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Ulrich Blum*

The Eastern German Growth Trap: Structural Limits to Convergence?

After an initial take-off during the first eight years following unification, the Eastern German economy started to stall and regress to its old growth path of the 1950s and 1960s. The initial quick convergence only compensated for the dismal stagnation that the expropriation and concentration strategies of party leader and general secretary Erich Honecker had produced. Since then, Eastern Germany has followed a two-thirds growth path compared to Western Germany, which shows that the structural problems of communist rule have not been overcome. The share of small and medium-sized firms is too small, creating an extremely fragmented group structure of firms and, thus, a lack of internationally active headquarters. A 1% increase of small and medium-sized firms on average reduces growth by 0.3%. This paper argues that catching up with the West will take more than a generation and needs to address central economic woes by encouraging endogenous, as well as exogenous growth through a merger-and-acquisition strategy and through the establishment of headquarters.

Thirty years after the fall of the Iron Curtain, it has become all too apparent that Eastern Germany will not catch up with Western Germany for another generation, thus threatening the achievement of constitutionally granted equal living conditions.¹ Before the Second World War, the Central German manufacturing belt – now the southern part of Eastern Germany – was over 30% richer than the rest of the nation, reflected in the wealth of its cities. Today, that 30% gap remains stubbornly constant. Political pressure is growing because left and right-wing populist parties are on the rise and put an economic squeeze on the centre. Reinforcing convergence thus becomes a long-term political task. The apparent contradiction between the economic reality of personal incomes (which are, on average, 10 to 30% lower than in Western Ger-

many) and this political assessment is rooted in an initially successful start of the economic transformation process in East Germany. At the time, annual growth rates were about 10%. Institutional reforms triggered this development and massive investment in the capital stock allowed a talented workforce to produce goods for the global market. The impressive convergence that took place between the early and the mid-1990s was, in fact, nothing more than compensation for the two lost decades under the rule of Erich Honecker, who had drastically centralised the East German economy.² After the turn of the millennium, Eastern Germany fell back to the long-term growth path it was following between the 1950s and the early 1970s – which was at 70% of western levels. Eastern Germany experienced two simultaneous adaptation shocks: globalisation and unification. Initial impressions were that it would be able to master both. In fact, the appearance of populist movements on the left and on the right in many former transition countries point to the contrary and may be regarded as a sign of increasing dissatisfaction with a political system that is unable to deliver the level of wealth promised in 1990 – in the German case of “blossoming landscapes”.³

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1 Art. 72 of the Federal Constitution requests the establishment of comparable living conditions (“gleichwertige Lebensverhältnisse”) – better translated as equivalent living conditions.

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2 U. Blum: East Germany's Economic Development Revisited: Path Dependence and East Germany's Pre- and Post-Unification Economic Stagnation, in: Journal of Post-Communist Economies, Vol. 25, No. 1, 2013, pp. 37-58.

3 Chancellor Helmut Kohl made this promise in 1990.

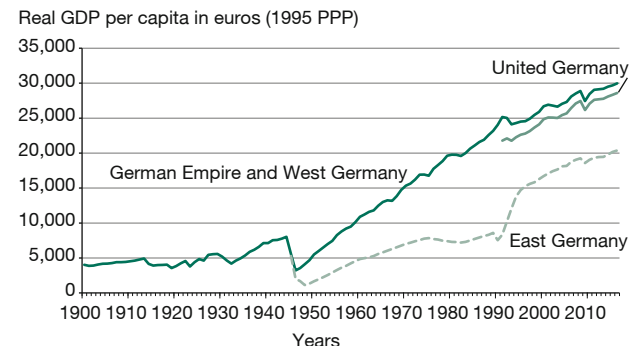
The stagnant twin

In order to ensure equal living conditions, the social security system and the public finances of Eastern Germany have been heavily subsidised by the West since unification. The economic benefits of migration from the East to the West easily financed these costs: after unification, an enormous share of human capital – idle as a result of massive industrial productivity gains by a factor of three to five – migrated to the West. This generated a youth bulge in the West, additional employment and a boost in productivity that led to increased tax revenues. In fact, based on a tax incidence analysis, Blum concludes that unification has been a national fiscal success because it is, by and large, financing itself.⁴ Nevertheless, it has drastically disturbed the economic base of the East.

Problems of convergence had previously been addressed by the East German government. After Honecker's dismissal and a rigorous analysis of the state of economic affairs by the East German government in September 1989, as documented by the so-called Schürer Report,⁵ it became clear that the central planning system, and even the East German state, could not survive. An earlier analysis of the currency regimes pointed to a productivity of some 20-25%, as compared to West Germany.⁶ If the self-declared figure of 70% had been true, as the East German government had continuously claimed and as many western institutions believed, then economic reform started with the foundation of the *Treuhand* agency which first privatised small and medium-sized enterprises that had been expropriated in the 1970s by the Honecker regime. Within a very short time, it became clear that without subsidies, many East German firms would falter. This remained true for the currency (and social) union on 1 July 1990 and reunification on 3 October 1990. Even today, many private and public investments would not be made without subsidies from the EU and the German federal government; they keep the Eastern states alive. One of the reasons for today's bleak perspective is an ill-designed privatisation policy that has prevented the emergence of firms and headquarters of a sufficient size.

Figure 1 highlights this situation. It shows the income development from the German Empire in 1900 up until today's united Germany. One can see the perturbations and

Figure 1
Development of per capita income in Germany, 1900–2016



Sources: Author's calculations based on data from U. Blum: East Germany's Economic Development Revisited: Path Dependence and East Germany's Pre- and Post-Unification Economic Stagnation, in: *Journal of Post-Communist Economies*, Vol. 25, No. 1, 2013, pp. 37-58; Statistical Yearbooks of the German Democratic Republic, 1989; Statistical Yearbook of the Federal Republic of Germany, 2017.

shocks from the First World War, the Great Depression and the Second World War. Then the development splits. West Germany is able to compensate for these disasters and, in the mid-1960s, returns to its old growth path. East Germany suffers from adverse starting conditions due to Stalinist reforms. Moreover, the 'Honecker years', characterised by massive expropriations of medium-sized enterprises and the destruction of the remainder of the middle class, lead to stagnation and a loss of competitiveness in this self-declared 'sixth largest industrial economy of the world'. The rapid convergence after the unification was just able to offset these losses and put Eastern Germany back onto the former East German growth track. We can easily identify the shock from the world financial crisis in Figures 1 and 2. It is also evident that the per-capita income during East Germany's best period never exceeds the output performance of Central Germany in the late 1930s, when it was the powerhouse of the German Empire and around 20% richer than the German average.⁷

Figure 2 highlights the period from 1956 to 2016 and includes linear growth trends that are lower in the East than in the West.⁸ The *Aufschwung Ost* (Upswing East), a huge

4 U. Blum: Wer profitiert, wer zahlt – Die Finanzierung der deutschen Einheit, Orientierungen der Wirtschafts- und Gesellschaftspolitik, No. 142, 2015, pp. 3-9.

5 G. Schürer: Zur Zahlungsfähigkeit der DDR, Berlin 1989, mimeo; G. Schürer, G. Beil, A. Schalck, E. Höfner, A. Donda: Analyse der ökonomischen Lage der DDR mit Schlußfolgerungen, Deutsche Demokratische Republik, 1989, mimeo.

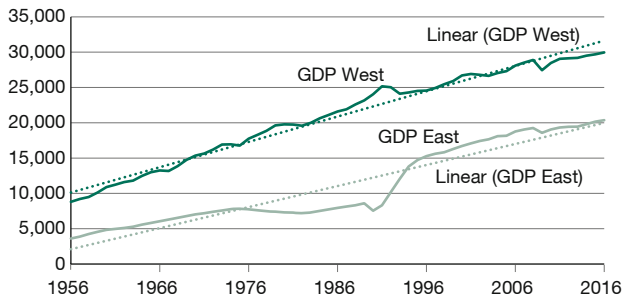
6 A. Schalck-Golodkowski, H. König: Zur Entwicklung des Kurses der Mark der DDR zu kapitalistischen Währungen seit 1949, Deutsche Demokratische Republik, 1988, mimeo.

7 GDP was not calculated in Germany prior to 1948. However, tax receipts and capital endowment (i.e. number of cars, telephone access, etc.) suggest that the Central Economic Region (*Mitteldeutschland*) was about 30% richer than the rest of the Empire. See Statistisches Amt des Freistaats Bayern: Statistisches Jahrbuch für Bayern, J. Lindauersche Universitäts-Buchhandlung (Schöpping), 1936, München.

8 1956 is the year in which the data on employment in different sized firms starts. Thus, we chose this year as a base period for the regression. The lower starting point of East Germany was the result of massive Soviet dismantling of factories and enormous problems of resource and energy supply – utilities had to switch from hard coal to lignite – and loss of export markets. Problems of central planning were yet to come.

Figure 2
Development of per capita income in Germany, 1956-2016

Real GDP per capita in euros (1995 PPP)



Sources: Author's calculations based on data from U. Blum: East Germany's Economic Development Revisited: Path Dependence and East Germany's Pre- and Post-Unification Economic Stagnation, in: *Journal of Post-Communist Economies*, Vol. 25, No. 1, 2013, pp. 37-58; Statistical Yearbooks of the German Democratic Republic, 1989; Statistical Yearbook of the Federal Republic of Germany, 2017.

investment programme financed by the West, only resulted in East Germany catching up to the old growth trend. The 1956 value of 3,612 euros (1995 prices) was about 40% of that of the West. If we compare growth rates from 1949 to 1989, i.e. the period in which East Germany existed as the German Democratic Republic, we obtain for East Germany a GDP per-capita growth rate of 4.6% against West Germany's mere 4%.⁹ This is evidence of the strong base effect resulting from the very low output values of East Germany after the war. Furthermore, it provides evidence that the higher growth rates of the lagging region compared to those of the leading region do not indicate a close in income gaps in absolute terms. In fact, we see that Eastern Germany's growth rates are thinning out at the beginning of the new millennium. Ongoing subsidies have had strong adverse effects in Eastern Germany as they distort incentive systems.¹⁰ Nearly all private investments to expand industrial activities are subsidised by European, federal and state incentive programmes, and firms expect this to continue. This will not be the case after 2019 as this year marks the end of the so-called Solidarity Pact. At this time, Eastern German states and their enterprises will no longer be able to rely on outside help beyond the normal federal equalisation schemes. However, as we see from the data,

9 This value, calculated from historical statistics by U. Blum: East Germany's..., op. cit., is also maintained by K. Blessing: Epilog: Was wir von den „Verlierern“ lernen können, in: *Die Kombinatdirektoren* (eds.): Jetzt reden wir: Was heute aus der DDR-Wirtschaft zu lernen ist, Berlin 2014, edition berolina, pp. 169-177, here pp. 171-172 regarding the slightly higher growth rate of the East compared to the West.

10 U. Blum: Are There Free Lunches in East Germany?, in: U. Blum, D. Dietrich, A. Lindner (eds.): *Empirische Makroökonomik für Deutschland: Analysen, Prognosen, Politikberatung*, Festschrift zum 65. Geburtstag von Udo Ludwig, Institute for Economic Research Series, No. 28, 2009, Nomos eLibrary, pp. 61-83.

the fundamental economic deficiencies that limit growth have not been overcome 30 years after the fall of the Berlin Wall, and they date back to times under communist rule as well as to the *Treuhand* privatisation scheme.

Theories of growth and stagnation

General theories

The inclusion of human capital is an important factor in the so-called endogenous growth models. Its historical roots can be traced back to the seminal work of List.¹¹ His ideas have been combined with the classical AK model in the tradition of Lucas and Solow and have been extended to the endogenous growth model by Romer as well as convergence models by Barro and Sala-i-Martin.¹² Heterogeneities were captured by conditional factors, as were divergences in the extensions made by Quah.¹³ They rest on the question posed by Lucas as to why capital does not flow in the direction of (seemingly) higher productivities.¹⁴ These are of interest in the German case insofar as convergence clubs may well exist in a world of divergent regions. The convergence models comprehensively explain the initial successes of East Germany, especially the massive growth after unification, but are unable to clarify why this growth process broke down at the end of the 1990s. Establishing the reason for the absence of a forceful expansion on the back of competitive start-ups in the early 1990s is a highly relevant topic of research given that, on a global level, many of today's large firms did not even exist 20 years ago but the quality of human capital in the East and the accessibility of technology did.

Institutional models follow two strains. One departs from List and extends into the work of Veblen, Schumpeter and von Mises.¹⁵ Following their arguments, the entrepreneurial sector of Eastern Germany today is deficient, which may be the result of a lack of financial entrepreneurs that are a prerequisite for the real economy entrepreneur. In

11 F. List: *Das nationale System der politischen Ökonomie*, Jena 1928 [1841], Fischer.

12 R.E. Lucas: On the mechanisms of economic development, in: *Journal of Monetary Economics*, Vol. 22, No. 1, 1988, pp. 3-42; P. Romer: Increasing Returns and Long-Run Growth, in: *Journal of Political Economy*, Vol. 94, No. 5, 1986, pp. 1002-1037; P. Romer: Endogenous Technological Change, in: *Journal of Political Economy*, Vol. 98, No. 5, 1990, pp. 70-102; R. Barro, X. Sala-i-Martin: Convergence, in: *Journal of Political Economy*, Vol. 100, No. 2, 1992, pp. 223-261.

13 D. Quah: Empirics for Economic Growth and Convergence, in: *European Economic Review*, Vol. 40, No. 6, 1996, pp. 1353-1373.

14 R.E. Lucas: Why Doesn't Capital Flow from Rich to Poor Countries, in: *American Economic Review*, Vol. 80, No. 2, 1990, pp. 92-96.

15 F. List, op. cit.; T. Veblen: *The Theory Of The Leisure Class*, New York 1934 [1899], The Modern Library; J. Schumpeter: *Theorie der wirtschaftlichen Entwicklung*, Berlin 1912, August Rabe; L. von Mises: *Staat, Nation und Wirtschaft*, Wien 1919, Manzsche Verlags- und Universitätsbuchhandlung.

addition, the institutional factors for growth may be adverse and lead, in the tradition of the functional school, for instance Myrdal and Hirschman,¹⁶ to the exit of the gifted that leaves behind a satisficing management class. Out-migration from the East has played a major role for a long time and has led to negative externalities in the sense of cumulative causation which the West profited from considerably.¹⁷ This would explain the present situation but does not explain the initial start-ups and why firms, after their initial expansion in the early 1990s, did not expand any further. It may be caused by a lack of positive externalities and good governance, taken up by the new institutional school, which argues that transaction costs in Eastern Germany are too high compared to the level of economic achievement as a result of inefficient rules. Thus, an institutional problem of united Germany, invisible in Western Germany, may exhibit very adverse effects in Eastern Germany.

Aghion and Howitt and Aghion, Bloom, Blundell and Griffith have set up a formal Schumpeter-type model of creative destruction and shown that the relationship between competition intensity is U-shaped, i.e. low as well as high product market competition (PMC following the authors) triggers high innovation levels.¹⁸ In addition, tight markets trigger innovation because firms try to escape the dire situation of tough competition; the higher this neck-in-neck effect is, the steeper the increase in competition intensity. Finally, debt may trigger innovation in the case of low competition intensity. Firms in East Germany are well capitalised with equity but have little direct market access because of their small average size, their location at the start of the value-added chain and their role as extended workbenches. This means innovation intensity is not driven by market conditions.¹⁹ In fact, sitting in the trough, i.e. the non-innovative part of the U-shaped innovation curve, means Eastern Germany crucially requires public support for innovation.

Both concepts are taken up by the new economic geography and cluster theory that was initially developed by Christaller, Lösch and, subsequently, by Krugman.²⁰ The general idea is that proximity matters and face-to-face groups are important in generating the externalities mentioned in the endogenous growth theory.²¹ In fact, there are different types of clusters,²² and those that have a common technological basis and exert general purpose technologies are the most important.²³ In the rare case that these clusters exist in Eastern Germany, for instance Dresden, Chemnitz or Jena, they are the engines of growth.

One of the explanations for why Eastern Germany is stagnating in contrast to the West has been addressed in a more general framework by Fouquet and Broadberry.²⁴ They argue that, in a regional setting, convergence is feasible or even easy if the rest of the world is, by and large, stagnant or only developing at a slow pace. However, once new market participants rush in, divergence is much more likely. This has been the case in the German context. For example, in southern Germany, the states of Bavaria and Baden-Württemberg have experienced expansion due to the new technologies they brought to manufacturing and their strong involvement in the world of microsystems and digital business models.

Figure 3 shows income development over 26 years. Nominal GDP per employee growth was 80% in Bavaria, 67% in Baden-Württemberg – the two best performing states – and 78% in Germany as a whole because of a growth rate of 274% in the eastern federal states. However, when based on the year 2000, the numbers are much lower: 40%, 39%, 37% and 54% for the East. The latter figure is a seemingly positive value; however, it is unable to close the income gap. Once we subtract the per-employee GDP of the eastern federal states from the western federal states, we see that overall convergence amounts to

16 G. Myrdal: *Economic Theory and Under-Developed Regions*, London 1967, Harper Row; A.O. Hirschman: *The Strategy of Economic Development*, New-Haven-London 1968, W.W. Norton Co; A.O. Hirschman: *Exit, Voice, and Loyalty: Responses to Decline in Firms, Organizations, and States*, Cambridge, MA 1970, Harvard University Press.

17 U. Blum: *Wer profitiert...*, op. cit.

18 P. Aghion, P. Howitt: *A Model of Growth through Creative Destruction*, in: *Econometrica*, Vol. 60, No. 2, 1992, pp. 323-351; P. Aghion, N. Bloom, R. Blundell, R. Griffith: *Competition and Innovation: An Inverted-U Relationship*, in: *The Quarterly Journal of Economics*, Vol. 120, No. 2, 2005, pp. 701-728.

19 U. Blum, H. Buscher, H. Gabrisch, J. Günther, G. Heimbold, C. Lang, U. Ludwig, M. Rosenfeld, L. Schneider: *Ostdeutschlands Transformation seit 1990 im Spiegel wirtschaftlicher und sozialer Indikatoren*, Special Volume 1/2009, 2010, second edition, Halle (Saale) 2010, Halle Institute for Economic Research (IWH).

20 W. Christaller: *Die zentralen Orte in Süddeutschland*, Darmstadt 1968 [1933], Wissenschaftliche Buchgesellschaft; A. Lösch: *Die räumliche Ordnung der Wirtschaft*, Stuttgart 1962 [1948], Gustav Fischer; P. Krugman: *Increasing returns and economic geography*, in: *Journal of Political Economy*, Vol. 99, No. 3, 1991, pp. 483-499; P. Krugman: *On the relationship between trade theory and location theory*, in: *Review of International Economics*, Vol. 1, No. 2, 1993, pp. 110-122.

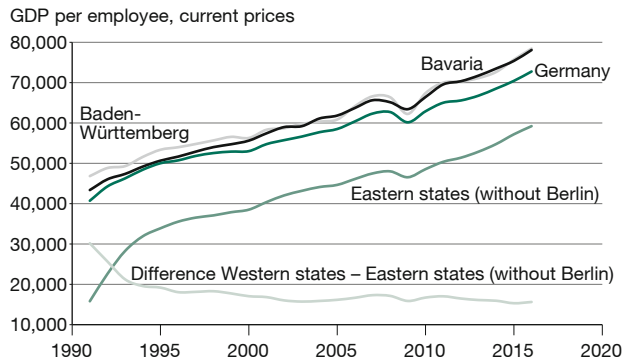
21 R. Hägerstrand: *The Propagation of Innovation Waves*, Lund 1952, Lund Series in Geography, Series B: Human Geography.

22 U. Blum: *Institutions and Clusters*, in: B. Johansson, C. Karlsson (eds.): *Handbook on Research on Clusters*, Cheltenham and Northampton, MA 2008, Edward Elgar, pp. 361-373; U. Blum: *East Germany's...*, op. cit.

23 E. Helpman: *General Purpose Technologies and Economic Growth*, Cambridge, MA 1998, MIT Press.

24 R. Fouquet, S. Broadberry: *Seven Centuries of European Economic Growth and Decline*, in: *Journal of Economic Perspectives*, Vol. 29, No. 1, 2015, pp. 227-244.

Figure 3
GDP growth in selected German states, 1991-2016



Source: Author's representation based on data from the Statistical Yearbook of the Federal Republic of Germany, 2017.

58% over the entire 26 years, but only 0.08% from 2000 to 2016.

Theories with a specific application to Eastern Germany

Price effects resulting from the above-mentioned subsidies play an important role in this dismal situation. They have led to an expansion of the local economy at the expense of the producers of tradable goods, thus first increasing price levels, then wage levels and finally crowding out the export industry. This was empirically shown in a balance-of-payments analysis by Blum and Scharfe based on a theoretical concept by Greiner, Maas and Sell.²⁵ The latter foresaw that a considerable part of de-industrialisation and loss of employment would be related to the adverse effects of incentive systems and massive stabilisation of the welfare sector in the East. This was later taken up by Merkl and Snower and by Uhlig, who specifically pointed to an adverse labour-market effect from the loss of employment in tradable industries and reduced network externalities that limit labour productivity.²⁶

The development in Germany's eastern regions contradicts everything that is known about a market economy

25 See U. Blum, S. Scharfe: Die Transformation in Ostdeutschland als entwicklungsökonomisches Phänomen, in: List Forum für Wirtschafts- und Finanzpolitik, Vol. 28, No. 4, 2002, pp. 348-369; and U. Greiner, H. Maas, F. Sell: The East German Disease: Volkswirtschaftliche Anpassungsprozesse nach der Deutschen Einheit, in: Zeitschrift für Wirtschaftspolitik, Vol. 43, No. 3, 1994, pp. 271-299.

26 C. Merkl, D. Snower: Caring Hand that Cripples: The East German Labor Market after Reunification, in: American Economic Review, Vol. 96, No. 2, 2006, pp. 375-382; H. Uhlig: The slow decline of East Germany, in: Journal of Comparative Economics, Vol. 36, No. 4, 2008, pp. 517-541.

where performance matters. In the business world, if firms opt out of competition, they falter and are washed out. Schumpeter called this the process of creative destruction and it implies that the organisational structure of the firm collapses but capital and labour are reorganised and employed towards aims that are more efficient.²⁷ Can and should this idea be applied to regional economies and political regions? The organisational and, in many cases, terminal solution of inefficiency that characterises a market economy is blocked if regions are kept alive artificially. This was the case with weak financial institutions and firms in the manufacturing and construction sector in Europe after the latest global financial crisis and, before this, in Japan after the growth crisis of the late 1980s and (ever since) the 1990s. Historic experience from rust belt states suggests that this will only prolong the transition period, i.e. undead regions will have fewer chances to recuperate than regions that were sent into creative destruction – and then rejuvenated. In addition, they compete with healthy firms that cannot survive under the pressure of these undead firms, 'the zombies', as Kane called them.²⁸ In fact, undead firms from communist times spilled into the transition period and the economic policy that was applied was not able, perhaps not even willing, to adjust or correct these deficits, thus indirectly supporting zombification.

Thus, *Treuhand* stands in the centre of this – at least in retrospect – ill-run privatisation policy. It was founded by the Modrow government, which ousted Honecker and organised the first free elections in East Germany in spring 1990 that then led to unification negotiations. On 1 March 1990, *Treuhand* began operations as a state hoping to safeguard the property interests of East German citizens during the course of the transition and privatisation. The first wave of reprivatization, so-called 'Modrow privatisation', handed back many small and medium-sized enterprises expropriated during the last wave of the concentration of industries in the seventies under Honecker. Often, the families who had lost their property were still in charge as directors. The results were, by and large, positive. After unification, *Treuhand* became an agency of the Federal Ministry of Finance. Its priority was to privatise rather than restructure, which became more and more complicated once the prime firms had been sold. In addition, entrepreneurial capacities were rare since families, expropriated by the Soviets and the early East German governments, were mostly excluded from restitution. Labour-shedding

27 J. Schumpeter, op. cit.

28 E.J. Kane: The S&L Insurance Mess: How Did It Happen?, Washington, DC 1989, Urban Institute Press; E.J. Kane: What Lessons Should Japan Learn from the U.S. Deposit-Insurance Mess?, in: Journal of the Japanese and International Economics, Vol. 7, No. 4, 1993, pp. 329-355.

due to firm closures and increases in productivity by a factor of three to five (and in the case of agriculture or chemical industries up to ten) once new capital had been brought in led to high unemployment levels. This resulted in subsidies and restructuring investments in *Treuhand* firms, very often at the expense of already privatised firms that suddenly faced competition from firms that could not go bankrupt. The zombification mentioned above began.

Shortly after unification, Blum and Siegmund summarised the issues by pointing to the following problems:

- *Elite change.* Which entrepreneurs will be able to implement market-oriented transitions of the more than 10,000 firms that broke off from the huge combines? The import of competent entrepreneurs seems of the utmost importance.
- *Market orientation.* Once all goods have to be paid in deutsch marks rather than transfer-rubles or through barter, will markets in Eastern European countries and in Russia accept Eastern German goods as western products of proven quality on similar terms – and will the market in Eastern Europe remain stable during its own transition process?²⁹

These two crucial points became the Achilles heel of economic development in Eastern Germany. The German government was in no way willing to restitute property that was expropriated under Soviet and early East German rule, resulting in the de-facto prevention of expelled entrepreneurs taking up the challenge of rejuvenating their old firms in the East. In addition, the Eastern market broke down because of transition and political turmoil as well as the fact that the contracts with the Soviet Union, agreed upon in the period 1990-92, dissolved and specifically left the Eastern German metal and steel industry without markets. Finally, from the perspective of circuit analysis, the above-mentioned monetary transfers from West to East implied a transfer of property titles from East to West. Market adoption thus implied colonisation.³⁰

One of the major findings by Blum and Dudley is that the group structure of national economies matters and that, during the 1970s, East Germany engaged in a centrali-

sation strategy that augmented transaction costs.³¹ In contrast, West Germany decentralised, setting up profit-centre structures in its OMEs. At the other end of the spectrum, the country profited from a booming sector of increasingly internationalising medium-sized enterprises that we call GMEs – global medium-sized enterprises. In many cases, they were supported in their endogenous and exogenous expansion through mergers and acquisitions (M&A) by state-owned banks – *Landesbanken* – that enforced a consolidation of industries that was often complemented by exogenous growth through a prudent M&A strategy. There was a global presence of certain industries, for instance, in machine-tool manufacturing or in the car component industry.

Using transaction-cost theory in the tradition of Coase and Williamson,³² we establish that efficiency and firm growth are influenced by efficient size structure. Taking West Germany before and Western Germany after unification as the benchmark economy, we set up a model of relative economic growth. Following our basic hypothesis, we assume that the economic inefficiency of East or Eastern Germany, i.e. its lag as a 70% economy in the 1950s, 1960s and after 1997, can be primarily explained by its relative firm size structure. From a general perspective, it is an issue of institutional economics because the economic framework defines the extent to which individuals become drivers of economic entrepreneurship and the extent to which the political system may support it. Furthermore, following the above-mentioned argument, transaction and production costs define the limits between market and hierarchy. More precisely, the structure of information costs matters.³³ Arguing from the perspective of Tobin,³⁴ individuals invest in firms if the respective revenue exceeds that which they can obtain on the external market. The resulting Tobin-Q is the relation between the market value, i.e. the value with respect to internal investment, and the book value, i.e. the value of reproducing the firm with outside resources. Generalising this concept allows us to argue that capital or labour may flow into a firm (or into a region with the respective forms or

29 U. Blum, J. Siegmund: Politics and Economics of Privatizing State Enterprises: the Case of the Treuhandanstalt, in: H.-U. Derlien, G. J. Szabłowski (eds.): Regime Transitions, Elites, and Bureaucracies in Eastern Europe, in: Governance, Vol. 6, No. 3, 1993, pp. 397-408.

30 J.B. Hall, U. Ludwig: German Unification and the "market adoption" Hypothesis, in: Cambridge Journal of Economics, Vol. 19, No. 4, 1995, pp. 491-507.

31 U. Blum, L. Dudley: The Two Germanys: Information Technology and Economic Divergence, 1949-1989, in: Journal of Institutional and Theoretical Economics, Vol. 166, No. 4, 1999, pp. 710-737; U. Blum, L. Dudley: Blood, Sweat, Tears: Rise and Decline of the East German Economy, 1949-1988, in: Jahrbuch für Nationalökonomie und Statistik – Journal of Economics and Statistics, Vol. 220, No. 4, 2000, pp. 438-452.

32 R.H. Coase: The Nature of the Firm, *Economica*, Vol. 4, No. 16, 1937, pp. 386-406; O.E. Williamson: The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting, New York 1985, The Free Press.

33 U. Blum, L. Dudley: The Two Germanys..., op. cit.

34 J. Tobin: Liquidity Behaviour as Behaviour towards Risk, in: Review of Economic Studies, Vol. 25, No. 2, 1958, pp. 65-86.

clusters) if the rent captured there exceeds that of external markets and vice versa.

Hypothesis

The overarching hypothesis of this article is that structural economic deficits from East German times spilled over into Eastern Germany after unification and were aggravated by *Treuhand* privatisation which cut the regional economic networks. Today, low levels of internationalisation and the lack of headquarters still prevail in Eastern Germany. Plants are positioned at the onset of the value-added chain and thus are dependent on other firms that capture important market signals. All of this weakens the economy considerably. It is important to note that Christa Luft – the former East German Minister of Economics during the transition government, which opened East Germany to free elections – warned that the atomised group structure after privatisation was oriented entirely against any market-type reference model and would put the Eastern states at a disadvantage.³⁵ In fact, most of the combines were organised on a horizontal level in order to exploit specific human capital and reduce the transaction costs that were prevalent in the centrally planned economy.³⁶ Thus, they included similar industries in an attempt to emulate horizontal clusters and exploited general purpose technologies.³⁷ Given this industry structure, they had the tendency to monopolise markets and become inefficient – over and above the level of slack usually observed in older, vertically integrated socialist firms. Their industrial research units were often centralised within the combine, and, after its break-up, were no longer needed by investors who were only looking for production plants (“extended work benches”) or not stand-alone enterprises. In fact, East Germany tumbled from a level of over-concentration to a level of under-concentration.

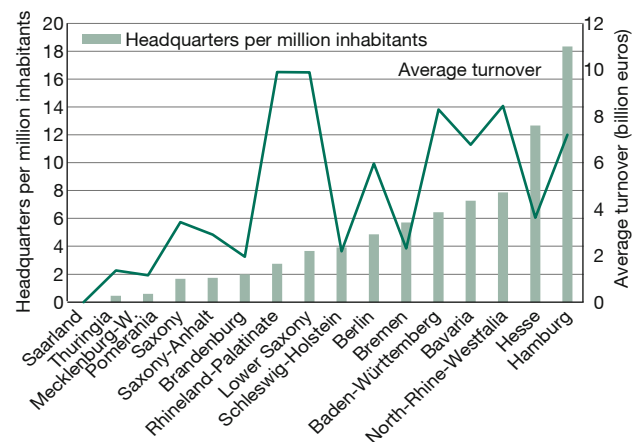
Figure 4 shows the spatial density of the 500 largest headquarters in Germany in the year 2011 (excluding financial institutions; left scale) in ascending order. All five new *Länder* are found on the left side, the lower bound, only surpassed by Saarland that hosts no headquarters at all. In addition, average turnovers (right scale) give evidence of rather low company sizes in the Eastern provinces. Seven years later, the situation has not improved: The number of top-500 headquarters in the east had declined from 18 to 17; Berlin has caught up slightly – from 17 to 20.

35 C. Luft: DDR-Wirtschaft – Marode und bankrott? Ihre Kapitäne Versager?, in: Die Kombinatdirektoren (eds.), op. cit., pp. 7-18, here pp. 12-13.

36 E. Netzmann: Der Versuch war nicht umsonst, in: Die Kombinatdirektoren (eds.), op. cit., pp. 43-53, here p. 47.

37 U. Blum: Institutions and Clusters..., op. cit.; E. Helpman, op. cit.

Figure 4
Regional distribution of Germany's 500 largest companies, 2011



Source: Author's calculations based on data from *Die Welt*: Top 500 Unternehmen in Deutschland, newspaper supplement, 18 June 2012.

Modelling convergence and the impact of firm size

‘Efficient’ firms should be in equilibrium in terms of both the transaction and production cost structure (especially information costs), and outside wage and interest levels. Their ability to profit from external economies, especially economies of scale, scope and learning curves, potentially improved by network effects and clusters, may drive expansion because of an attractive internal use of labour and capital resources.

The relevant model would thus analyse output dynamics in relation to firm size and other factors. In such a world, convergence factors that are conditional on firm size should drive output. It is an entrepreneurial quality to generate internal rents relative to the opportunity costs of resources, such as labour and capital, in order to stimulate additional growth. The political system has the capacity to generate an environment where this growth becomes possible because of low transaction costs and publicly generated externalities. Following Barro and Sala-i-Martin,³⁸ the transition to a steady state is described as follows:

$$\frac{1}{t} \cdot \log \left(\frac{y_{it}}{y_{i0}} \right) = B - \left(\frac{1 - e^{-\beta t}}{t} \right) \cdot \log(y_{i0}) + u_{it}, \quad (1)$$

$i = \text{West, East}; \quad t = 1, 2, \dots, T.$

38 R. Barro, X. Sala-i-Martin: Convergence, op. cit.; R. Barro, X. Sala-i-Martin: Economic Growth, New York 1998, McGraw Hill.

On the left side of the equation, we see the relative growth rate of variable y , i.e. output, relative to an initial starting point. The spatial dimension of y is given by i and the time dimension by t ; $t=0$ is the starting date. On the right side, we see the growth element of the convergence relationship with β as the convergence rate per period t . Further factors may be added to this equation to make it conditional to them, i.e. describe different levels of steady state relating to regional structures etc. μ is the white noise residual.

Whereas the Barro-Sala-i-Martin type of convergence relates one region to another, we use a specific approach that is adapted to the German case. We calculate unconditional and conditional path dynamics by inquiring about the economic forces that drive the change of East (Eastern) German relative to West (Western) German output. Let us define the percentage change of relative output ΔY_t and for the firm size variables also expressed as percentage changes in an analogous way) as follows:

$$\Delta Y_t = \left[\frac{Y_{East,t}/Y_{West,t} - Y_{East,t-1}/Y_{West,t-1}}{Y_{East,t-1}/Y_{West,t-1}} \right], \quad (2)$$

The function to be estimated looks like this:

$$\Delta Y_t = a_0 + a_1 \cdot \Delta Y_{t-1} + \sum_{j=2}^m a_j \cdot \Delta X_{jt} + \sum_{k=m+1}^n a_k \cdot \Delta D_{kt} + v_t, \quad t=3,4,\dots,T. \quad (3)$$

Path dependency is included with a lagged dependent variable, the elasticity of which gives a percentage estimate of the replication dynamic, i.e. the extent to which the present ratio of growth influences tomorrow's growth ratio. If this elasticity were above unity, the lagging region (in our case the East) would *ceteris paribus* catch up to the rich reference region (in our case the West) in the long run. Conditional factors X_{jt} and dummies D_{kt} are added on the right-hand side of the equation to account for structural developments and important system shocks.

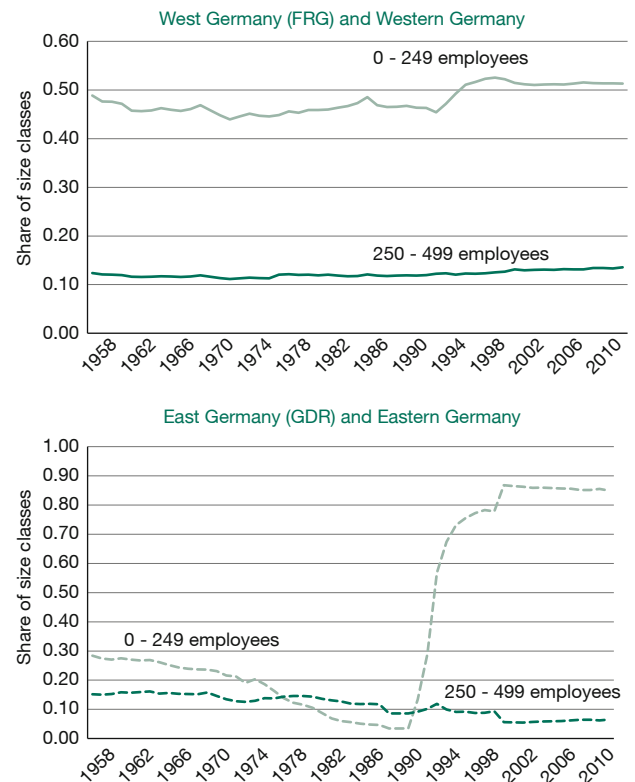
Testing for path dynamics and relative growth

Selection of variables

Growth data as a dependent variable. In a previous paper, Blum sets up a consistent time series for East German and Eastern German output for the years 1949-2012.³⁹ Since East Germany used the material product system as an accounting standard during communist times, this had to be adjusted to market standards. This was possible because the two Germanys were at the same starting point

39 U. Blum: East Germany's..., op. cit.

Figure 5
Firm size structures in Germany, 1956-2010



Sources: Author's calculations based on data from the Statistical Yearbooks of the German Democratic Republic, 1989; Statistical Yearbook of the Federal Republic of Germany, 2017; and Institute for Employment Research (IAB), 2015.

after losing the war, and had similar technologies and similar population preferences. East Germany's problem was that it was unable to sufficiently and efficiently invest in its stock of capital. Thus, differences in incremental input-output relationships were used to standardise East German output with respect to West German output for the period up to unification.

Firm size. It was necessary to set up a consistent series for firm size based on employment data for the period from 1949 to 2012. For West Germany, changes in delineations and the composition of data were necessary. This was also necessary for East Germany, but more importantly, the switch from East German data documentation to West German data presentation had to be accounted for.

These data sets distinguish among four categories of firms according to the number of employees (0 - 249; 250 - 499; 500 - 1000; >1000). Figure 5 depicts the two smaller categories following our hypothesis that a fragmented firm structure impacts output negatively. Whereas firm size

Table 1
Firm size structure in the German Empire, 1933

	Manufacturing and crafts			Services and transportation		
	Plants in 1,000	Em- ployees in 1,000	Ratio (E/P)	Plants in 1,000	Em- ployees in 1,000	Ratio (E/P)
Prussia	1,034	5,137	4.97	954	3,334	3.49
Bavaria	272	1,020	3.75	188	579	3.08
Saxony	189	1,012	5.35	151	488	3.23
Württemberg	107	523	4.89	64	198	3.09
Baden	77	364	4.73	52	190	3.65
Thuringia	62	282	4.55	38	112	2.95
Hesse	48	192	4.00	36	106	2.94
Empire	1,903	8,999	4.73	1,600	5,492	3.43

Source: Statistisches Amt des Freistaats Bayern: Statistisches Jahrbuch für Bayern, P10, J. Lindauersche Universitäts-Buchhandlung (Schöpping), Munich 1936.

structure in the West is relatively continuous, (30% of employment is in very large firms, not mapped by the graph), the situation in the East is very different. Very small firms – many in the trade sector – showed a continuous decline in numbers over time. In the second group of firms, which have between 250 and 499 employees, this decline accelerates until 1990. This was when the *Treuhand* dismantled large units and shock-changed the structure, resulting in smaller firms making up nearly 90% of total employment. Today, less than 10% of employees work in very large firms – most of which are extended work benches of international OMEs. The variables are named $\Delta W(0 - 249)$ and $\Delta W(250 - 499)$.

It is interesting to evaluate this firm size structure against the backdrop of historic differences in Tables 1 and 2. This enables us to see that, before the war, the distribution was quite homogenous across the states. In manufacturing and crafts, the highest values are found in Prussia (steel and mining) and Saxony – the core area of the Central German business districts. After the war, concentration in manufacturing was higher in the East than in the West, and both increased over time. Obviously, concentration in the East fell sharply after unification because of the privatisation strategy of *Treuhand*.

Other explanatory variables. Two important variables were included in the model:

- The direction coefficient (*Richtungskoeffizient*, or *RiKo*), a measure of how many East German deutsch marks the communist government had to invest to earn

Table 2
Firm size structure in Germany, 1969, 1989 and 2009

	Manufacturing East			Manufacturing West		
	Plants in 1,000	Em- ployees in 1,000	Ratio (E/P)	Plants in 1,000	Em- ployees in 1,000	Ratio (E/P)
1969*	12	2,819	230	99	8,546	86
State owned	3	2,379	745			
1989**	3	3,211	952	46	7,300	158
2009***	4	535	152	19	4,512	237

Notes: * West German values of 1969 were interpolated from 1968 and 1970 values. ** East Berlin part of East Germany, West Berlin part of West Germany. *** without Berlin.

Sources: Statistisches Jahrbuch der Deutschen Demokratischen Republik, 1970, p. 103; Staatsverlag der Deutschen Demokratischen Republik, Berlin 1970; Statistisches Jahrbuch der Deutschen Demokratischen Republik, 1990, Rudolf Haufe Verlag, Berlin 1990, p. 158; German Economic Institute: Deutschland in Zahlen, Köln 1978, p. 50; German Economic Institute: Deutschland in Zahlen, Köln 1991, p. 63; German Economic Institute: Deutschland in Zahlen, 2017, available at <http://www.deutschlandinzahlen.de/tab/bundeslaender/branchen-unternehmen/industrie/betriebe-in-der-industrie>.

one West German deutsch mark on international markets; the value rose to 4.6 in 1989. As in the rest of the model, we used the percentage rate of change.

- The interest rate (Central Bank rate), again as percentage rate of change.

We used additional explanatory dummy variables to test for shocks during development and other important events. Major events included:

- the worker's revolt of 1953 in East Germany,
- the building of the Berlin Wall in 1961,
- the expropriation of medium-sized enterprises in East Germany in the early and mid-1970s,⁴⁰
- the unification shock,
- rapid convergence in the early to mid-nineties,⁴¹
- the global financial crisis of 2007-08.

Path replication dynamics and relative growth

Table 3 below gives the results of the model of relative growth. The dependent ΔY_t is related to its preceding val-

40 See the arguments in U. Blum, L. Dudley: The Two Germanys..., op. cit.; U. Blum, L. Dudley: Blood, Sweat, Tears, op. cit.; and U. Blum: East Germany's..., op. cit.

41 For an analysis, see U. Blum, L. Dudley: Fast Convergence: Institutions and Economic Growth in New East Germany, in: Jahrbuch für Wirtschaftswissenschaften – Review of Economics, Vol. 49, No. 2, 1998, pp. 124-143.

Table 3
Models of path dynamics, East vs. West, 1956-2010

Dependent Explanatory (Elast.)	ΔY_t (1)	ΔY_t (2)	ΔY_t (3)	ΔY_t (4)
Constant	0.0043 (0.6796)	0.0035 (0.5716)	0.0033 (0.5399)	0.0054 (0.8394)
ΔY_{t-1}	0.5898 (5.2249)	0.5809 (5.4650)	0.5565 (5.1105)	0.5417 (4.9386)
$\Delta W(250 - 499)_t$		-0.2083 (2.5635)	-0.2020 (2.4796)	-0.2080 (2.5495)
$\Delta W(0 - 249)_t$		-0.1335 (2.0686)	-0.1177 (1.7748)	-0.1218 (1.8351)
$\Delta Interest_t$			-0.1175 (1.0241)	-0.1422 (1.2154)
$\Delta RiKo_t$				-0.1216 (1.0518)
Log likelihood	91.7397	96.1394	96.7102	97.3242
No. of observations	55	55	55	55
Adjusted R ²	0.3400	0.4376	0.4491	0.4613

Note: t-statistics in parentheses.

Source: Author's calculations.

ue ΔY_{t-1} and other structural variables. The four columns first list the unconditional and then three different conditional models that depend on the number of other structural variables included.

First, let us turn to the results on statistical quality. The unconditional model explains 34% of variance, the subsequent conditional models explain some 45%. Increases in the log likelihood are only marginal between models 2, 3 and 4. All null hypotheses of a unit root can be rejected for all five variables: ΔY_{t-1} , $\Delta W(250 - 500)_t$, $\Delta W(0 - 250)_t$, $\Delta Interest_t$ and $\Delta RiKo_t$.⁴² All variables listed above that are not included in the table proved to be insignificant.

Let us now turn to the economic results. Row 1 shows the unconditional convergence model with a replication factor (elasticity) of 0.6%, i.e. if the ratio of growth rates is 1 in year t , this would only predict 0.6% of next year's growth. This shows that East Germany – and later Eastern Germany – was unable to profit from its, on average, higher growth rate over all of the years covered compared to the West. First, it was unable to catch up because of its very low starting point of only 35% of western levels in the late 1940s and early 1950s. Secondly, its relative growth path was only 60% of that of the West, i.e. the growth replica-

tion process was too low. A detailed look at the regression analysis shows that:

- The lagged dependent variable ΔY_{t-1} , with values between 0.54 and 0.59, shows a stable and highly significant path pattern statistically.
- If we distinguish between two firm size groups for which the changes in the East relative to those in the West are included (from 250 to 499 workers per firm [$\Delta W(250 - 499)_t$] and less than 250 workers per firm [$\Delta W(0 - 249)_t$]), both show significant negative impact on relative growth in the East in contrast to the West. The increase in the number of small and medium-sized firms of 1% leads to a slowdown in growth dynamics of 0.3%.
- Interest rates ($\Delta Interest_t$) and the direction coefficient ($\Delta RiKo_t$) are marginally insignificant. This is a consequence of a continuously falling growth dynamic already captured by the lagged dependent variable. In terms of log likelihood, there is no improvement in the models from column 2 onwards.

Growth strategies

The results clearly show that group structure, i.e. size distribution of firms, is problematic in Eastern Germany. It is not so much a problem of extended work benches – these also exist in Western Germany. The West, however, has many large firms that are headquarters. The East has a first-rate growth problem: There are only 37 top 500 firm headquarters in the East 30 years after the fall of the Berlin Wall. If we exempt Berlin from this statistics, this number shrinks to 17 – and it shrinks further once utilities are excluded. There is also a lack of dynamic firms: there is no firm from Eastern Germany that has become a world leader over the last 30 years such as Tencent (China), Google (USA) or SAP (Germany).

The results further show that Eastern Germany is on a 60-70% growth path compared to the West. The low replication dynamic will not allow for the closing of the income gap in the near future. Economic catch-up policies must concentrate on firm growth – in our delimitation this means breaking the barrier of 500 employees – a size seen as necessary to reach beyond national markets. This might imply providing subsidies for internal growth through investment – as is presently done – as well as supporting an intelligent mergers and acquisitions policy for small and medium-sized enterprises. We have set up a vade mecum for mergers and acquisitions that addresses the most important Achilles heel of the East: firm size.

⁴² P values are 0.001, 0.005, 0.0106, 0.0002 and 0.0241 for ΔY_t , $\Delta W(250 - 499)_t$, $\Delta W(0 - 249)_t$, $\Delta Interest_t$, $\Delta RiKo_t$, respectively.