

LINKING ENTREPRENEURSHIP TO GROWTH: THE CASE OF WEST GERMANY

DAVID B. AUDRETSCH AND MICHAEL FRITSCH

While the USA created 20 million new jobs between 1992 and 1998, resulting in unprecedented levels of prosperity and unemployment, Germany had been plagued by stagnant growth and double-digit unemployment rates. One of the main differences in the economic performance between the two countries was the ability of the USA to usher in the New Economy: entrepreneurship in the USA had created entirely new industries such as biotechnology and software that have provided the engine for growth, competitiveness, and job creation. In Germany the institutional and policy structures seemed to pose rigid barriers preempting the New Economy.

Ever since its famous *Wirtschaftswunder*, or economic miracle of the post-World War II era, the rest of the world has associated Germany with remarkable prosperity and stability, providing both high employment and wage rates. The German model of a *social market economy* had generated a *Wohlstand*, or standard of living, that equaled not only the material wealth found on the other side of the Atlantic, but also the high degree of social services and security found elsewhere on the European continent. What has become known as *The German Economic Model* demonstrated that not only could capitalism generate a high and equitable *Wohlstand*, but that it could also have a friendly face.

The empirical evidence suggested that the German model for growth provided a sharp contrast to that for the USA. While Reynolds (1999) has found that the degree of entrepreneurship was positively related to growth in the USA, a series of studies by Audretsch and Fritsch (1996) and Fritsch (1996, 1997) could not identify such a relationship for Germany. However, the results by Audretsch and Fritsch were based on data from the 1980s. More recently, there are compelling reasons to suggest that the source of growth in Germany has shifted towards an increased role of entrepreneurship. The purpose of this paper is to explicitly test this hypothesis. In the second section we explain why, as a result of globalization and a shifting source of comparative advantage, entrepreneurship might be more important for German growth in the 1990s than in the previous decade. In the third section we estimate two regression models linking economic growth to the relative importance of entrepreneurial activity for the 1980s and 1990s. Finally, in the fourth section a summary and conclusion are presented. We find persuasive evidence suggesting that the source of growth in Germany has shifted away from established incumbent firms towards entrepreneurial activity.

TABLE 1: CHANGE IN EMPLOYMENT FIGURES IN WESTERN GERMANY AND AT FOREIGN SUBSIDIARIES (1991-95, IN THOUSANDS)

Employment trend	Sector						
	Manufacturing	Chemicals	Electrical engineering	Automotive	Mechanical engineering	Textiles	Banking and insurance
Foreign	189	14	-17	30	16	-6	21
Domestic (west)	-1,307	-80	-198	-161	-217	-68	28

Source: BMWi (1999: 7).

employment in German plants decreased by 1,307,000 while it increased in foreign subsidiaries by 189,000 (BMWi 1999: 7). In the chemical sector, the decrease of domestic employment was 80,000, while 14,000 jobs were added by German chemical companies in plants located outside of Germany. In electrical engineering employment in German plants decreased by 198,000. In automobiles employment in Germany decreased by 161,000, while 30,000 jobs were added outside of Germany. These developments in the larger firms dominated employment figures for many German regions and industries during the 1980s.

The reaction of the German public has been to accuse German firms of not fulfilling their social contract. As one of the leading newspapers, *Die Zeit*, asked German industry, "When Profits Lead to Ruin—More Profits and More Unemployment: Where is the Social Responsibility of the Firms?"

However, most recently, creating high-tech startups that would provide the backbone for the New Economy became a focal point of the public policy debate in Germany and a priority for all four major political parties. In particular, the effects of globalization and the fast expansion of new technologies, such as the Internet, have forced Germany to undertake major structural change. A broad range of reforms, privatization, deregulation, and policies to generate entrepreneurship in high-tech industries was implemented to create the New Economy in Germany. What was unimaginable in the 1980s seems to have taken place in Germany in the 1990s—the creation of a New Economy driven by high-tech entrepreneurial startup firms. Looking at the time period from 1980 to the end of the 1990s, the share of R&D employment increased considerably. In particular, smaller units became more important for innovation processes as is indicated by the rising share of R&D employees in establishments with less than 50 employees (Table 2).

Looking at the yearly number of startups in the 1980s and the 1990s (Figure 1) we see a clear rising trend. While in the 1983-89 period there were about 117,000 new establishments per year in West Germany, this number increased by nearly 14 percent to more than 133,000 in the years 1990-97. By far the greatest part of this increase was in the service sector, where the average yearly number of new establishments rose by about 15,000 or 17.9 percent between the two time periods. Given the clear trend to decreasing manufacturing employment in western Germany, the growth in the yearly number of startups in manufacturing by about 500 cases or 3.5 percent between these two periods is quite remarkable. However, accounting for the number

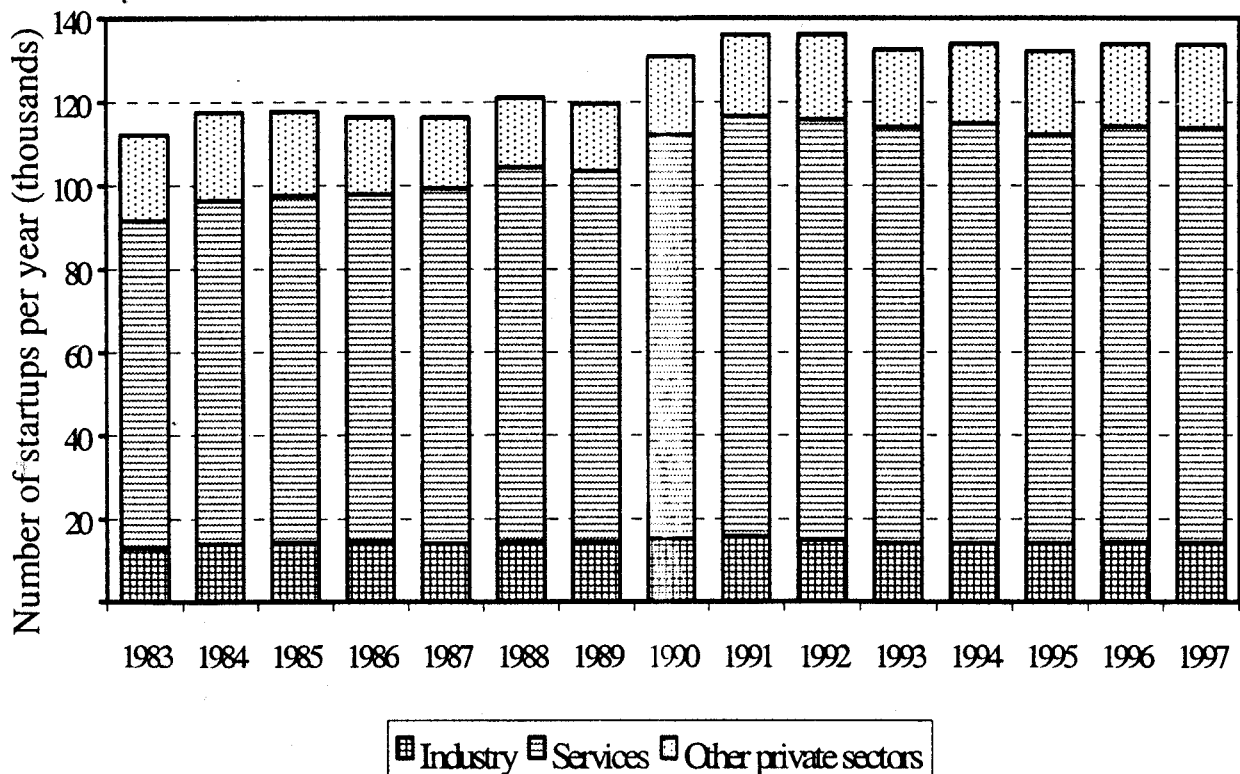
TABLE 2: THE DEVELOPMENT OF R&D EMPLOYMENT IN WEST GERMANY IN THE 1980s AND THE 1990s

	Share of R&D employees ^a on all employees (%) ^b	Share of R&D employees ^a on all employees in establishments with less than 50 employees (%) ^b
1980	1.87	0.82
1987	2.23	0.91
1988	2.27	0.95
1989	2.34	1.01
1990	2.38	1.07
1991	2.44	1.15
1992	2.50	1.23
1993	2.57	1.30
1994	2.60	1.36
1995	2.63	1.42
1996	2.70	1.46
1997	2.75	1.51
1998	2.73	1.47

^aEngineers, mathematicians, physicists, chemists, and other natural scientists. *Source:* Social Insurance Statistics.

^bSource: Social Insurance Statistics.

FIGURE 1: NUMBER OF NEW ESTABLISHMENTS IN WEST GERMANY 1983-97.



Source: Social Insurance Statistics.

of closures in manufacturing the net entry in this sector becomes negative in the 1990s.²

All in all, we find a number of indications that a shift from a routinized regime to a more entrepreneurial regime has taken place in West Germany between the 1980s and the 1990s. Accordingly, the main sources of growth may have shifted from the large long-established firms to startups and the “new economy”.

STARTUP ACTIVITY AND REGIONAL EMPLOYMENT CHANGE IN WEST GERMAN REGIONS

For analyzing the relationship between startup activity and growth we employ a database constructed from the German Social Insurance Statistics, as described and documented by Brixy and Fritsch (2002). These data were available for the 74 (West) German planning regions.³ An important adjustment was made to control for the fact that not only does the composition of industries vary considerably across regions, but the relative importance of startups and incumbent enterprises also varies systematically across industries (Audretsch and Fritsch 1999).⁴ For example, startup rates are higher in service industries than in manufacturing industries. This means that the relative importance of startups and incumbents in a region is confounded by the composition of industries in that region. This would result in a bias of overestimating the level of entrepreneurial activity in regions with a high composition of industries where startups play an important role, and underestimating the presence of entrepreneurship in regions with a high composition of industries where new firm startups are relatively unimportant. To correct for the confounding between the regional composition of industries with the relative importance of startups and incumbent enterprises, a shift-share procedure, as described by Ashcroft *et al.* (1991), was deployed to develop a measure of sector adjusted startup activity. This sector adjusted number of startups is defined as the number of new firms in a region that can be expected to be observed if the composition of industries was identical across all regions. Thus, the measure adjusts the original data by imposing the same composition of industries on each region.⁵

As noted earlier, many of the previous studies (cf. Audretsch and Fritsch 1996; Fritsch 1996, 1997) had found no evidence linking startup activity to subsequent growth for German regions. But the earlier analyses were for the 1980s. There are compelling reasons to suspect that Germany has changed between the two decades. Thus, in Table 3 we estimate employment growth in each region and link it to the startup rate. We control for population density in these models due to the statistical impact on employment change that we find for this variable in our data. Population

2 For a more detailed analysis see Fritsch and Niese (2002). The main industries that are summarized under the category “other private sectors” are agriculture, construction, and mining.

3 The Berlin region was excluded due to changes in the definition of the region in the time period under inspection here.

4 Startup rates are calculated according to the “labor market” approach here, i.e. the number of startups is divided by the number of persons in the regional workforce at the beginning of the respective period. See Audretsch and Fritsch (1994) for different ways of calculating a startup rate.

5 For the private sector of the economy as a whole, the difference between the sector adjusted number of startups and the original number of startups was between 0.3 and 9.8 percent; for details see Fritsch and Niese (2002).

TABLE 3: DETERMINANTS OF REGIONAL EMPLOYMENT CHANGE IN THE 1980s AND THE 1990s^a

	Regional employment change (%) 1983-89 ^b		Regional employment change (%) 1993-98 ^b	
Constant	5.043*	4.252	-9.591**	-11.013**
	(2.02)	(1.38)	(4.00)	(4.21)
Average startup rate ^c	0.401	—	1.090**	—
	(0.98)		(2.70)	
Average sector adjusted startup rate ^d	0.605	—	1.308**	
	—	(1.20)		(3.02)
Population density	-0.001	-0.003*	-0.002**	-0.002*
	(1.65)	(2.22)	(2.87)	(2.52)
R^2_{adj}	0.034	0.100	0.213	0.230
F-value	2.30	4.06**	10.85**	11.91**

^at-Values in parentheses. *Statistically significant at the 5 percent level; **statistically significant at the 1 percent level.

^bPercent change of private sector employment 1983-89 and 1993-98, respectively.

^cMean value of the startup rate for the private sector according to the labor market approach in the years 1983-85 and 1993-95, respectively.

^dMean value of the sector adjusted startup rate for the private sector according to the labor market approach in the years 1983-85 and 1993-95, respectively.

density here represents all kinds of regional influences like availability of qualified labor, house prices, local demand, and the level of knowledge spillovers. Including population density instead of indicators for these individual effects into the regression avoids the problem of multicollinearity caused by a relatively high level of correlation between these factors. Moreover, we find a higher level of statistical significance compared with estimates based on separate indicators for the different effects of location. Other indicators for regional characteristics not related to population density (e.g. qualification of regional workforce, level of innovation activities, etc.) did not prove to be statistically significant at any conventional level in explaining regional employment change. As the results show, the startup rate had no significant impact on growth for the 1980s. This holds for both measures of the original startup rate as well as the adjusted startup rate. In the regression using the sector adjusted startup rate, population density is statistically significant at a 5 percent level with a negative sign indicating unfavorable conditions for employment in urbanized areas.

For the 1990s, a different result emerges. Those regions with a higher startup rate exhibit higher growth rates. This would suggest that, in fact, Germany is changing over time, where the engine of growth is shifting towards more of a focus on the entrepreneurial regime. The higher coefficients for the sector adjusted startup rate compared with the non-adjusted rate indicate that the relationship between the startup rate and employment change is indeed somewhat "disturbed" by differences with regard to the industry structure between the regions (Table 3). This clearly demonstrates the relevance of the sector adjustment procedure. Therefore, Table 4 shows only the results of regressions with the adjusted startup rates.

In our data, we find several hints suggesting the relevance of long-term effects for regional development. One piece of evidence for the importance of long-term factors is that development of a region in the 1990s is statistically linked to its growth performance in the 1980s. By including a dummy variable reflecting regions with an

TABLE 4: ENTRY AND GROWTH HISTORY AS DETERMINANTS OF REGIONAL EMPLOYMENT CHANGE IN THE 1990s^a

	Regional employment change 1993-98		
	I	II	III
Constant	-12.099** (5.15)	-12.341** (4.99)	-13.407** (6.29)
Average sector adjusted startup rate 1983-85	2.542** (2.95)	—	1.510** (4.27)
Average sector adjusted startup rate 1993-95	-1.236 (1.31)	1.300** (3.21)	—
Population density 1993	-0.001 (1.53)	-0.002 (1.81)	-0.001 (1.49)
Above average employment change 1983-89 (yes = 1; no = 0)	1.526* (2.21)	2.280** (3.38)	1.830** (2.80)
R^2_{adj}	0.395	0.329	0.389
F-value	12.93**	12.91**	16.49**

^at-Values in parentheses. *Statistically significant at the 5 percent level; **statistically significant at the 1 percent level.

above average growth rate in the 1980s, we find that high growth regions in the 1980s also tended to be high growth regions in the 1990s (Table 4). But even holding this path dependency constant, those regions that experienced high startup rates in the 1980s also exhibited high growth rates in the next decade. This suggests that while relatively high employment growth in the 1980s tended to prolong into the 1990s, regions with high startup rates in the 1980s had a greater likelihood of being high growth regions in the 1990s. That is, one of the keys to a high growth performance region in the 1990s was having a high startup rate in the 1980s.

The non-significance of the startup rate in the 1990s in Model I may be caused by multicollinearity because startup rates for different time periods tend to be correlated. However, omitting the startup rate for the 1980s or the 1990s from the model in order to account for such correlation between these two variables the coefficient for the startup rate in the 1980s (Model III) is higher than that for the startup in the 1990s (Model II) suggesting that the long run impact of a high startup rate is stronger than the short run effect. Moreover, we find a higher share of explained variance for the model with the startup rate of the 1980s (Model III in Table 4).

CONCLUSIONS

Divergent findings from the 1980s about the relationship between the degree of entrepreneurial activity and economic growth in the USA and Germany posed something of a puzzle. On the one hand, these different results suggested that the relationship between entrepreneurship and growth was fraught with ambiguities. No confirmation could be found for a general pattern across developed countries. On the other hand, it provided evidence for the existence of distinct and different national systems. The empirical evidence clearly suggested that there was more than one way to achieve growth, at least across different countries. Convergence in growth

rates seemed to be attainable by maintaining differences in underlying institutions and structures.

The results of this paper suggest a somewhat different interpretation. Based on the compelling empirical evidence that the source of growth in Germany has shifted away from the established incumbent firms during the 1980s to entrepreneurial firms in the 1990s, it would appear that a process of convergence is taking place between Germany and the USA, where entrepreneurship provides the engine of growth in both countries. Despite remaining institutional differences, the relationship between entrepreneurship and growth is apparently converging in both countries. We also find evidence that long-term influences play an important role for regional development. Obviously, regions that have once attained a relatively steep growth path tend to follow this path for a longer time period. Moreover, some stimulating effects of new firms on regional development seem to become effective not immediately but after a number of years. One could, therefore, conclude that startups had a positive impact on employment growth in West Germany even in the 1980s. But maybe these long-term effects needed the change towards a more entrepreneurial regime in order to become effective.

REFERENCES

- Ashcroft, Brian, Love, James H. and Malloy, Eleanor 1991: New firm formation in the British counties with special reference to Scotland, *Regional Studies*, 25: 395-409.
- Audretsch, David B. and Fritsch, Michael 1994: On the measurement of entry rates, *Empirica*, 21: 105-113.
- Audretsch, David B. and Fritsch, Michael 1996: Creative destruction: turbulence and economic growth, in Ernst Helmstädter and Mark Perlman (eds.), *Behavioral Norms, Technological Progress, and Economic Dynamics: Studies in Schumpeterian Economics*, pp. 137-150. Ann Arbor: University of Michigan Press.
- Audretsch, David B. and Fritsch, Michael 1999: The industry component of regional new firm formation processes, *Review of Industrial Organization*, 15: 239-252.
- Brixy, Udo and Fritsch, Michael 2002: Betriebsdatei der Beschäftigtenstatistik der Bundesanstalt für Arbeit [The establishment file of the social insurance statistics of the Federal Agency for Employment], in Michael Fritsch and Reinhold Grotz (eds.), *Das Gründungsgeschehen in Deutschland—Darstellung und Vergleich der Datenquellen [New Firm Formation—Exposition and Comparison of Data Sources]*. Heidelberg: Physica (in German).
- Bundesministerium für Wirtschaft und Technologie (BMWi) 1999: *The Economic Report 1999*. Berlin: Bundesministerium für Wirtschaft und Technologie.
- Fritsch, Michael 1996: Turbulence and growth in West-Germany: a comparison of evidence by regions and industries, *Review of Industrial Organization*, 11: 231-251.
- Fritsch, Michael 1997: New firms and regional employment change, *Small Business Economics*, 9: 437-448.
- Fritsch, Michael and Niese, Michael 2000: Der Einfluss der Branchenstruktur auf das Gründungsgeschehen—Eine Analyse für die westdeutschen Raumordnungsregionen 1983-1997 [The impact of industry structure on startup activity—an analysis for West German planning regions 1983-1997], *Geographische Zeitschrift*, 88: 234-250 (in German).
- Fritsch, Michael and Niese, Michael 2002: Entwicklung und sektorale Struktur von

Gründungen und Stilllegungen in Deutschland [Development and industry structure of startups and closures 1983-1997]. Freiberg, Mimeo (in German).

Reynolds, Paul D. 1999: Creative destruction: source or symptom of economic growth?, in Zoltan J. Acs, Bo Carlsson and Charlie Karlsson (eds.), *Entrepreneurship, Small and Medium-sized Enterprises and the Macroeconomy*, pp. 97-136. Cambridge: Cambridge University Press.

Statistisches Bundesamt various volumes: *Stand und Entwicklung der Erwerbstätigkeit (Ergebnisse des Mikrozensus)*, Fachserie 1, Reihe 4.1.1. Stuttgart: Metzler-Poeschel.