Initial Conditions and Regional Adaptation: The case of Manufacturing in a post-socialist economy

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Abstract

This paper is devoted analyzing the process of structural change in East Germany. This part of the country underwent a transition from a centrally planned towards a market economy in the course of the German Re-unification. This implied a tremendous shock for the manufacturing industries. The paper aims at investigating how the manufacturing sector adapted to the shock of transition. It is hypothesized and shown that the initial conditions and especially the initial configuration of the local industry structure were of outstanding importance for the change in manufacturing employment across regions. Thus, the economic development of regions seems to depend on the past.

Keywords: Structural Change, Transition, Employment growth

JEL-classifications: L16; P25; R11

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1 Introduction

This paper is devoted to analyze the role of regional initial conditions for structural change. It is argued that especially the initial industry structure explains a lot of the change in manufacturing employment in the aftermath of transition. It is shown by referring to the former socialist GDR that the structural make-up of regions at the eve of the transition towards a market economy explains regional differences of the adaptation of the manufacturing sector in different stages of transition. In contrast to other studies that focus on the relevance of initial conditions, the effect of gradual endogenously evolving economic reform is only modest since the whole formal institutional framework of the Federal Republic of Germany was transferred to East Germany in the course of reunification.

The main findings of the present paper are that the regional specialization in manufacturing has a significant negative effect on the adaptation of manufacturing measured by the respective change of employment in this sector. Moreover, regions that contained high shares of certain manufacturing industries that performed especially weak in comparison to the respective sector in West Germany were marked by pronounced de-industrialization.

These results have an important implication. Namely, that the failure and success of regions in the aftermath of heavy exogenous shocks like the changeover between economic systems with completely opposing economic principles seems to be explained to a large extent by the initial configuration of regions especially in regard to the industry structure. The success and failure of regions after transition is not simply a story of good or bad luck, but seems to be linked to the economic development and the imprinted socialist face of regions just before adopting the market.

2 Framework

2.1 Initial Conditions in the transition context

In the transition context, initial conditions can be understood as the structural makeup of an economy on the eve of the transition from a centrally planned towards a market one. Thus, initial regional conditions aim on spatial differences within a transition economy in regard to the starting point of transition. The role of initial conditions was studied by several authors. Initial conditions were found to affect the ability of countries to adapt successfully in the course of transition (De Melo et al., 2001). Popov (2000) found that more than 60% of the differences of economic performance across transition countries in Central Eastern Europe countries (CEEC) can be explained by uneven initial conditions, such as pre-transition disproportions in industrial structure. Hodgson (2006) finds that initial conditions explain GDP growth across CEEC countries. Despite these cross-country studies there are also analyses that focus to the role of initial regional conditions. Ahrend (2005, 2008) finds that initial industry structure explains most of the economic performance across Russian regions in the 1990s.

Most of the papers on initial conditions in the context of CEEC focus on the debate on whether initial conditions or economic reform explain differing economic performance (Ahrend, 2008). Economic reforms were introduced in these countries with a different degree of gradualism. Thus, the formal institutional framework evolved endogenously over time and was not ready-made at the starting point of transition. The current paper provides a case study where the effect of gradual economic reform is negligible since the whole, exogenously evolved, formal institutional framework was introduced practically overnight by becoming part of another country. The case study, it is focused on, is East Germany, the former German Democratic Republic (GDR) that reunified with the Federal Republic of Germany (FRG) in 1990 and “adopted” the market economy immediately (see e.g. Brezinski & Fritsch, 1995; Hall & Ludwig, 1995).

2.2 Initial Conditions and the transition of the East Germany

The effect of initial conditions in the case of East Germany is investigated mainly in explaining deviations from the West German economy in the aftermath of re-unification in regard to economic development, but take no regional focus (see e.g. Brakman & Garretsen, 1993; Snower & Merkl, 2006; Burda, 2008; Hall & Ludwig, 2007). There have been papers that find different degrees of economic capability across East German regions (see e.g. Barjak, 2001; Kronthaler, 2005) and that investigate the driving forces of regional growth in East Germany (see e.g. Blien & Wolf, 2002; Suedekum et al., 2006), but none of these papers sheds light on the role of initial conditions.

There are however early assessments on the prospects for regional adaptation that refer mainly to the initial industry structures of the former GDR (Budde et al., 1991; Rudolph, 1990). The work of Kawka (2007) is one of the rarely approaches where the effect of regional initial conditions is tested empirically. The author finds that initial conditions explain regional differences in regard to GDP growth. The present paper follows this kind of analysis, but uses the change in manufacturing employment as an indicator for regional adaptation. The change of regional employment in manufacturing is a suited indicator for regional adaptation because this sector was affected heavily by transition.

2.3 East German manufacturing at the eve of transition

Manufacturing industries in the GDR were aggregated into state-owned combines *(Kombinate)*, which were set up in accordance with the aims and scopes of central planners. Combines consisted of a collection of plants with a high degree of vertical integration and large plant sizes. These combines were assigned to specific branches. Independent ties between organisations were forbidden or highly regulated. The high degree of vertical integration resulted in a high dependency of single plants within the combines. The combines were closed systems mainly producing single standard products

operating in a quasi-monopolistic market, low diversified and not exposed to competition (see e.g. Mehta, 1989; Bannasch, 1990; Lange & Prugh, 1998).

In this situation the manufacturing industry was heavily affected by the sudden shock of transition. These shocks comprised a competition; supply; wage; regulatory and mental shock (see Brezinski & Fritsch, 1995, for a detailed discussion). The competition shock exemplifies the problems the East German manufacturing sector had. Due to the above mentioned modes of production in socialism, the pursued national autarky and typical misallocations inherent in a planned economy, the manufacturing sector of the GDR was marked by low productivity levels compared to the West German competitors that entered the East German market since the fall of the Berlin Wall (see e.g. van Ark, 1995; Sleifer, 2006).

Many enterprises were closed down, which set free a lot of workforce that could not be absorbed by the "bottom-up" transition via new business formation and lead to a rapid decline in manufacturing employment. Industry production, for instance, fell by 20% to 30% between June and July 1990, in response to the German currency union on July 1st (Lange & Prugh, 1998). From 1989 to 1992 GDP declined by roughly 30%, value added in industry by more than 60% and employment by 35%. Thus *"…it is difficult to find a more dramatic episode of economic dislocation in peacetime during twentieth century*" (Burda & Hunt, 2001).

2.4 The regional dimension of adaptation of the East German manufacturing

There were also regional differences in regard to the degree of de-industrialization (see figure 4.1 and 4.2 for regional differences between 1989-1995 and 1989-2001). The configuration of manufacturing across regions was marked by pronounced differences within the former GDR (see e.g. GeoJournal, Vol. 8 No.1, 1984 for an overview).

Local Industry Structures

Some industries were expected to have especially severe problems to adapt to the new economic system. These industries were mainly those that were especially marked by socialist production methods, described in the previous section. These industries had an especially low productivity compared to West German competitors, produced with environmental harming production techniques, followed outmoded technological paths, or typically would have been off shored in case the GDR was an OECD market economy (Rudolph, 1990). These “unfavourable” industries mainly comprised the large-scale industries chemical, energy (mining), and metallurgy sectors (see e.g. Rudolph, 1990; Stokes, 1995). Regions with an unfavourable industry structure reflect a considerable shaping by socialist modes of production and planning principles that may make it more difficult to adapt to market economy.

There are two different channels how these unfavourable industry structure may affect the adaptation of regions. First, GDR incumbents are maybe harder to be privatized since the resources they provided had a comparatively lower economic value and firms belonging to these industries may therefore have been downsized and closed-down with a higher probability. Second, the resources these industries provided were maybe less feasible to be a source for finding and exploiting market opportunities, reflected by the creation of new firms. Spin-offs from the former state-owned combines may have been occurred less likely, because individuals may not make properly use of the existing resources.

Regional Specialization

Regions with a high initial degree of specialization also reflected a shaping by socialism and socialist regional planning respectively. The specialization of the former GDR was “artificially” high (Suedekum, 2006). This can be explained by socialist planning principles, which were in favour of bundling industries at certain locations to exploit rationalization potentials or creating

regionally close production-cycles (see e.g. Berentsen, 1979; Grabher, 1997). Some regions were characterized by highly-specialized mono-industrial structures (Scherf & Scholz, 1984). This kind of specialization was, however, not an expression of the utilization of pecuniary externalities and market-mediated linkages, which Krugman (1991) had in mind. Rather it reflected the enforcement of socialist economic planning.

A high “artificial” specialization may reflect an extensive need for down-ward-correction towards a natural level of specialization, which means that regions that bundled resources of certain industries to make use of socialist rationalization had to release these resources, especially workforce, since the level of concentration of resources and employment in the region is unsustainable after the unleashing of market forces. At the same time the released workforce may not be absorbed by other manufacturing industries since East German manufacturing as a whole had to cope with restructuring. Therefore, initial regional specialization should have a negative effect on employment growth in manufacturing.

Hypotheses

In essence, it may be a difficult task to transform regions that were affected heavily by socialist industrial policy, which found its expression in regional specialization and the configuration of local industry structures. At least empirical evidence for Russia by Ahrend (2005, 2008) shows, that it is indeed the initial industry structure that affects economic performance most. For East Germany the effect of the initial industry structure was assessed in determining which regions will have a hard stand in adapting successfully (Rudolph, 1990; Budde et al., 1991), but so far no study explicitly tested the effect of the initial composition of the manufacturing sector on employment growth. It is hypothesized here that:

(H1) Regional Specialization has a negative effect on the change in the level of manufacturing employment.

(H2) The higher the share of employment in "unfavourable" large scale industries, the higher is the degree of de-industrialization.

3 Data & Measurement

3.1 Data

The study was conducted by using a unique dataset that contains data on the current NUTS3-level (districts) for industrial shares of 9 broad sectors (8 manufacturing industries), and data on population structure. All of these data came from the GDR Statistical Offices (see Rudolph, 1990, for a description of the original data; see Kawka, 2007, for a detailed description of the adjustment of the data toward the current regional stratification).[1] This data was presumably not falsified because it was not sensitive in regard to socialist propaganda, unlike official data on productivity. Data on employment growth after transition were obtained from the German Social Insurance Statistics' database. It contains information on every German establishment with at least one employee liable to Social Insurance (Fritsch & Brixy, 2004).[2]

3.2 The analysis of employment growth

Our main interest is how and why the employment within manufacturing changed across regions. Thereby, employment growth is measured by the growth of employment in the manufacturing sector between 1989 and a reference point after transition.

$$(1) \qquad Employment\_Manufacturing_{Growth} = \frac{Employment\_Manufacturing_{1989+t}}{Employment\_Manufacturing_{1989}}$$

The construction sector is not taken into consideration here since Re-Unification triggered a boom in the construction sector, which may bias the results. The change in manufacturing employment is calculated for the period

[1] A special thanks to Dr. Rupert Kawka for providing this adjusted data. The data for East Berlin are not used because they are not reliable and because current data do not distinguish between East and West Berlin.

[2] Data from later years were gathered in accordance to a new sector classification, which makes it difficult to compare data over time.

1989 to 1995 and for the period 1989 to 2001. The reason for this division is that the privatization agency THA officially finished its work by December 31st, 1994. Thus, the sector structure in the year 1995 should not be biased in regard to delayed privatization. The analysis for 1989 to 1995 should reveal the short term effect of initial conditions on the adaptation process in the course of restructuring of the economy, whereas the period from 1989 to 2001 should reveal long term effects. In addition, an analysis of the driving forces of employment growth in manufacturing in West Germany is carried out to detect differences between East and West Germany.

It is not distinguished whether the employment growth happened via new business formation or by the adaptation of privatized GDR incumbent firms. The contribution of spin-offs mad use of appropriate resources of incumbent firms is also not investigated. So, the analysis is limited to the research question whether the existence of a certain structure was helpful or a burden for the ongoing process of restructuring of regional manufacturing.

The regression analysis is carried out by running ordinary least square regression (OLS) with robust standard errors. This method relies on OLS regressions, which are robust in accordance with the Huber-White sandwich procedure (Huber, 1967; White, 1980), in order to avoid the problem of heteroskedasticity. In the regression analysis the independent variables and employment growth are introduced as log-values to interpret the results as elasticity.

3.3 Independent Variables

We take into consideration the initial conditions of the manufacturing sector across regions to test the proposed hypotheses. This is the regional specialization and the initial industrial mix. For measuring regional specialization the *Krugman index* is used. Thereby, the national employment share of a manufacturing industry in 1989 is calculated as well as the respective regional employment share. The absolute difference of both

values is added up for the seven broad industries for which we have data on for the year 1989.[3]

$$(2)\quad KSI_{r\_89} = \sum_{i=1}^{7} | x_{ir\_89} - \overline{x_{i\_89}} |$$

The regional specialization in the former GDR was artificially high, which has to do with the socialist regional planning principles. It was argued that a high initial specialization may reflect an extensive need for down-ward-correction towards a natural level of specialization by shedding manufacturing employment. A possible source of error may be the existence of a regional policy focus. In some cases policy was backing regions that have been mono-industrialized (highly specialized) (e.g. the "Chemical Industry Triangle" in southern Saxony-Anhalt) for the simple reason that the collapse of the dominating industry was expected to cause deep structural problems for the respective regions. This policy attention may weaken the negative effect of regional specialization. Unfortunately, it cannot be reasonably controlled for this policy intervention, which is a drawback of the present analysis.

The industrial mix is measured by the regional share of employment in unfavourable industries. Unfavourable industries were marked by especially low productivity and outmoded and especially environmentally harmful production techniques. These unfavourable industries mainly comprised the large-scale industries chemical, energy (mining), and metallurgy sectors (see Rudolph, 1990; van Ark, 1995; Stokes, 1995). It is expected that in regions with a high share of such industries in total initial manufacturing employment have a decreasing employment in manufacturing most. This may be explained by problems of incumbents to survive in the market, but also by lower rates of new business formation in manufacturing due to a lack of market opportunities caused by the downsizing of industries and the depreciation of the resources of these unfavourable industries that are only to

[3] Berlin is not included in constructing the national employment shares, because it is not possible to distinguish between East and West Berlin in the data for 1995 and 2001. Moreover, the regional integration of East and West Berlin in 1990 makes it difficult to define a consistent reference level for the period from 1989 and 1995 and 1989 to 2001 respectively.

a limited degree an appropriate source for the exploitation of market opportunities.

$$(3)\quad Emp_{Unfav} = \frac{Emp\_Energy + Emp\_Chem + Emp\_Metal}{Emp\_Total}$$

The aggregate development of the local manufacturing sector may not be entirely affected by local industry structures,[4] but also by other initial conditions. Sustaining the level of manufacturing employment via the survival of incumbents and the emergence of new firms may also be affected by localization and agglomeration externalities. In socialism such externalities were underutilized, because the socialist planning principle dictated economic activity across regions. The local industry was rather decoupled from the region (Stark & Grabher, 1997). What is known empirically is that socialist cities underwent a tremendous restructuring (see Andrusz et al., 1996). This holds also for East German agglomerations. Cities were centers of industrial development under socialism (Berentsen, 1992). Due to the absence of pricing of land in socialism and its introduction after the fall of the Iron Curtain many relocation processes took place (Häussermann, 1996). Thus, it should be controlled for the effect of agglomeration. This is done by employing a variable that measures employment density. This is the total regional employment in 1989 divided by the size of the region measured in square kilometres.

The initial stock of knowledge may also have an effect on the adaptation of manufacturing. Thereby, the economic value of knowledge acquired in GDR times has to be considered. Since the GDR followed different technological paths than West Germany (see e.g. Stokes, 1995; Fritsch, 2004), parts of the knowledge stock had to be depreciated, which is reflected by the shedding of highly-qualified labour after transition (De Rudder, 2009). The regional knowledge stock in the GDR in 1989 is measured by the share of employees that have a university degree.

[4] It is not controlled for the average regional firm size. The socialist combines and their plants were huge and had a tendency to hoard labour. Plant Sizes were large in general but had no economic meaning.

Unfortunately, the official GDR data cannot distinguish between employees with such a degree across sectors on the current NUTS3 level of regional aggregation. It is just the aggregate share of highly skilled employment across regions, we have information on. This is a drawback for measuring the role of the initial knowledge stock since there were remarkable differences in the shedding of highly skilled employees across sectors in the aftermath of transition (Mayntz, 1995), which may reflect different degrees of appropriateness of knowledge acquired in the GDR. However, one may argue that since the use of knowledge had to be adjusted anyway, the general stock of knowledge may be an indicator of the regional potential to recombine knowledge in the market economy, which may find its expression in the exploitation of entrepreneurial opportunities and subsequent growth.

It is also controlled for location patterns, which means that it is investigated whether NUTS3-regions that share a borderline with the Re-Unified Berlin and NUTS3-regions that share a common border with West German regions had different employment growth prospects. It is expected that both types of regions gained from economic integration. In the case of the adjacent regions of Berlin, because of the huge market potential of the new “old” German capital and in the case of regions along the former inner German border, because firms in these regions may attract additional demand from West Germany.

4 Descriptive statistics

The descriptive statistics reveal that the employment growth since 1989 was negative across East German regions regardless of the period analyzed, although the regional differences were pronounced (see figure 4.1 and figure 4.2 and Table 4.1; see Table A.1 and A.2 for correlation matrices in the Appendix). For the period between 1995 and 2001 there has been some regions growing slightly in East Germany in terms of manufacturing employment. The development of manufacturing employment in West Germany was also slightly negative on average in all analyzed periods, but much less than in East Germany (see mean comparison tests in table 4.1).

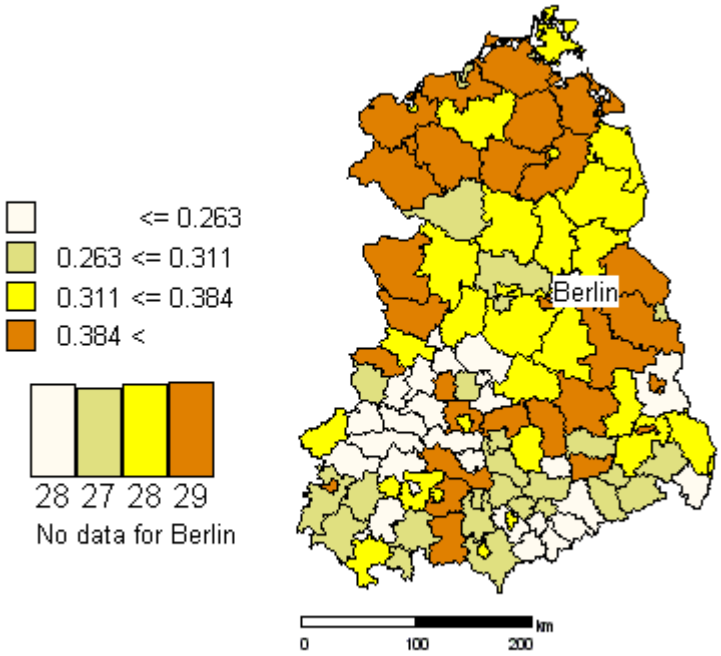

Figure 4.1: The decline in manufacturing employment in East Germany 1989-1995

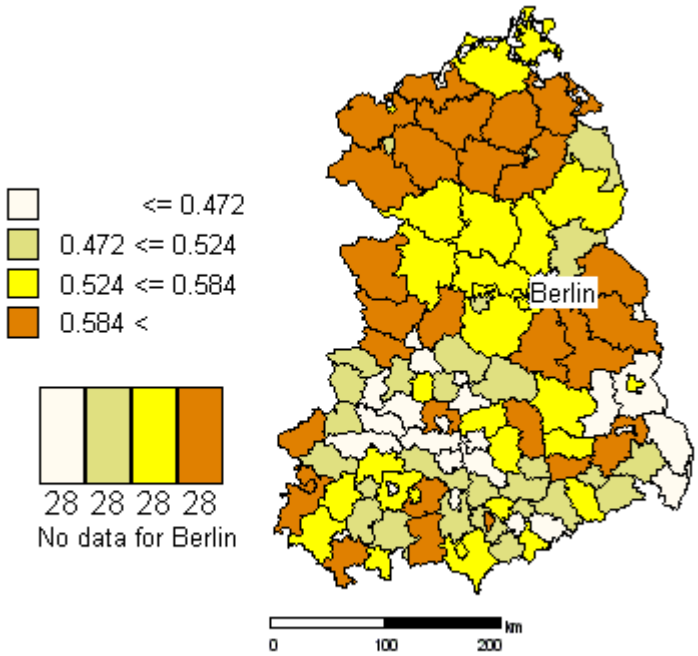

Figure 4.2: The decline in manufacturing employment in East Germany 1989-2001

Since the regional specialization in manufacturing was “artificially” high in the former GDR one can detect a dramatic decrease of the Krugman Specialization Index. The change in West Germany between 1989 and 1995 is much smaller, but the level in 1995 astonishingly higher (see Table 4.1). This has to be interpreted with caution since the index was calculated on basis of only 7 industries. What is striking here is the heavy change within East Germany given that the measure is calculated with such a low number of industries.

Table 4.1: Descriptive statistics for East and West Germany

	East				West			
	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max
Employment Growth Manufacturing 1989-1995	0.332	0.099	0.187	0.828	0.935	0.113	0.532	1.338
Employment Growth Manufacturing 1989-2001	0.536	0.096	0.352	0.929	0.935	0.085	0.647	1.175
Krugman Specialization Index for Manufacturing 1989	0.558	0.214	0.134	1.322	0.476	0.213	0.134	1.517
Krugman Specialization Index for Manufacturing 1995	0.388	0.169	0.119	1.035	0.438	0.202	0.088	1.507
Krugman Specialization Index for Manufacturing 2001	0.386	0.154	0.118	0.863	0.426	0.209	0.08	1.512
Share of Employees in Unfavourable Industries 1989	0.085	0.103	0.004	0.532	0.127	0.085	0.013	0.652
Share of Employees in Unfavourable Industries 1995	0.083	0.048	0.021	0.323	0.119	0.072	0.017	0.591
Share of Employees in Unfavourable Industries 2001	0.086	0.042	0.026	0.24	0.112	0.066	0.012	0.531
Share of Employees in Manufacturing 1989	0.396	0.122	0.125	0.647	0.467	0.118	0.163	0.823
Share of Employees in Manufacturing 1995	0.254	0.069	0.088	0.432	0.425	0.111	0.153	0.776
Share of Employees in Manufacturing 2001	0.269	0.086	0.073	0.475	0.401	0.114	0.139	0.744
Share of Employees with University Degree 1989	0.063	0.031	0.024	0.211	0.045	0.025	0.015	0.207
Regional Employment Density 1989	4.616	1.136	3.059	7.455	4.276	1.338	1.907	7.503
Share of Employees in Manufacturing with University Degree 1989	/	/	/	/	0.039	0.029	0.006	0.217
Average Firm Size in Manufacturing 1989	/	/	/	/	27.573	21.406	7.401	286.1

5 Results & Discussion

5.1 The effect of initial regional conditions

The initial regional specialization of manufacturing industries in East Germany has a significant negative effect on employment growth in manufacturing across regions. The effect is smaller over the entire period from 1989 to 2001 compared to the initial post-transition period from 1989 to 1995. This finding is in line with the first hypothesis (see Table 5.1). It reflects that the initial transition period can be characterized by a pronounced regional de-industrialization if the specialization was high initially. The descriptive statistics revealed that a tremendous process of regional de-specialization took place as well in the early stage of transition. If one calculates the change of the Krugman specialization Index between 1989 and 1995 and investigates the correlation of this change with the initial specialization and the share of unfavourable manufacturing industries or the share of employees in manufacturing respectively, the decrease in specialization is significantly correlated with the initial level of specialization and not correlated with industry structure. At the same time there is no correlation between the specialization in 1989 and the subsequent change of specialization in West Germany (see Table 5.2). Moreover, in West Germany the regional specialization in 1989 had only a weakly significant effect on employment growth between 1989 and 1995, but a highly significant negative effect between 1989 and 2001 (see Table 5.3). These findings reflect the peculiarity of the initial regional specialization in East Germany.

The results suggest that the downward-correction of specialization (see Table 4.1) was combined with pronounced de-industrialization in East Germany. It seems that regions that bundled resources of certain industries had to release them since the level of concentration of these resources in the region was not sustainable under the rules of market competition. At the same time the released workforce could not be absorbed by other manufacturing industries. We are nevertheless not able to state whether the negative effect of initial specialization would have been stronger in case of

absence of a regional policy focus. Policy was, at least in some cases, in favour of shielding mono-industrialized (highly specialized) regions from de-industrialization processes related to transition, which, in turn, should have weakened the negative effect of the specialization index.

The initial employment share of unfavourable industries reveals a significant negative effect of this share on employment growth in manufacturing for the early transition period in East Germany between 1989 and 1995. The coefficient is slightly weaker for the entire period 1989 to 2001, but still significant. Regions that were composed mainly of unfavourable industries initially seem to have deep structural problems that are not specific to the initial period of transition. Thus, the second hypothesis can be stated as well.[5]

The initial stock of knowledge has a significant positive effect on employment growth in the East German manufacturing for the first period between 1989 and 1995, but the effect becomes weaker for the period 1989 to 2001. It seems that the initial knowledge stock was an asset for regional adaptation. Since we have no sector-specific information on the initial knowledge stock, we just can make assumptions. It may be that regions with a high share of highly skilled employees had a better qualification structure of the local GDR incumbent firms, which made their privatisation more successful and kept the loss of employment at bay. It may also be that highly qualified individuals could successfully started new firms. Survey evidence reveals that the group of engineers was the most active one among founders of new businesses in the early 1990s (Koch & Thomas, 1997).

The employment density has a negative effect on employment growth. Thus, the decrease of employment in manufacturing was more pronounced in agglomerated areas that underwent pronounced structural change. A location close to Berlin has a significant positive effect on employment growth in manufacturing in the short and long run. The same can be found across

[5] Since this variable refer to the specific situation of the GDR in 1989 it would be arbitrary to apply it in the regression analysis on West Germany. The same applies to the variable that measures the knowledge stock in 1989.

West German regions (see Table 5.3). So, in both parts of the country more densely populated areas showed a decrease in manufacturing employment, which can be interpreted as an indicator for systematic suburbanization. The negative effect was also found by Suedekum (2006) for the period 1993 to 2001 and general employment growth. An interesting difference in East and West Germany is the effect of the dummy variable that indicates whether a county is located at the prior inner-German border. A location at the prior inner German border in East Germany has a significant positive effect on employment growth in manufacturing in the long run, but not if one takes into account only the initial period of transition. It seems that regions close to the West German border could make use of regional demand shifts. However, a location at the prior inner German border in West Germany has a negative effect on employment growth in manufacturing in the long run. There is no effect for the initial period between 1989 and 1995.

The dummy variable that indicates whether regions are located close to Berlin has a significant positive effect on employment growth in manufacturing. This may have to do with sub-urbanization and de-concentration processes, but also with the rise of manufacturing in these regions due to the proximity of the newly emerged economic unit, the reunified Berlin.

Table 5.1: The change of Manufacturing Employment over time

Growth of Employment in Manufacturing	(1)	(2)	(3)	(4)
	1989-1995		1989-2001	
Krugman Specialization Index for Manufacturing	-0.178***	-0.139***	-0.144***	-0.115***
	(0.0548)	(0.0492)	(0.0343)	(0.0278)
Share of Employees in Unfavourable Industries	/	-0.0734***	/	-0.0551***
	/	(0.0208)	/	(0.00988)
Share of Employees with University Degree	0.275***	0.262***	0.0995**	0.0898**
	(0.0595)	(0.0584)	(0.0429)	(0.0363)
Regional Employment Density	-0.125***	-0.114***	-0.0833***	-0.0754***
	(0.0270)	(0.0231)	(0.0169)	(0.0153)
Adjacent County of Berlin (YES=1)	0.140**	0.139**	0.0746**	0.0741**
	(0.0670)	(0.0643)	(0.0372)	(0.0370)

County located along the prior Inner German Border (YES=1)	0.0670 (0.0686)	0.0485 (0.0613)	0.107*** (0.0364)	0.0936*** (0.0318)
Constant	0.0786 (0.282)	-0.203 (0.255)	-0.0879 (0.191)	-0.299* (0.163)
Observations	112	112	112	112
R-squared	0.291	0.381	0.431	0.559

Notes: Berlin is excluded/ Robust standard errors in parentheses/ *** p<0.01, ** p<0.05, * p<0.1/ Krugman Specialization Index is calculated only for Manufacturing without Construction/ All independent variables refer to the year 1989

Table 5.2: Correlation of regional specialization and industry structure in East and West Germany

East						
		[1]	[2]	[3]	[4]	[5]
[1]	Change of Krugman Specialization Index for Manufacturing 1989-1995	1				
[2]	Change of Krugman Specialization Index for Manufacturing 1989-2001	0.649 [0.000]	1			
[3]	Krugman Specialization Index for Manufacturing 1989	0.247 [0.009]	0.355 [0.000]	1		
[4]	Share of Employees in Unfavourable Industries	0.065 [0.493]	0.192 [0.042]	0.594 [0.000]	1	
[5]	Share of Employees in Manufacturing	0.017 [0.855]	0.063 [0.512]	0.262 [0.005]	0.449 [0.000]	1
West						
		[1]	[2]	[3]	[4]	[5]
[1]	Change of Krugman Specialization Index for Manufacturing 1989-1995	1				
[2]	Change of Krugman Specialization Index for Manufacturing 1989-2001	0.677 [0.000]	1			
[3]	Krugman Specialization Index for Manufacturing 1989	0.057 [0.306]	0.056 [0.316]	1		
[4]	Share of Employees in Unfavourable Industries	0.066 [0.232]	0.059 [0.290]	0.384 [0.000]	1	
[5]	Share of Employees in Manufacturing	0.073 [0.187]	0.107 [0.055]	0.282 [0.000]	0.376 [0.000]	1

Table 5.3: Employment Growth in Manufacturing in West Germany

Growth of Employment in Manufacturing	(1) 1989-1995	(2) 1989-2001
Krugman Specialization Index for Manufacturing	-0.0237* (0.0130)	-0.0375*** (0.0102)

Share of Employees in Manufacturing	-0.0983***	-0.0411**
	(0.0270)	(0.0196)
Share of Employees in Manufacturing with University Degree	-0.0379***	-0.0188**
	(0.0108)	(0.00929)
Average Firm Size in Manufacturing	0.0130	0.0259
	(0.0234)	(0.0179)
Regional Employment Density	-0.0529***	-0.0457***
	(0.00715)	(0.00578)
County located along the prior Inner German Border (YES=1)	-0.0173	-0.0487***
	(0.0186)	(0.0130)
Constant	-0.118	-0.0840
	(0.0936)	(0.0749)
Observations	326	326
R-squared	0.475	0.438

Notes: Berlin is excluded/ Robust standard errors in parentheses/ *** p<0.01, ** p<0.05, * p<0.1/ Krugman Specialization Index is calculated only for Manufacturing without Construction/ All independent variables refer to the year 1989

6 Concluding Remarks

This paper investigates the effect of initial conditions on subsequent differences of regional employment growth across the manufacturing sector in an area that underwent transition from a centrally planned towards a market economy. In contrast to many other works which investigate the relevance of initial conditions, the effect of economic reform in the aftermath of transition is only modest. This is possible by using the former German Democratic Republic (GDR) as case study. The transition of the former GDR was the reunification with the Federal Republic of Germany (FRG). The whole formal institutional framework was transferred to East Germany, the former GDR, practically overnight.

The main findings of the paper are that the initial industry structure explains the adaptation of the East German manufacturing sector in terms of employment growth to a large degree. This finding is in line with empirical findings for other transition economies. To put it more precisely, regions that have been highly specialized have experienced a higher level of de-industrialization during the transition. The effect of the initial specialization was stronger in the initial period of transition. In West Germany during the

same period of time the effect of specialization on employment growth was modest. Regions in East Germany that comprised a relatively unfavourable industry structure in 1989 also had worse employment growth. Unfavourable industries were especially shaped by socialist modes of production and planning principles that made it more difficult to sustain these industries after transition.

There are several limitations of this study. Even though the transition of the former GDR was “radical” and the formal institutional framework did not evolve endogenously, it cannot be ruled out that the change in manufacturing employment may be an effect of the privatization policy in the aftermath of re-unification. Another shortcoming is that it cannot be distinguished whether the contribution to growth comes from the privatized incumbent GDR firms or from start-ups. The role of spin-offs is another crucial issue. Although a former GDR enterprise may have been not able to survive in the market as a whole, parts of it may have been an important resource for the emergence of entrepreneurship.

Despite its shortcomings, this study shows that initial conditions play an important role for economic growth in transition economies. Moreover, it adds another aspect to the literature on path-dependencies in economic development. Future research should try to replicate these results for other transition economies. Another aim should be to take recent developments into consideration and not only the initial stages of transition. The role of entrepreneurship should be investigated in more detail as well. Altogether, a lot of future research is clearly warranted.

7 References

Ahrend, R. (2005), Speed of Reform, Initial Conditions or Political Orientation? Explaining Russian Regions' Economic Performance, *Post-Communist Economies*, 17, 289-317.

Ahrend, R. (2008), Understanding Russian Regions' Economic Performance during Periods of Decline and Growth: An Extreme-bound Analysis Approach, *OECD Economics Department Working Papers*, 644, Paris: OECD Economics Department.

Andrusz, G. et al., (1996), *Cities after Socialism: Urban and Regional Change and Conflict in Post-Socialist Societies,* Oxford: Blackwell.

Bannasch, H.-G. (1990), The role of small firms in East Germany, *Small Business Economics*, 2, 307-312.

Barjak, F. (2001), Regional Disparities in Transition Economies: a Typology for East Germany and Poland, *Post-Communist Economies*, 13, 289-311.

Berentsen, W. H. (1979), Regional Planning in the German Democratic Republic: Its Evolution and Goals, *International Regional Science Review*, 4, 137-154.

Berentsen, W. H. (1992), The Socialist face of the GDR: eastern Germany`s landscape – past, present and future, *Landscape and Urban Planning*, 22, 137-151.

Blien, U. & Wolf, K. (2002), Regional development of employment in eastern Germany: an analysis with an econometric analogue to shift-share techniques, *Papers in Regional Science*, 81, 391-414.

Brakman, S. and Garretsen. H. (1993), The Relevance of Initial Conditions for the German. Unification, *KYKLOS*, 46, 163-181.

Brezinski, H. & M. Fritsch (1995), Transformation: The Shocking German Way, *Moct-Most*, 5, 1-25.

Burda. M. C. & Hunt, J. (2001), From Reunification to Economic Integration: Productivity and the Labor Market in Eastern Germany. *Brookings Papers on Economic Activity*, 2, 1-92.

Burda, M. C. (2008), What kind of shock was it? Regional integration and structural change in Germany after unification, *Journal of Comparative Economics*, 36, 557-567.

De Melo, M. et al., 2001), Circumstance and Choice: The Role of Initial Conditions and Policies in Transition Economies, *The World Bank Economic Review*, 15, 1-31.

De Rudder, H. (2009), The Transformation of East German Higher Education: Renewal as Adaptation, Integration and Innovation, *Minerva,* 35, 99-125.

Fritsch, M. (2004), Entrepreneurship, entry and performance of new business compared in two growth regimes: East and West Germany, *Journal of Evolutionary Economics*, 14, 525-542.

Fritsch, M. & Brixy, U. (2004), The Establishment File of the German Social Insurance Statistics, *Zeitschrift für Wirtschafts- und Sozialwissenschaften*, 124, 183-190.

GeoJournal (1984), *Special Issue: "German Democratic Republic - Regional structure and development",* 8, 1.

Grabher, G. (1997) Adaptation at the Cost of Adaptability?: Restructuring of the East German Regional Economy. In: Grabher, G., Stark, D. (Eds.),

Restructuring Networks in Post-socialism: Legacies, Linkages, and Localities, Oxford University Press/ Oxford, pp. 107-134.

Grabher, G. & Stark, D. (1997), *Restructuring Networks in Post-Socialism. Legacies, Linkages, and Localities*, Oxford: Oxford University Press.

Hall, J. B. & Ludwig, U. (1995), German Unification and the 'market adoption' Hypothesis, *Cambridge Journal of Economics*, 19: 491-507.

Hall, J. B. & Ludwig, U. (2007), Explaining Persistent Unemployment in Eastern Germany, *Journal of Post-Keynesian Economics,* 29, 601-619.

Häussermann, H. (1996*),* From the Socialist to the Capitalist City: Experiences from Germany, in: Andrusz, G. et al. (Eds*.), Cities after Socialism: Urban and Regional Change and Conflict in Post-Socialist Societies,* Oxford: Blackwell, pp. 214-231.

Hodgson, G. M. (2006), Institutions, recessions and recovery in the transitional economies, *Journal of Economic Issues*, 40, 875-894.

Huber, P. J. (1967) 'The behavior of maximum likelihood estimates under non-standard conditions', *Proceedings of the Fifth Berkeley Symposium on Mathematical Statistics and Probability,* vol. I, pp. 221–33.

Kawka, R. (2007), Regional Disparities in the GDR: Do They Still Matter?, in: Lentz, S. (Ed.), *German Annual of Spatial Research and Policy: Restructuring Eastern Germany*, Springer: Berlin, pp. 111-122.

Koch, T. & Thomas, M. (1997), The Social and Cultural Embeddedness of Entrepreneurs in Eastern Germany, in: Grabher, G. & Stark, D. (Eds.): *Restructuring Networks in Post-Socialism. Legacies, Linkages, and Localities*, Oxford: Oxford University Press, pp. 242-261.

Kronthaler, F. (2005), Economic Capability of East German Regions: Results of a Cluster Analysis, *Regional Studies*, 39, 741-752.

Lange, T. & Prugh, G., (1998), *The Economics of German Unification: An Introduction,* Edward Elgar: Cheltenham, UK/ Northampton, MA, USA.

Mayntz, R. (1995), Sektorale Unterschiede in der Transformation des Wissenschaftssystems der DDR, *Berliner Journal für Soziologie*, 4, 443-453.

Mehta, J. (1989), Combine Management in the GDR, *Economic and Political Weekly*, February.

Popov, V. (2000), Shock Therapy Versus Gradualism: The End Of The Debate (Explaining The Magnitude Of Transformational Recession), *Comparative Economic Studies*, XLII, 1-57.

Rudolph, H. (1990), Beschäftigungsstrukturen in der DDR vor der Wende: eine Typisierung nach Kreisen und Arbeitsämtern, *Mitteilungen aus der Arbeitsmarkt- und Berufsforschung*, 23.

Scherf, K. & H. Schmidt (1984), The Southern Agglomeration Zone of the GDR: Regional Structure and Development, *GeoJournal*, 8, 33-44.

Sleifer, J. (2006), Planning ahead and falling behind : the East German economy in comparison with West Germany 1936 – 2002, *Jahrbuch für Wirtschaftsgeschichte*, Berlin: Deutscher Akad.-Verlag.

Snower, D. & Merkl, C. (2006), The Caring Hand that Cripples: The East German Labor Market after Reunification, *American Economic Review*, 96, 375-382.

Stokes, R. G. (1995), Autarky, Ideology, and Technological Lag: The Case of the East German Chemical Industry, 1945-1964, *Central European History*, 28, 29-45.

Suedekum, J. et al., (2006), What has caused regional employment growth differences in Eastern Germany ?, *Jahrbuch für Regionalwissenschaft*, 26, 51-73.

Suedekum, J. (2006), Concentration and Specialization Trends in Germany since Re-Unification, *Regional Studies*, 40, 861-873.

van Ark, B. (1995), The Manufacturing Sector in East Germany: A Reassessment of Comparative Productivity Performance, 1950-1988, *Jahrbuch für Wirtschaftsgeschichte*, 2, 75-100.

White, H. (1980), A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity, *Econometrica*, 48, 817-838.

8 Appendix

Table A.1: Correlation matrix for East Germany

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
[1]	Employment Growth Manufacturing 1989-1995	1							
[2]	Employment Growth Manufacturing 1989-2001	0.789 [0.000]	1						
[3]	Krugman Specialization Index for Manufacturing	-0.23 [0.015]	-0.315 [0.001]	1					
[4]	Share of Employees in Unfavourable Industries	-0.393 [0.000]	-0.489 [0.000]	0.174 [0.066]	1				
[5]	Share of Employees with University Degree	0.042 [0.660]	-0.167 [0.078]	0.062 [0.515]	0.05 [0.597]	1			
[6]	Regional Employment Density	-0.325 [0.000]	-0.487 [0.000]	0.005 [0.954]	0.124 [0.192]	0.623 [0.000]	1		
[7]	Adjacent County of Berlin [YES=1]	0.232 [0.014]	0.189 [0.046]	-0.016 [0.866]	-0.017 [0.857]	0.043 [0.655]	-0.145 [0.128]	1	
[8]	County located along the prior Inner German Border [YES=1]	0.142 [0.136]	0.317 [0.001]	-0.036 [0.703]	-0.11 [0.246]	-0.127 [0.181]	-0.211 [0.025]	-0.137 [0.150]	1

Table A.2: Correlation matrix for West Germany

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
[1]	Employment Growth Manufacturing 1989-1995	1							
[2]	Employment Growth Manufacturing 1989-2001	0.87 [0.000]	1						
[3]	Krugman Specialization Index for Manufacturing	-0.116 [0.037]	-0.18 [0.001]	1					
[4]	Share of Employees in Manufacturing	-0.152 [0.006]	-0.037 [0.506]	0.224 [0.000]	1				
[5]	Share of Employees in Manufacturing with University Degree	-0.524 [0.000]	-0.45 [0.000]	-0.148 [0.007]	-0.019 [0.739]	1			
[6]	Average Firm Size in Manufacturing	-0.576 [0.000]	-0.498 [0.000]	0.234 [0.000]	0.396 [0.000]	0.581 [0.000]	1		
[7]	Regional Employment Density	-0.636 [0.000]	-0.622 [0.000]	0.042 [0.454]	-0.115 [0.038]	0.668 [0.000]	0.717 [0.000]	1	
[8]	County located along the prior Inner German Border [YES=1]	0.05 [0.367]	-0.028 [0.616]	0.019 [0.727]	0.057 [0.306]	-0.08 [0.150]	-0.01 [0.850]	-0.143 [0.010]	1