for calculating the corrected unemployment rate – a statistics was used for the first 6 months of 1991[6] showing the distribution of "entries" by duration (in months), yielding an average duration of 6.4 months. The corresponding monthly number of participants in FT was estimated on the basis of this distribution, which allows to determine the numbers to be expected in the following months from the number of entries in a certain month. The thus resulting number of participants in FT programmes is, of course, only an estimated value, amounting, e.g. to 254 thousand persons in the second quarter of 1991. This value, added to the average of 116 thousand participants in WCM in that quarter, yields the figure shown in column (5) for that quarter.

For a comprehensive assessment of the degree of underutilization of the factor "labour" one has further to take into consideration the persons who claimed benefits by either the early retirement regulation (possible until October 2, 1990)[7] or the transitory retirement regulation (starting from October 3, 1990)[8]. In June 1991, the first group counted 367 thousand persons, while the second group amounted to 144 thousand, these two groups totalling over half a million persons in June 1991.

To calculate the extent of the underutilization of labor, we added up the registered unemployed of column (1), the short–time workers converted to full–time unemployed (as described above), the participants in WCM and FT as well as the early retired or receivers of transitory pensions and expressed the result as a percentage of the employees. For the sake of comparability, we first used the data from columns (1) and (7) to find out the number of employees, to which we added the number of participants in FT measures as well as the number of persons from column (6). As a result of this calculation, the second quarter of 1991 e.g. yielded a figure of 9.5 million "corrected employees" and therefore an unemployment rate of 28 p.c., shown in column (1) for that quarter.

One could argue that the correction of the unemployment rate made in table 1 is incomplete to the same extent as the migration and commuter flows are induced involuntarily, i.e. by unemployment. Thus, for September 1991, the estimated number of East–West commuters is of 450 thousand, respectively,[9] the estimated total (i.e. regardless of their being employed or unemployed) of East German immigrants ("Übersiedler") reaching 530 thousand, while there is an estimated number of 70 thousand remigrating foreigners who had been employed in the former GDR on the basis of intergovernmental agreements.[10] Moreover, there might be a "hidden reserve" such as discouraged workers developing in East Germany, estimated at approximately 175 thousand persons for

[5] cf. ANBA 6/1991, p. 959.

[6] I am grateful to Mr. Blaschke of the IAB for this information.

[7] As decreed on February 8, 1990, early retirement benefits could be received 5 years before reaching retirement age (i.e. from 60 years onwards by men, and from 55 years onwards by women).

[8] Transitory retirement benefits could be claimed, under certain conditions, by unemployed or by those at risk, from 57 years onwards (or by women having lost their jobs by the end of 1990, from 55 years onwards). Starting from early July 1991, entitlement to temporary retirement benefits has been extended to persons from the age of 55. Source: IAB Werkstattbericht No. 1 of July 10, 1991, p. 5f.

[9] Source: Frankfurter Allgemeine Zeitung (FAZ) No. 234 of Oct. 9, 1991, p. 15.

[10] Cf. Bach et al. (1990), p. 462, Survey 5.

1991.[11] In table 1 these persons are left out of consideration not only because of the partially rough estimates and forecasts, but also by reason of the fact that commuters and East German immigrants who found employment in the western federal states do not constitute an underutilized production potential.

The case of the unemployed placed into "waiting status" is somewhat different.[12] The DIW estimates the size of this group to be of 250 thousand persons in the first 6 months of 1991, whereas the Federal Ministry of Labour is quoted to the effect that it reckons with some 700 thousand redundant employees who will have to be dismissed.[13] Hardly anything is known about the working time of these "employees"; cautious and informal rough estimates proceed from about 10 p.c. In view of this fairly diffuse situation, these persons have been disregarded in table 1. The corrected unemployment rate shown in column (8) would increase by more than 2 percentage points if all these persons were added to the number of unemployed.

The development of employment in East Germany mirrors the rise in (registered) unemployment; the number of employees declined from 9.9 million in the first quarter of 1989 to 8.2 million in the fourth quarter of 1990; only in 1990, their number went down by approximately 1.4 million.[14] This decline in employment cannot be equalled with a corresponding rise in unemployment, because many employees migrated to West Germany[15] or – as already described – left for early retirement.

There is a complex of several reasons which come into consideration when explaining the exorbitant losses in employment outlined above. A brief empirical survey will be presented below for the following factors:

1. layoffs due to failures in organizing and planning, inherent in the system, as well as to political impediments;

2. layoffs due to supply and demand shocks;

3. unemployment due to obstacles to the East German structural change.

2.2 Layoffs due to a Reduction of Staff Surplus

The layoffs mentioned under (1) are based on an inefficient use of labour under given production and demand conditions, i.e. for a hypothetical case of full employment.[16] First of all, this notion of overstaffed firms includes employees and working hours spent on political tasks, like e.g. political cadres and their staff (party functionaries in enterprises, paramilitary actions etc.), political activities of the staff during working hours,

[11] As estimated by the IAB, according to the Frankfurter Allgemeine Zeitung (FAZ) of May 7, 1991.

[12] Meaning civil servants still employed for a certain time, any further employment being, however, excluded. In the waiting status, they are paid 70 p.c. of the average monthly salary of the last 6 months of service, with no obligation to work.

[13] Sources: DIW, National Accounts for East Germany of June 21, 1991; iwd 13/1991 of March 28, 1991, p. 6.

[14] Source: Monthly reports of the Deutsche Bundesbank 43, Heft 7, p. 23. The DIW estimated the number of employees (including the balance of commuters and participants in WCM) to amount, in the fourth quarter, to an average of some 6.8 million persons (6.1 million persons without commuters and WCM). Source: DIW – Weekly Report (Wochenbericht) 26–27/1991 of June 27, 1991, p. 370.

[15] The reduction of vacancies caused by migrants from East– to West Germany is estimated at approximately 250 thousand persons for 1990, and at approximately 32 thousand for the first 6 months of 1991. Source: iwd 31/1991 of August 8, 1991, p. 4.

[16] For the following, cf. also Vogler–Ludwig (1990).

an extremely wasteful administration, etc. Second, it comprises manpower and working hours unnecessary under different organizational conditions, as e.g. times of standstill of the production due to missing supply of materials or to defective production plants, misallocation of labour within the planned targets and the employees' limited willingness to produce and achieve (absenteeism). It is obvious that even estimating the order of magnitude of these misallocations is difficult. In May 1990, the Ifo Economic Research Institute conducted interviews in enterprises, offices and conglomerate firms ("Kombinate") to enquire and find out the extent of misassignments. The "Kombinate" and firms interviewed represent some 5 p.c. of all employees, whereby the persons interviewed were chosen with particular attention to a wide sectoral and regional dispersion. The study came to the conclusion that approximately 1.4 million employees could be saved if the failures in organizing and planning mentioned above were eliminated and if the political and incomparably high social expenditure[17] was removed, i.e. some 15 p.c. of employees are "misallocated". At best, this figure is to be regarded as an approximate value, but it is substantial even with this reservation and can considerably help to explain the layoffs in 1990/91.[18] The general label of "hidden unemployment" should, however, be applied with care. A part of these 1.4 million persons pursued a "socially useful" occupation under the premise of the socialist dictatorship; there are companies in West Germany which for good reasons maintain large–scale social facilities, without their employees being labelled as "hidden unemployed"; likewise, the number of complaints about West German employees absent from work (especially on Mondays and Fridays) is legion. Without intending to deny the substantial misallocation caused by faulty organization and planning and by a surplus of enterprise staff due to political reasons, one should, however, avoid using a too idealized standard of comparison.

It is obvious, on the one hand, that the factors mentioned under (1) do cause lower labour productivity of East German enterprises, yet measuring this labour productivity, on the other hand, proves to be problematic, not to say dubious, especially if it is used as a criterion in the process of wage determination.[19] How high is the productivity of a firm which produces unsaleable goods? It would perhaps be more "appropriate" to differentiate between an actual productivity (per man–hour) under the given production technique as well as the given sales situation, and a potential productivity (also on an hourly basis) for a given qualification of the labour force, for production methods corresponding to West German methods and a realistic sales situation (i.e. for instance on the basis of current sales prices for these products). The actual productivity can be measured by the gross domestic product per man–hour. Its nominal value for the overall economy of East Germany is of DM 16.84 in 1989 and 1990 and is estimated to reach DM 24.68 (31.32) in 1991 (1992).[20] As compared to the corresponding productivity per man–hour for West Germany (1989: DM 44.0, 1990: DM 45.7),[21] this shows an East German productivity of 38.3 p.c. and 36.8 p.c. respectively, and hence its value lies in between the estimates made so far, which range from 28.5 p.c. (Statistisches Bundesamt,

[17] E.g. in the form of nursery schools in enterprises, club houses etc. Cf. Vogler–Ludwig (1990).

[18] In an interview within East German enterprises, the Institute for Applied Economic Research (IAW) in Berlin found out that 78 p.c. of all enterprises want to reduce their staff in 1991. Quoted from: Wirtschaftswoche No. 29 of July 12, 1991, p. 12.

[19] Neubäumer (1991) offers a brief survey of the discussion regarding the measurement of East German productivity.

[20] DIW, National Accounts for East Germany of June 21, 1991.

[21] Source: Institut der Deutschen Wirtschaft (1991), Table 23.

for the second half of 1990)[22] to 42 p.c. [Heinze et al. (1991)]. These productivity figures are most likely to be relevant for the already existing enterprises in East Germany with, in the short run, a low potential of modernization.[23] Newly created or modernized enterprises, however, approach the higher potential productivity.

2.3 Layoffs due to Demand and Supply Shocks

In the analysis of the transition problems faced by the former GDR moving towards a Western–type system, the different sectoral and specific employment structures are essential. Reliable data can only be obtained after extensive corrections, as the official statistics of the GDR merely published data of the "census of working people" and of the "report on the labour force" which were incomplete. They excluded especially the so–called "sector X", in which worked, among others, employees of the army, police, national security, parties and mass organizations.[24] In view of these difficulties, the following tables are only meant to offer some orders of magnitude for comparison. Moreover, the contrasting of the structures does not express the intention of regarding the sectoral structure in West Germany as optimal, especially as it is subject to continuous changes, too.

Table 2 illustrates substantial differences in the sectoral distribution of employees in the former GDR as compared to the FRG at that time. Thus, agriculture and forestry, energy, mining, amounting to 13 p.c., were overrepresented (FRG: 6 p.c.), whereas commerce, banking, insurance, hotels and restaurants, totalling 10 p.c., were clearly underrepresented (FRG: 19 p.c.). The reasons for this employment structure in East Germany are, among others, the policies of autarchy (including the "self–sufficiency strategy" of the "Kombinate") and the unilateral ties with the CMEA countries.[25] These differences are also evident in the distribution of employees by activities in table 3. The share of manual and agricultural activities is, at 18 p.c., clearly ahead of that of the FRG (8 p.c.), while the service sector, administration and office activities as well as transport and trade, totalling 33 p.c., lagged behind (FRG: 44 p.c.).

The sectoral division made in table 2 should not lead to the conclusion that only intersectoral restructurings were required and that the service sector could absorb primary and secondary sector layoffs. According to the calculations of the German Economy Institute (Institut der Deutschen Wirtschaft – IW), the service sector is – related to the number of inhabitants – approximately of equal size for East and West Germany, coming to 250 employees per 1,000 inhabitants. Yet intra–sectoral restructurings are to be expected in the service sector: the surplus in the fields of education, sciences and culture (45 employees per 1,000 inhabitants as compared with 27 in West Germany) contrasts

[22] Quoted from Siebert (1991), p. 52f.

[23] An immediate growth in productivity is reached, however, as soon as the staff surplus is reduced. Further increases in productivity can be attained – under given production techniques – by reducing the man–hours lost, e.g. through a smoother spare parts acquisition. Gerstenberger (1990), p. 19, estimated that realistic values for the level of productivity would range, after an adjustment period of one year, between 70 to 85 p.c. of the West German level. The Deutsche Bundesbank (1990), p. 15, estimated the productivity of the former GDR at approximately 40 p.c. of West German productivity, while Cornelsen and Kirner (1990) state a value of approximately 50 p.c. , though with a substantial dispersion like e.g. for the chemical fibres industry at 20 p.c., as compared to the fine–ceramics industry at 88 p.c. (p. 172).

[24] See Heinze et al. (1991) on this subject and for recent calculations.

[25] See Brautzsch (1991) for details on this subject. CMEA stands for Council for Mutual Economic Assistance, i.e., the COMECON countries.

Table 2: Sectoral Distribubtion of Employees in East and West Germany in 1989 (in p.c.)[a)]

Sector	East Germany	West Germany
Agriculture and forestry, fishing	9.9	3.9
Energy and mining	3.2	1.7
Manufacturing	34.1	31.4
Construction	6.1	6.6
Trade	7.8	13.0
Transport and communications	6.8	5.9
Banking and insurance	0.7	3.1
Hotels and restaurants	1.9	3.1
Services, public sector, defence, other sectors	29.7	31.7
Total of employees (mill.)	9.3	27.6

a) Rounded figures.

Source: Siebert (1991), p. 13.

with a shortage of banks/insurances (4, as compared with 16 in West Germany) and in catering/hotels (7, compared with 18 in West Germany).[26]

With the introduction of the economic, monetary and social union on July 1, 1990, the former GDR – with its distortions of output structure and misallocations described – was abruptly exposed to international competition. This was a sudden and abrupt liberalization of commodity and factor markets, coupled with a substantial appreciation. The consequences of this shock were foreseeable in qualitative terms, although not to their full extent and duration, mainly due to the incomplete and/or manipulated statistics of the GDR.

The index of net production for the manufactoring industry collapsed from approximately 180 in the first 6 months of 1990 to 100 in the 3rd quarter of 1990 and to about 60 in the second quarter of 1991, i.e. the industrial output in East Germany has shrunk to one third within less than a year.[27] This development is caused, first of all, by a radical shift of East German demand (especially in the consumer goods sector) away from East German goods to western markets. According to the National Accounts for East Germany, real East German imports increased 67 p.c. in 1990 compared to 1989, whereas the forecast for 1991 is a corresponding growth rate of 74 p.c.[28] In 1990 (1991), approximately 68 (90) p.c. out of East Germany's 106 (186) billion DM nominal imports

[26]Source: iwd No. 27 of July 4, 1991, p. 4–5.
[27]Source: DIW–Weekly Report (Wochenbericht) 39–40/1991 of September 26, 1991, p. 556.
[28]Source: DIW–Weekly Report (Wochenbericht) 25–27/1991 of June 27, 1991, p. 382.

Table 3: Employees by activities in East and West Germany in 1988 (in p.c.)

Activities	East Germany	West Germany
Mechanical engineering	12.9	15.7
Manual manufacturing	11.8	4.3
Agricultural activities	6.6	3.8
Maintenance and repair	12.0	8.0
Preparation of production and scientific activities	6.1	5.5
Rendering services	6.6	9.8
Administration and office	12.6	16.6
Transport and commerce	13.9	18.0
Other	17.5	18.3

Source: Dostal (1990), p. 81.

Table 4: Development of Wages and Prices in East Germany[a)]

Variable	Quarter				Growth rate[g)]
	1990/3	1990/4	1991/1	1991/2	
Contractual wage rate[b)] (DM)	9.75	10.57	11.64	12.85	32
Cost of-living price index (1989 = 100)[c)]	95.30	98.50	107.00	109.00	14
Consumption wage[d)] (DM)	8.70	9.12	9.25	10.02	15
Index of producer prices (1989 = 100)[e)]	63.40	62.50	63.30	64.00	1
Product wage[f)] (DM)	17.69	19.45	21.15	23.09	31

a) cf. text for details, 1991/1 and 1991/2 partly estimated.

b) hourly wage rate per full-time employee in East Germany.

c) for all employees' households.

d) net hourly contractual wage rate deflated by the cost-of-living price index.

e) for manufactured goods.

f) gross hourly wage rate plus 15 p.c. for non-wage costs, deflated by the producer price index.

g) 1991/2 compared to 1990/3, in p.c.

Source: DIW, National Accounts for East Germany of June 21, 1991;
Statistisches Bundesamt, Fachserien 16 and 17; own calculations.

are from West Germany.[29]

The decline in exports is often considered as a second reason for the East German production slump. In fact, total East German exports did increase, in real terms, by 19 p.c. in 1990 (by + 13 p.c. in nominal terms), and a dramatic decrease estimated at approximately 9 p.c. is to be expected only for 1991.[30] Already in 1990, East Germany's exports of goods (excluding services) to West Germany and foreign countries registered a decline by 7 p.c. to 38 bio DM in nominal terms, whereby exports to state–trading countries still increased by 2 p.c.[31] In other words, the decline in sales of the East German firms in 1990 was mainly caused by the falling domestic demand. The decline of foreign demand in 1991 is attributable, above all, to the breakdown of the exports to the former CMEA countries. In 1989, these countries had still taken up some 70 p.c. of the overall exports of the GDR, while West Germany, as the most important exporter to those countries, sold only 4 p.c. of its exports there.[32] One reason for this retarded reaction of the exports to Eastern Europe are the West German Federal government's subsidies of exports to these countries – with 6.5 bill DM [33] at the end of 1990, according to information from the Federal government – and that the trade with former CMEA countries has been handled with convertible currencies starting on January 1st, 1990. Additionally to the ensuing price increase of East German export goods, the East European demand for these products is hampered by these countries' shortage of foreign reserves.

East German firms found themselves not only facing rationing barriers on the demand side, but also being confronted with massive growth rates of the wage costs. Table 4 attempts to provide some quantitative information in this respect. To begin with, the first line shows the development of contractual wages per man–hour for full–time employees (i.e. without short–time employees) in East Germany (and therefore without commuters). Within one year, contractual wages increased by more than 30 p.c., whereby it must be pointed out that there had partly been substantial wage increases already before the introduction of the economic, monetary and social union. The average values of the wage variable mentioned amounted to DM 7.86 (DM 9.68) in 1989 (1990), yielding an increase rate of some 25 p.c. for 1989/1990.

A distinction between consumption wages and product wages is instructive. To begin with consumption wages, we estimate, on the basis of the National Accounts for East Germany, an average tax rate (including social security contributions) to be of 15 p.c.[34] In table 4, the inflation rate of living costs, totalling 14 p.c. (between 1990/3 and 1991/2), is biased in more than one respect. The most important problems are the elimination of the differences in quality (in the course of time and in comparison with West Germany) and the fixing of the 1989 market basket by constructing the price indices as Laspeyres indices.[35] Both factors are likely to cause an overestimation of the

[29] ibid., p. 367 and 382.

[30] "In real terms" means in prices of the second half of 1990. Source: DIW–Weekly Report (Wochenbericht) 33/1991 of August 15, 1991, p. 473.

[31] ibid., p. 478.

[32] Source: ifo – Schnelldienst 18/1991, p. 17.

[33] Source: Hoffmann (1991), p. 10.

[34] See DIW, National Accounts for East Germany of June 21, 1991.

[35] For further details see Deutsche Bundesbank (1991a). In the former GDR, the output costs of enterprises were inflated by heavy government taxes, which were several times the tax burden of West German enterprises. To give just one example, East German enterprises were liable to an overall wage tax of 70 p.c. Cf. Genser (1990) for an overview of the tax system of the former GDR.

price development, so that the net real wages shown in table 4 are biased downwards. With all these substantial reservations, the resulting growth rate for 1990/3 and 1991/2 is of 15 p.c.

In table 4, the producer price index for the industrial products made in East Germany and sold within the united Federal Republic of Germany is subject to similar caveats. The sampling of price data for the base year 1989 was made for selling–prices of the industry in GDR–marks. In spite of the difficulties in measuring this index, the immense slump of producer prices between 1989 and 1990 is evident. To a considerable extent, this is due to the lower tax load resulting from the cancellation, in mid–1990, of all product–related charges, which are basically cost taxes and whose volume had by far surpassed the subsidies given to the industry.[36] This slump in prices is also partly due to price reductions which were either meant to curb the decline in sales, or simply represented a "closingdown sale". The growth rate of the product wages accounts to 31 p.c. between 1990/3 and 1991/2, i.e. twice as large as that of the consumption wages.

The wage inflation in East Germany is also reflected in table 5, which compares the average earnings in individual sectors of the economy in East and West Germany. Whereas East German employees gained, at the beginning of 1990, about 30 p.c. of West German incomes, this ratio approached the 40 p.c. mark already at the end of 1990, reaching 50 p.c. in construction. To some extent, this catching–up process has already been laid down in collective bargainings: the collective agreement of the East German metal industry of spring 1991 stipulates an adjustment of East German contractual earnings to the West German level by 1994. Nota bene: This refers to contractual wages only; fringe benefits and wage premiums such as holiday pay and Christmas bonuses, asset–formation payments under the employees' saving scheme and, above all, payments in excess of contractual wage rates are partly or completely excluded from this adjustment. Furthermore, the East German working–time will exceed that in the West by at least 3 hours until 1998.

In summing up, a combination of demand and supply shocks was observed.

i. Domestic demand (particularly for consumer goods) in the former GDR corresponded to the preferences of buyers only to some extent. With the introduction of the economic, monetary and social union, the preferences of the East Germans became obvious. The consumers and part of the investors reduced their demand for those goods which they had purchased only because they were denied acquisition of other (substitute) goods or because these goods were prohibitively expensive. Now the price of these substitute goods went down, and the suppliers of domestic products were rationed on the goods market due to the deficiency of demand. Further reasons were the shortfall in demand e.g. the armaments industry as a result of a declining government demand.
Since estimates of elasticities of demand with respect to prices and income for East German and West German products respectively are missing, it is rather speculative at this stage to ask whether the decline in demand would have been less pronounced in case of a different conversion rate. Hoffmann (1991) estimates that the difference in quality would rather have suggested a conversion rate of about 1 DM : 5 M rather than 1 : 1 for prices and wages as actually happened. Yet a distinction must

[36] Council of Economic Experts, Annual Report 1990/91, para. 103.

Table 5: Ratio of Earnings in East and West Germany by Sectors of Economy[a)]

Sector	Jan. 1990	Oct. 1990	Jan. 1991	Apr. 1991
Manufacturing industry	30.8	37.3	394	44.0
Primary and production goods industry	29.9	37.1	381	42.8
Chemical industry	27.4	35.6	349	40.2
Investment goods industry	30.5	36.8	388	44.4
Food industry	31.4	39.2	401	42.6
Construction	34.0	50.2	562	60.4
Retail trade[b)]	31.6	41.2	466	50.3
Banks[b)]	27.3	39.6	412	45.8

a) Average monthly gross earnings of workers and salaried staff in East Germany as a percentage of the corresponding earnings in West Germany

b) Salaries only.

Source: Statistisches Bundesamt, Fachserie 16, Reihe 2.2.

be made here between short–term and long–term attitudes: within a short time – i.e. immediately after the introduction of the economic, monetary and social union – a hitherto suppressed demand for Western products was freed, so that even a price increase of these products via a higher M/DM–conversion rate would probably have resulted in a just slightly weaker import demand, even allowing for income restrictions, unless the conversion rate had been fixed at such a high level that purchasing, especially of durable goods, would have been extended over a period of time. Since mid–1991, however, an increasing purchase of domestic products can be observed in East Germany, i.e. the cross price elasticity of the demand for East German goods reaches (in absolute terms) higher values and the autonomous pressure of demand for Western products has been decreasing, particularly with regard to standard products with comparatively low differences in quality. Put differently: Under the given wage development, a conversion rate less favourable in the medium–term perspective, allowing for the private budget restrictions , would – maybe not in the short run, but in all probability – have caused lower sales losses to East German producers of consumer goods. However, "given wage development" may not be a realistic assumption if unions pressure for wage parity would have been equally strong even without a conversation rate at par. If so – what is somewhat speculative – the conversation rate is simply not the issue.

ii. As opposed to the clearly adverse demand shocks for East German products, ambiguous effects can be observed for the corresponding supply shocks. As "favourable" supply shocks can be viewed the dismissals of

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Table 6: Typology of East German Firms of the Manufacturing Industry (p.c.)[a)]

Time	Weakness in demand	Supply problems	Demand and supply problems	Equilibrium
	(1)	(2)	(3)	(4)
July 1990	29	20	47	4
Jan. 1991	25	18	49	8
March 1991	19	22	48	11

a) Cf. text for explanations.

Source: Gürtler, Nerb and Penzkofer (1991), p. 13.

> staff on grounds of redundancy, the reduction of failures in planning and organizing, lower input costs as a consequence of the conversion rate, as well as the readjustment of the East German tax system. The substantial wage increases of 1990/91, however, can be characterized as adverse supply shocks (see above). It is implausible that the increases in wage costs were offset as a result of the favourable supply shocks mentioned, and thus the adverse supply shocks seem quantitatively more important in the time period considered.[37]

The macroeconomic effects of the aspects set out under (i) and (ii) can be described within the simple textbook model of aggregate demand and supply.[38] No theory of the transformation process of any particular provenience is required. In the standard price–output diagram , the demand shock leads to a considerable shift of the demand curve downwards left and the supply shocks, seen as a whole and described under (ii), lead to a shift of the overall supply curve upwards left. The diagram thus unambiguously displays a reduction of output and, hence, of employment. With regard to price effects, the supply/demand scheme results, first of all, in a price reduction as a consequence of the adverse demand shock and the costs relief, but this price reduction successively turns into price increases together with the wage inflation exceeding productivity growth.[39]

The developments observed in 1990/91 corresponds with these results: A decline in output and employment as well as a sharp cutback in output prices which, however, are being replaced by (presently still slight) increases. Ironically, this development – at least with regard to employment – had realistically been assessed, even in quantitative terms, by the persons affected,[40] contrary to the promises of politicians who had held out the prospect of an improvement of the situation along the lines of the Pareto criterion.

[37] Cf. also Akerlof et al. (1991), Neumann (1991).

[38] Cf. Flassbeck and Scheremet (1991) for a similar procedure.

[39] For a discussion of the effects of this shock on the EC member countries see, among others, Issing (1991). The author comes to the conclusion that the economic consequences of German unification have to be interpreted primarily as a supply shock (p. 2).

[40] This is the result of a study by Lechner, Pfeiffer and Wagner (1991).

In accordance with the assessment above, table 6 gives empirical evidence for the coincidence of demand and supply shocks. Based upon the Ifo Institute's business test for East Germany, this table includes the percentage rates of those firms which faced restraints in production either exclusively due to a deficiency of demand [column (1)], or only as a result of supply constraints (e.g. shortage of qualified manpower, insufficient technical equipment, financial difficulties etc.) [column (2)] or both problems [column (3)], or firms which did not state any restraints at all ("equilibrium") [column (4)]. Nearly half of the firms stated, throughout the observation period, that their main problems were both on the demand and the supply side, whereas the number of firms facing weakness in demand as their only restraint decreases considerably with the course of time.

2.4 Unemployment due to Obstacles to Investment in East Germany

The increasing underutilization of the factor labour as described in section 2.1 could have been curbed by an early and more powerful investment activity on the part of Western, particularly West German firms. The necessity of a renewal of the extremely obsolete East German capital stock is also indisputable.[41] This obsolescence is already evident in the 1989 vintage grouping: only 27 p.c. of the GDR industrial equipment was installed during the past five years (West Germany: 40 p.c.) and half of it is older than 10 years (West Germany: 30 p.c.).[42] Its bad state of repair as well as the inefficiency of production caused by missing spare parts and the severe environmental pollution are further drawbacks. It is therefore necessary to analyse the quantitative importance of the various obstacles to investment.

In view of the numerous appeals having as subject the "national challenge", it might not be too trivial after all to remark that investments are less the result of patriotic outbursts, but are placed to those locations where they yield the highest returns as compared to other investment locations. We know from regional economics that the most important determinants of the locational choice are, above all, cost advantages, availability of (qualified) labour, land and infrastructural facilities, and – for some sectors – regional demand. The latter especially applies to the production of goods and services which require proximity to the market[43], like public service companies including banks and, to a certain extent, the construction industry, but companies of the manufacturing industry similarly indicate "proximity to the market for businesses in East Germany" as a leading motive for West German firms for investments or intentions to invest. This follows from table 7, whose data are based on a special investigation of the Ifo Economic Research Institute from November 1990 to February 1991. The "bridgehead" motive is mainly determined by the aspiration to a market proximity – to Eastern Europe. Capacity limits in West Germany and a qualified skilled labour force in East Germany are important motives too, while wage and capital costs play a comparatively minor role.[44]

Table 8 shows that, from the point of view of a formal completion of training, there is indeed a high percentage of qualified labour available in East Germany. Highlighting

[41] Estimates of the investments in East Germany, required to (partly) close the productivity gap to West Germany, are presented for alternative scenarios in McDonald and Thumann (1990). Further estimates of capital requirement are given, among others, by Möller (1991) and Sinn (1990).

[42] Source: Klodt (1990), p. 80.

[43] Cf. also Franke (1991).

[44] Cf. also Oppenländer (1991) for more detailed comments on tables 7 and 9.

Table 7: Motives for West German Firms for Investment in East Germany (p.c.)[a)]

Motive	Total	Size groups of employees		
		up to 49	50 - 199	1000 and above
Market proximity for business in East Germany	82	74	76	83
Bridgehead for Eastern Europe	45	19	36	52
Capacity limits in West Germany	25	20	30	24
Qualified skilled workers	21	13	22	22
Favourable conditions for investment and financing	12	16	19	12
Lower wage costs than in West Germany	11	14	18	10

a) Share of the motives mentioned in p.c., multiple answers possible; manufacturing industry; see text for explanations.

Source: Weichselberger and Jäckel (1991), p. 6.

the "formal completion" proves to be significant for the comparison with West German qualification levels. Apart from the substantial differences between the school systems,[45] there are reservations regarding the knowledge of foreign languages since this was primarily Russian, as well as regarding the substance of knowledge which was directed at executive tasks and performance functions in line with the socialist planned economy and the ideological superstructure.[46]

Table 9 shows the obstacles to investment in East Germany from the point of view of West German firms for the period from November 1990 to February 1991. Their investments are estimated at approximately 20 and 22 billion DM for 1991 and 1992 respectively[47] and thus constitute about 4 (10) p.c. of West German gross (net) investments. According to the statements contained in table 9, the main obstacles are problems of valuation of existing East German firms, deficiencies in infrastructure and administrative impediments. This assessment on the part of enterprises proves the urgent need of a considerable improvement of the East German infrastructure and the removal of still existing legal uncertainty.

[45] Cf. the overview by Henninges (1991), Scheuer (1990) and Schwarze (1991).

[46] Cf. Scheuer (1990), p. 73.

[47] Including the purchase of real estate and participations, as well as access to used assets; Source: Weichselberger and Jäckel (1991), p. 9, Table 3.

Table 8: Qualification Structure of the Labour Force in East and West Germany (in p.c.)[a)]

Formal Completion of Training	East Germany 1990	West Germany 1989
Without completion of any vocational training	9	19
With completion of training as skilled worker	59	64
With completion of training as master's craftsman	7	7
With completion of training at a technical college	16	4
With completion of university education	9	6

a) Non–self employed persons of the 1989/90 waves taken by the Sozio–Ökonomisches Panel; see text for explanations.

Source: Wagner and Schupp (1991), p. 180.

3 Aspects of the Wage Formation Process

The wage development documented in quantitative terms in the previous section is one of the mostly discussed economic aspects of the labour market development in East Germany. To begin with, a brief summary of the factual course of "collective bargaining" in East Germany might be helpful.

In the first collective bargainings after the introduction of the economic, monetary and social union, neither management nor trade unions were sufficiently organized to be able to conduct collective bargainings analogously to the West German model. There were in fact four "bargaining parties" taking part in the negotiation process: (i) the employers' side was still in a phase of formation, and was mostly represented by the former works supervisors and/or directors of the "Kombinate". Apart from the fact that these former party functionaries had no experience with collective bargainings, the economic efficiency interests of these enterprises were pushed into the background in favour of these "employers' " own interests in high wage settlements. This can be explained by the fact that they had to expect to become "employees" themselves or unemployed before long, whereby unemployment benefit is calculated analogously to the West German system, as a percentage of the last income. Therefore it is hardly surprising that these employers–employees opposed little resistance to wage demands. (ii) They were hardly prevented from doing so by the Trust Institution ("Treuhandanstalt"), the new factories owner – the contrary being rather the case. The Trust Institution did criticize the compensation paid to dismissed employees as being excessive but otherwise it kept

Table 9: Obstacles to Investment in East Germany (p.c.)[a)]

Obstacle	Total	Size groups of employees		
		up to 49	50 – 199	1000 and above
Problems of valuation	36	23	28	38
Deficiencies in infrastructure	32	18	35	36
Unknown environmental damages	27	19	19	37
Legal problems in the acquisition of real estate	24	32	29	24
Insecure market development in Eastern Europe	18	9	16	18
Delays in obtaining business licenses and building permits	15	14	17	15
Wage costs	12	11	11	14

a) Share of the motives in p.c., multiple entries possible; manufacturing industry; see text for explanations.

Source: Weichselberger und Jäckel (1991), p. 7.

out of collective bargainings and in some cases it showed its favour for "fair" wages.[48] (iii) The trade unions might first have been affected by the discrediting of the East German Federation of Trade Unions FDGB and of its individual member unions,[49] but starting from March 1990, experts of the West German Trade Unions DGB acted as advisers, and from then on DGB representatives took part in practically all East German collective bargainings.[50] The trade unions' target in negotiations was to close the gap between wages in East and West Germany, as a unified Germany would require, in their view, equal wages. Behind this was the fear of trade unions of not being able to explain to their new East German members the deep disparity in wages for the same work done at only small regional distances on the one hand, and, on the other, that the consequence of an excessive wage differentiation might be a migration–induced pressure on the growth rate of West German earnings. In other words, the West German trade unions dominated over their inexperienced East German employees' representatives who were still in their infancy. (iv) Similarly, politicians clearly advocated swift wage increases, particularly as failing this they feared a strong East- West migration - in view of statements, expressed at demonstrations, like: "If the DM does not come to us, we will come to the DM". The attitude of politicians ranges from the full support of wage parity – the Minister–President of the federal state of Saxony is quoted to have said that "East German earned incomes must very quickly rise to West German levels"[51] – up to an (implicite) acceptance. For instance, an announcement signed, among others, by the Minister–Presidents Biedenkopf and Engholm, despite comprehensively addressing to labour market policy, does not contain a single word about wage movements, but instead the need for work promoting corporations and a special tax for gainfully employed and for receivers of unearned income.[52] Nota bene: The intention here is not a valuation of this appeal, but the description of the political surroundings in which the East German collective bargainings took place.[53]

In view of this situation, the results of the collective wage agreements are little surprising. Between the third quarter of 1990 and the first quarter of 1991 alone, the contractual wage increase was of about 20 p.c. (cf. table 4). This catching–up process of East German wages continued even if management was organisationally represented by West German associations. In proof of this, the collective agreement for the metal industry in East Germany of spring 1991 provides that from April 1, 1991 to April 1, 1994, a gradual increase of contractual wages and salaries from approximately 60 p.c. of the comparable West German wage to the full West German level should be achieved. Similarly plans are scheduled for other branches.[54] Under the assumption that the average yearly contractual wage increase in West Germany will be of 5 p.c., this means an average growth rate of East German contractual wages – depending on the relative initial level – of around 20 to 30 p.c. a year.

[48] The first president of the Trust Institution, R. Gohlke, said in a discussion: "It is unfair that an engine driver should receive three times the pay to make a roundtrip from Hamburg to Leipzig as to make the same journey in the opposite direction", cf. Akerlof et al. (1991), p. 47.

[49] Vogler–Ludwig (1991), p. 88.

[50] Forschungsinstitut der Friedrich–Ebert–Stiftung (1991), p. 7.

[51] According to the President of the employers' association of the metal industry ("Gesamtmetall"), W. Stumpfe, in an interview in: "Die Zeit", No. 26 of June 21, 1991.

[52] Printed in: Frankfurter Allgemeine Zeitung (FAZ) No. 161 of July 15, 1991, p. 13.

[53] In connection with wage increases before and after the monetary union, Donges (1991) speaks of "political wage rounds" (p. 286).

[54] Cf. survey in Deutsche Bundesbank (1991c), p. 25.

With regard to a theoretical explanation for the wage formation process and its economic effects, it proves useful to distinguish between the following two aspects. In a time perspective, the organizational phases of the collective bargainings will be treated separately, while the second aspect will relate to the distinction between newly established versus existing East German firms.

To begin with the time perspective, the wage setting process can partly be described with elements of a simplified version of an "end game" model by taking into account that frequently there were employees on both sides of the negotiating table. Such an end game model was used to explain the wage differentials in some declining industry sectors of the manufacturing trade in the USA,[55] but in its essence it has been familiar as the Marshall–Hicks–rule in the theory of labour demand.[56] The essence of the argument is that the elasticity of labour demand η relative to the wage rate in absolute terms is the lower, the lower the absolute values of the price elasticity of demand ϵ for the product of the firm as well as the substitution elasticity σ between labour and capital are.[57] Workers in declining branches where no new factories are being built do not need to fear that they might be substituted by capital due to investment. For those East German branches which, after the implementation of the economic, monetary and social union, increasingly realized that they did not have any chance of survival in competition anyhow (and therefore did not have to expect any job-saving investments either), such an end game interpretation might not be fully implausible if they did rely on that the Trust Institution would still keep them through for some time without any dismissals.[58] Ultimately the employees successfully tried to appropriate the quasi–rents, if any, either in the form of the difference, possibly still positive, between output price and variable per-unit costs or in the form of the subsidy from the Trust Institution – their attempt being successful because often the employees' interests predominated on the managerial side as well. The end game interpretation is implausible, however, for those employees who had – realistically – to expect that the breakdown of the firm and consequently their exit into unemployment would be accelerated by high wage agreements. In this case it was a matter of weighting up the alternatives: either a longer duration of employment with low wages and a correspondingly lower unemployment benefit or an imminent dismissal with higher unemployment benefits.

For the second phase of the wage formation process, various aspects of the efficiency wage theory and/or arguments of a "fair wage rate" may be considered as theoretical attempts at explanation. As already mentioned, the bargaining parties were dominated in this phase by West German participants who also took into account the interests of West German firms or employees. These interests manifested first of all in the acquisition of East German enterprises, especially in the takeover of the qualified staff. Thus the qualified skilled employees in East Germany were, in the view of potential West German investors, a "threat" in the form of migration to West Germany or fluctuation into those East German sectors which already paid high wages in comparison with West Germany – like e.g. banking and insurance.[59]

[55] Cf. Lawrence and Lawrence (1985).

[56] In a comment on Lawrence and Lawrence (1985), Solow puts it laconically: "Always nice to see an old friend", (p. 109).

[57] For a formal deduction of this result cf. e.g. Franz (1991a), p. 132ff, or Neumann (1987), p. 86ff.

[58] This was also conceded by Akerlof et al. (1991), p. 49f., who are otherwise sceptical about an end game interpretation.

[59] The President of the employers' association of the metal industry ("Gesamtmetall"), W. Stumpfe, said in an interview about the collective agreement for the metal industry in East Germany: "With

To avoid this fluctuation, the employers granted efficiency wages, i.e. rewards above the equilibrium wages, thus implying unemployment especially for less qualified persons, which was approvingly accepted.[60] The payment of efficiency wages has also been substantiated by the incentive function of boosting the employee morale, less developed in the socialist system.[61] This implies that with efficiency wages, firms are offering incentives for East German employees to practise no shirking (e.g. absenteeism). The "fair wage hypothesis" goes into this direction as well, by referring to the fact that employees reduce the intensity of their performance if the wages actually paid fall below a certain level regarded as "fair".[62]

Which was the interest – from a theoretical point of view – of the trade unions in the wage agreements of the second phase of the wage formation process? Why did they not practise wage moderation to achieve a reduction of losses in employment, like e.g. in the sense of a wage-employment–bargaining model of the McDonald– Solow type? Here too we must recall that the East German trade unionists had benefitted at least from the "advisory" support of their West German colleagues who represented labour in many cases – as e.g. in the East German metal industry. Fearing migration and commuter flows from East to West Germany, the trade unions might have proceeded from the validity of the law saying that in one labour market there could also be only one wage, attainable by wage increases in East Germany but preferably not by wage reductions in West Germany. It is irrelevant for this argument that migrations had extremely been overrated relative to their extent. It is sufficient to assume that the trade unions were expecting a high migration.

This hypothesis could be viewed as an irrational attitude of trade unions, since a quick glance at the literature about migration will show that for the migratory decision the expected wage differentials are decisive, i.e. wage rates weighted with the corresponding employment possibilities. High wages in East Germany will result, however, in a lower employment possibility and thus counteract the targetted levelling of wage differentials. Seen from this angle, the trade unions pursued an unreasonable policy from the economic point of view: they wanted to avoid migration and did induce it by consciously accepting substantial losses in employment due to wage increases in East Germany. This argument, sound by itself, is losing relevance in this concrete case, since the high unemployment benefits (including short–time benefits) as a result of high wage agreements and of the expectation that the Trust Institution would see enterprises through to a considerable extent, did in the end enormously raise the expected income in East Germany. The reduced migration therefore exercises a lower wage pressure in West Germany.

For an assessment of the economic consequences of the high wage agreements it must further be differentiated between newly established or existing East German enterprises. For large-scale industrial projects, newly built enterprises and completely modernized companies in East Germany, West German productivities serve as reference magnitudes. Hence wage costs are acceptable for these enterprises, but they did not constitute an attractor to investment in East Germany, as reflected in table 7. West German enter-

our wage policy we must prevent above all that migration of the most competent from the East to the West will render upswing in the East totally impossible. Those who keep wages and salaries too low, will lose their best employees." Source: "Die Zeit", No. 26 of June 21, 1991, p. 29.

[60] "This had not been the aim, but we have in a way put up with these consequences". Source: ibid.

[61] Cf. e.g. Bellmann (1991).

[62] Cf. Akerlof and Yellen (1990).

prises did not assume anyhow that East Germany would be a "low–wage country" in the long run. It proves to be even more difficult, if not impossible, for the existing or newly created enterprises in East Germany which have first of all to surmount organizational and starting problems or whose products, having improved in quality, would have better sales prospects with correspondingly lower prices, especially as a partial shift of demand to East German products has started to emerge since 1991.

4 Inflation and Unemployment in West Germany: A Simulation Experiment

The tremendous increase of East German Imports from West Germany (see section 2.3) has many observers led to the fear of high inflationary pressure in West Germany. This view was seemingly supported by high capacity utilization rates of 98 percent in 1990 (see table 10) and by NAIRU-estimates of 9 percent for West Germany.[63] Until now, however, that fear of substantial inflation was misplaced. At the time of this writing, inflation of consumer prices is 3.9 percent (September 1991) or some 3 percent if corrected for higher indirect taxes since July 1991. This is hardly an outburst of inflation. Moreover, those NAIRU estimates seem to be exaggerated as well. Other estimates wind up with figures of 4 to 6 percent[64] which seem to meet the facts more closely. Whatever the merits of NAIRU estimates, a more detailed analysis may be provided by the empirical results from a macroeconometric rationing model for the West German economy. If the aformentioned view of possibly high inflationary pressure were to be correct, the demand shock in the aftermath of unification should have met firms being for their most part capacity constrained. Put differently, to be in line with actual price increases, a considerable share of firms should have been still confronted with some lack of goods demand. Besides this aspect an assessment of how the West German economy will be influenced quantitatively by the continued but probably declining import demand from East Germany might be instructive.

The model under consideration is a macroeconometric rationing model for West Germany which takes into account the openess of this economy. Since the model has been discussed elsewhere, [65] it suffices here to give a brief overview on its basic structure.

When wages and prices are not adjusting fast enough to clear markets at any instant of time, some form of rationing is observed. On each micro market for goods transacted quantities can be constrained by demand YD, productive capacity YC, or by available labor YS. Rationing on each of N micro markets can therefore be described by:

$$Y_i = \min(YD_i, YC_i, YS_i), \qquad i = 1, \ldots, N. \tag{1}$$

In the absence of labor hoarding transacted labor (L) is the minimum of labor (LD) needed to produce YD, labor that can be employed by existing capital (LC) and of labor supply (LS):

$$L_i = \min(LD_i, LC_i, LS_i), \qquad i = 1, \ldots, N. \tag{2}$$

[63] See Jäger and Parkinson (1990), for example.

[64] See Coe and Krüger (1990) and Franz (1987).

[65] See Entorf, Franz, König and Smolny (1990), Franz and König (1990), Franz, Heidbrink and Scheremet (1991) and Franz and Heidbrink (1991) for details of this model.

Table 10: Selected Indicators for the West German Labour Market

Year/ Quarter[a)]	Inflation Rates: Consumer Prices[b)]	Inflation Rates: GDP Deflator	Growth Rate of Unit Labour Costs[c)]	Unemployment Rate[d)]	Employment Growth[e)]	Capacity Utilization[f)]
	(1)	(2)	(3)	(4)	(5)	(6)
1985	+0.2	+2.2	+1.9	8.2	+0.9	94.6
1986	−0.1	+3.1	+2.7	7.9	+1.5	94.8
1987	+0.2	+2.0	+2.3	7.9	+1.0	94.5
1988	+1.3	+1.6	+0.2	7.7	+0.9	95.8
1989	+2.8	+2.6	+1.2	7.1	+1.6	96.9
1990	+2.7	+3.4	+2.5	6.4	+2.9	98.2
1991/1	+2.7	+3.4	+1.8	6.1	+2.5	n.a.
1991/2	+3.1	+4.4	+2.7	5.4	+2.3	n.a.
1991/3	+4.2			5.6	n.a.	n.a.

a) Yearly and quarterly averages respectively; growth rates for quarters are on an annual basis;

b) cost of living–index;

c) unit labour costs are gross labour income divided by real GDP;

d) unemployed persons as a percentage of total labour force;

e) nonself–employed persons;

f) real GDP as a percentage of potential output; 96.5 percent is regarded by the CEE to be "normal utilization".

Sources:

- Monatsberichte (Monthly Reports) der Deutschen Bundesbank, September 1991; cols. (1), (4), (5)
- Deutsches Institut für Wirtschaftsforschung, Vierteljährliche Volkswirtschaftliche Gesamtrechnung (German Institute of Economic Research, Quarterly National Accounts); cols. (2), (3)
- Sachverständigenrat, Jahresgutachten 1990/91, p. 310 (Council of Economic Experts, Annual Report 1990/91); col. (6)

These min–conditions hold for micro markets. If the statistical distribution of demand and supply on the micro markets follows a joint log–normal distribution, aggregate transaction can be approximated by a CES–type function of the aggregate concepts of demand and supply denoted by:

$$L = \left[LD^{-\rho} + LS^{-\rho} + LC^{-\rho}\right]^{-1/\rho} \tag{3}$$

with $L \leq \min(LD, LC, LS)$ where the inequality sign holds for all finite values of ρ. The parameter ρ reflects the mismatch between demand and supply components on micro markets. For $\rho \rightarrow \infty$, the equation tends to the usual min–condition, i.e., the aggregate economy is subject to only one of the constraints.

The variables YC and LC are explained on the basis of a technology which can be characterized by ex–ante substitution possibilities but ex–post limitationality. More specifically, we assume an ex–ante CES–production function with constant returns to scale (K denotes the capital stock and γ stands for technical progress).

$$YC = \gamma\left[\delta(e^{\gamma_l(t)} \cdot LC)^{(\sigma-1)/\sigma} + (1-\delta)(e^{\gamma_k(t)} \cdot K)^{(\sigma-1)/\sigma}\right]^{\sigma/(\sigma-1)}. \tag{4}$$

When prices (P) are set as a constant mark–up on average production costs (such as wages W and user cost of capital Q) in the long run, firms can maximize profits by minimizing their input costs, which gives the following first order conditions:

$$A^* := (yc - lc)^* = const. + \sigma(w-p) + (1-\sigma)\gamma_l(t) \tag{5}$$

$$B^* := (yc - k)^* = const. + \sigma(q-p) + (1-\sigma)\gamma_k(t) \tag{6}$$

Small–case letters denote logs of the variables. Optimal factor productivities are determined by the respective factor– product–price ratios and an efficiency term reflecting technical progress. Ex—post productive capacity is determined by fixed factor productivities and the stock of capital:

$$yc = B^* + k \tag{7}$$

$$lc = yc - A^*. \tag{8}$$

A disadvantage of the specification (1)–(3) may be seen in the inability to distinguish between capacity mismatch, i.e., the inadequacy of installed capital to match the composition of the demand for goods and mismatch between labor supplied and demanded due to differences in qualification profiles, regional immobility and other labor market inflexibilities. Since these different types of mismatch require different types of corrective policies, it is more appropriate to assume a two–stage process of firms' employment decisions. For the goods market we assume:

$$Y_i = \min(YG_i, YS_i) \qquad \text{with} \qquad YG_i = \min(YD_i, YC_i) \tag{9}$$

and, correspondingly, for the labor market:

$$L_i = \min(LG_i, LS_i) \qquad \text{with} \qquad LG_i = \min(LD_i, LC_i). \tag{10}$$

This means that the individual firm in a first step determines its labor demand in accordance with the restrictions of the goods markets and confronts in a second step its labor

demand with available labor supply. If the minimum of lognormally distributed variables is itself approximately distributed lognormally, smoothing by aggregation results in a nested employment function:

$$L = \left[(LD^{-\rho_1} + LC^{-\rho_1})^{\rho_2/\rho_1} + LS^{-\rho_2}\right]^{-1/\rho_2}. \tag{11}$$

The parameter ρ_2 describes labor market mismatch, whereas ρ_1 captures capacity mismatch. Turning to the treatment of aggregate demand YD, private consumption, investment, exports and imports are endogenous variables, whereas government expenditures and housing investment are treated exogenously. Consumption depends on disposable income, the interest rate, and on a labor market indicator. The investment equation is based on the accelerator principle. Rationing is introduced in the following way. Excess demand for domestic goods will lead to additional imports to bypass the constraint, while on the other hand, excess demand on the world market will restrain German imports. The opposite may hold for exports: Domestic constraints will hinder foreign demand, while supply constraints on the foreign market may induce additional German exports. Rationing of the demand components other than exports and imports will be observed only in the case of simultaneous constraints on the domestic and the world markets. No significance of those effects was found. Therefore they may be regarded as rather small. Demand for exports (XD) and imports (MD) are calculated for a situation with no rationing on the domestic market. This gives the following identities for goods demand:

$$YD = C + I + G + XD - MD + \text{ housing investment} \tag{12}$$

and for labor demand:

$$ld = yd - A^*. \tag{13}$$

One central feature of this model is that it distinguishes proportions of firms being constrained by the demand for goods π_D, by existing capacities π_C or by available labor π_S, where

$$\pi_D = \left[(LC^{-\rho_1} + LD^{-\rho_1})^{(\rho_2-\rho_1)/\rho_1} \cdot LD^{-\rho_1}\right]/L^{-\rho_2} \tag{14}$$

$$\pi_C = \left[(LC^{-\rho_1} + LD^{-\rho_1})^{(\rho_2-\rho_1)/\rho_1} \cdot LC^{-\rho_1}\right]/L^{-\rho_2} \tag{15}$$

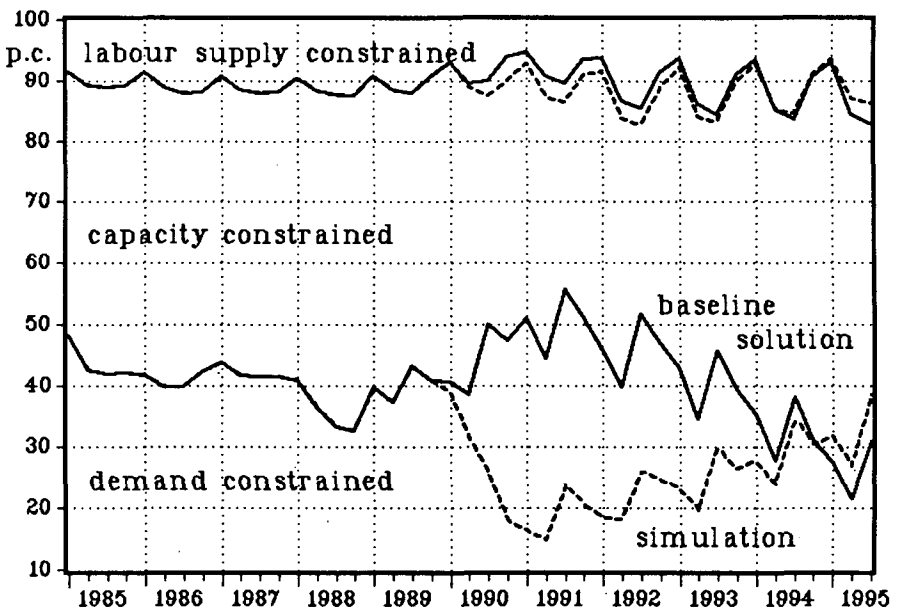
$$\pi_S = (LS/L)^{-\rho_2}. \tag{16}$$

Labor supply consists of two components. Labor supply of German persons is modelled by an endogenously determined labor force participation rate depending on the real wage rate and the unemployment rate in order to allow for discouraged workers. The same approach is carried out for labor supply of foreign people in Germany.

Finally, the interest rate is an endogenous variable via endogenous demand for money and exogenous money supply. Wages and prices are determined by demand and supply factors and react slowly to market disequilibria. Price setting of firms is assumed to follow a mark–up pricing on several types of costs, where the mark–up depends on demand conditions on the goods market. Costs considered are wage costs, i.e., standard wages relative to actual labor productivity, prices of imported goods relative to the GNP–deflator, value added taxes, and the share of non–wage labor costs in total labor costs. Wages are set in negotiations between labor unions and employers. Explanatory factors are expected inflation, change in labor productivity, and several supply variables. The effect of labor market conditions is captured by the unemployment rate.

The upshot of the estimation results in figure 1 which displays, for 1985 to 1988, the share of firms being constrained either by the demand for goods, π_k or by existing physical capacities, π_c, or by available labor, π_s. These shares have been estimated by the model according to eqs. (14) – (16).[66] As can be seen the second half of the eighties is characterized by an increasing importance of capacity constraints in due course of the restrictive monetary and fiscal policies in the beginnings of the eighties which led to an investment squeeze. These findings are at variance with the results obtained by Laroque (1989). His estimates attribute virtually all German unemployment, after 1981, to a Keynesian unemployment regime. Hence, our figures regarding the share of firms being demand constrained may be viewed as the more conservative estimates. Nevertheless, they wind up with a respective figure of nearly 50 percent in 1985/1 which declines to some 30 percent at the end of the estimation period, i.e. 1988/4. These considerable shares of firms being demand constrained may contribute to an explanation as to why inflation did not speed up. This can also be seen by the ex–ante simulation of the model starting in 1989/1, where the solid lines represent estimates of the time path of the regime shares without some effects due to unification (see below). The dashed lines indicate the future course of the regime shares, seen from the model's end of the estimation period 1988/4, if some effects of unification are taken into account.

Figure 1: Proportions of Constrained Firms in West Germany



[66] See the sources in the previous footnote for a discussion of the results for the whole sample period of the model which covers the period from 1960 to 1988.

More precisely, the difference between both lines stems from the following assumptions concerning changes of exogenous variables due to unification:[67]

- Increase of real net exports from West Germany to East Germany in billion DM: + 42(1990), + 98(1991), + 80(1992), + 70(1993), + 60(1994) and + 50(1995);[68]
- increase of labour supply due to German emigrants from East Germany to West Germany (including West–Berlin) ("Übersiedler") in thousand persons: + 50(1990), + 160(1991), + 260(1992); + 340(1993), + 400(1994) and + 420(1995), and due to commuters: + 275 during the whole simulation period; [69]
- increase of direct and indirect taxes:

  + 7.5 percentage points for the income tax rate for 1991/3 to 1992/2

  + 1 percentage point higher value added tax starting in 1993/1;
- the real interest rate is kept on its actual level until 1991/2, in order to take into account interest rate effects of public deficits due to unification and is kept on the 1991/2 level afterwards.[70]

It goes without saying that all the aforementioned assumptions are highly debatable and it should be stressed that the paper does not engage in calculations such as working out the "costs of unification"and the like. The aim is much more modest in that it attempts to provide "educated guess estimates" about partial macroeconomic effects of German unification on inflation and unemployment in West Germany.

Given this caveat, what, if anything, can be learned from this simulation exercise? An inspection of the dashed lines in figure 1 confirms that the autonomous, favourable demand shock from East Germany leads to a considerable increase of firms which are constrained by existing capacities. On the other hand, neither aggregate demand nor labour supply does seem to be an important constraint. The latter observation sheds light on the development of wages and, consequently, on prices. As is shown in figure 2 the simulated inflation rate of the GDP deflator exceeds its baseline solution for 1.8 percentage points at the most. Given the massive immigration into West Germany and the increase of West German labour supply due to commuters it is hardly surprising that only a modest reduction of the West German unemployment rate is simulated (see figure 2). Moreover, while simulated inflation is lower compared with the baseline solution since 1994, the reverse holds for the unemployment rate. The model predicts that investment increases due to the higher share of capacity constrained firms. Since

[67] Hence, the term "without unification" refers to a forecast of the model where the assumptions described below in the text are undone. For all other exogenous variables such as world trade, GNP of foreign countries, export and import prices, wedges–variables, and the like, the DIW forecast has been used which includes, of course, effects of German unification. Put differently, only partial effects from German unification are taken into account.

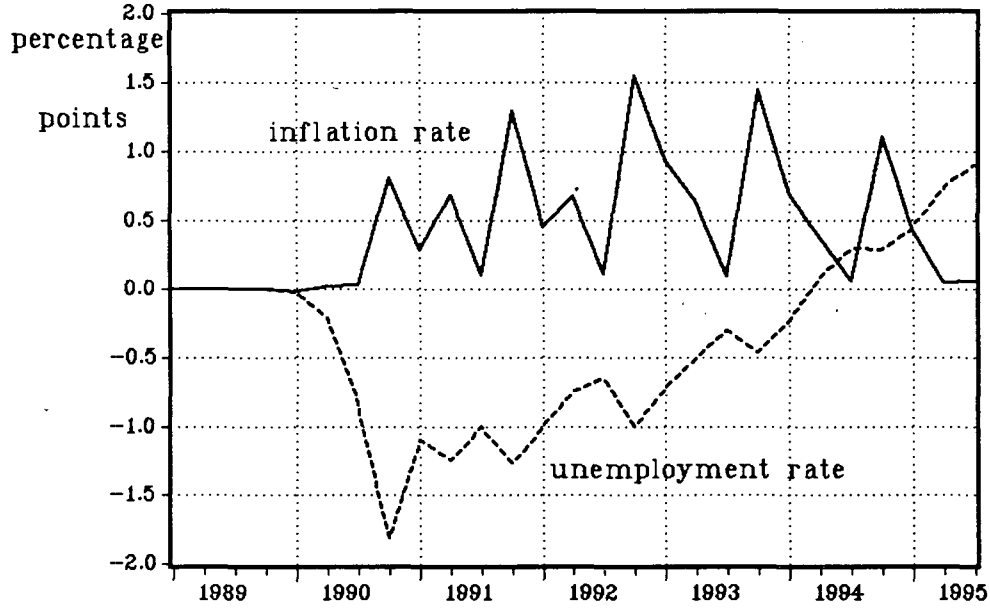
[68] The figure for 1990 are actual values, for 1991 and 1992 they are taken from the DIW forecast, for 1993–1995 they are hypothetical figures.

[69] Note that all figures display labor supply at the end of each simulation year compared with labor supply at 1990/4, quarterly figures for the simulation are obtained by linear interpolation. The figures are taken from a forecast of the Institute of Labour Market Research (IAB), see Mitteilungen aus der Arbeitsmarkt– und Berufsforschung 23 (Nr. 4), p. 471.

[70] While the interest rate is an endogenous variable in our model (determined on the money market by endogenous demand for money and exogenous money supply) we treat it as an exogenous variable here due to difficulties in differentiating money supply between West and East Germany.

the simulated demand shock is declining, as described above, since 1993, those newly established capacities become underutilized afterwards.thus creating downward pressure on inflation and employment.

Figure 2: Change of Inflation and Unemployment in West Germany[a)]



[a)] Differences between simulated values and the baseline solution, see text.

Taken together, the figures about the effects of unification on West German inflation and unemployment rates are anything but outrageous. Unless a quantitatively important aspect has been overlooked (foreseeable or not), the numbers do not give rise either to a fear of spurring inflation or to a hope of substantial reductions of joblessness in due course of unification.

5 Concluding Remarks

The topic of this paper was, first, a summary and analysis of recent developments on the East German labour market, and, second, an evaluation of some effects of German unification on the West German labour market.

Three major sources of increased joblessness in East Germany were identified: layoffs due to a reduction of oversized staff, layoffs due to adverse demand and supply shocks, and employment barriers due to obstacles to investment in East Germany. The outcome of the wage bargaining process in East Germany can be better understood if it is recognized that four parties were envolved in "bargaining": the employers' side partly represented by employees, the East German trade unions advised if not dominated by West German unions, the politicians, and the Trust Institution. Moreover, elements of an "end game–situation" as well as parts of efficiency and fair wage hypotheses can contribute to an explanation of the tremendous spurt in wages.

A simulation experiment on the basis of a macroeconometric rationing model reveals that the effects from higher import demand from East Germany on West German inflation and unemployment rates are anything but outrageous. The figures do not give rise either to the fear of spurring inflation or to a hope of substantial reduction of joblessness in West Germany in due course of unification.

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