ECONSTOR
Make Your Publications Visible.

A Service of

ZBW Leibniz-Informationszentrum Wirtschaft
Leibniz Information Centre for Economics

Audretsch, David B.; Carree, Martin A.; van Stel, André J.; Thurik, A. Roy

Working Paper

Impeded industrial restructuring: The growth penalty

HWWA Discussion Paper, No. 114

Provided in Cooperation with:
Hamburgisches Welt-Wirtschafts-Archiv (HWWA)

Suggested Citation: Audretsch, David B.; Carree, Martin A.; van Stel, André J.; Thurik, A. Roy (2000) : Impeded industrial restructuring: The growth penalty, HWWA Discussion Paper, No. 114, Hamburg Institute of International Economics (HWWA), Hamburg

This Version is available at:
https://hdl.handle.net/10419/19437

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

WWW.ECONSTOR.EU

Mitglied der Leibniz-Gemeinschaft

HWWA HAMBURG

DISCUSSION PAPER

Impeded Industrial Restructuring: The Growth Penalty

D.B. Audretsch
M.A. Carree
A.J. van Stel
A.R. Thurik

HWWA DISCUSSION PAPER

114

Hamburgisches Welt-Wirtschafts-Archiv (HWWA)
Hamburg Institute of International Economics
2000
ISSN 1616-4814

The HWWA is a member of:

- Wissenschaftsgemeinschaft Gottfried Wilhelm Leibniz (WGL)
- Arbeitsgemeinschaft deutscher wirtschaftswissenschaftlicher Forschungsinstitute (ARGE)
- Association d‘Instituts Européens de Conjoncture Economique (AIECE)

Impeded Industrial Restructuring: The Growth Penalty

D.B. Audretsch
M.A. Carree
A.J. van Stel
A.R. Thurik

This Discussion Paper is a result of the HWWA guest researcher programme. It is part of the HWWA´s research programme "International mobility of firms". David Audretsch is a member of the HWWA Scientific Advisory Board.

HWWA DISCUSSION PAPER

Edited by the Department
EUROPEAN INTEGRATION
Head: Dr. Konrad Lammers

Hamburgisches Welt-Wirtschafts-Archiv (HWWA)
Hamburg Institute of International Economics
Öffentlichkeitsarbeit
Neuer Jungfernstieg 21 - 20347 Hamburg
Telefon: 040/428 34 355
Telefax: 040/428 34 451
e-mail: hwwa@hwwa.de
Internet: http://www.hwwa.de/

D.B. Audretsch
Institute for Development Strategies, Indiana University, Tinbergen Institute at Erasmus University Rotterdam (EUR), Centre for Economic Policy Research (CEPR), London and EIM Business and Policy Research, Zoetermeer

M.A. Carree
Centre for Advanced Small Business Economics (CASBEC) at Erasmus University Rotterdam, Maastricht University and EIM Business and Policy Research, Zoetermeer

A.J. van Stel and A.R. Thurik
Centre for Advanced Small Business Economics (CASBEC) and Tinbergen Institute, Erasmus University Rotterdam and EIM Business and Policy Research, Zoetermeer

Correspondence: Roy Thurik, Centre for Advanced Small Business Economics, Faculty of Economics, Erasmus University Rotterdam, P.O. Box 1738, 3000 DR Rotterdam, The Netherlands, tel 31-10-4081398, email thurik@few.eur.nl.

Contents

List of Tables and Figures

Abstract

This paper documents that a process of industrial restructuring has been transforming the developed economies, where large corporations are accounting for less economic activity and small firms are accounting for a greater share of economic activity. Not all countries, however, are experiencing the same shift in their industrial structures. Very little is known about the cost of resisting this restructuring process. The goal of this paper is to identify whether there is a cost, measured in terms of forgone growth, of an impeded restructuring process. The cost is measured by linking growth rates of OECD countries to deviations from the optimal industrial structure. The empirical evidence suggests that countries impeding the restructuring process pay a penalty in terms of forgone growth.

Zusammenfassung

Dieses Diskussionspapier dokumentiert einen Strukturwandel, der zur Transformation der Wirtschaften hochentwickelter Länder führt: Großunternehmen verlieren gegenüber den kleineren Firmen relativ an Gewicht. Dieser Strukturwandel erfolgt in den einzelnen Ländern in unterschiedlichem Maße. Sehr wenig ist über die Konsequenzen bekannt, die entstehen, wenn ein Land sich dem Strukturwandel verweigert. Ziel dieses Papiers ist eine Einschätzung möglicher Kosten, die durch Behinderung des Strukturwandels entstehen. Derartige Kosten werden gemessen, indem die Wachstumsrate der OECD-Länder den Abweichungen von einer "optimalen" Unternehmensstruktur gegenübergestellt werden. Die empirische Evidenz legt die Vermutung nahe, dass Länder, welche den Strukturwandel behindern, eine "Strafe" in Form von Wachstumseinbußen bezahlen.

Keywords: Industry structure, firm size distribution, entrepreneurship, economic growth.

JEL classification: O11, L11
SSDS index: 901, 906

1. INTRODUCTION

Explanations for economic growth have generally been restricted to the realm of macroeconomics (Romer, 1990; Krugman, 1991). However, a different scholarly tradition linking growth to industrial organization dates back at least to Schumpeter (1934). According to this tradition, performance, measured in terms of economic growth, is shaped by the degree to which the industry structure most efficiently utilizes scarce resources. But what determines this optimal structure? There is a long-standing tradition in the field of industrial organization devoted towards identifying the determinants of industry structure (Scherer and Ross, 1990; Chandler, 1990). As early as 1948, Blair (1948, p. 121) remarked that, "The whole subject of the comparative efficiency of different sizes of business has long raised one of the most perplexing dilemmas in the entire body of economic theory…But a beginning must be made sometime in tackling this whole size-efficiency problem on an empirical basis. The first step in any such undertaking would logically be that of studying the underlying technological forces of the economy, since it is technology which largely determines the relationship between the size of plant and efficiency." Scherer and Ross (1990) and Chandler (1990) expand the determinants of optimal industry structure to include other factors as well as the underlying technology. This leads Dosi (1988, p. 1157), in his systematic review of the literature in the *Journal of Economic Literature*, to conclude that "Each production activity is characterized by a particular distribution of firms."

When the determinants of the underlying industrial structure are stable, the industry structure itself would not be expected to change. However, as Chandler (1990), Scherer and Ross (1990) and Dosi (1988) emphasize, a change in the underlying determinants would be expected to result in a change in the optimal industry structure. Certainly, Chandler (1990) and Scherer and Ross (1990) identified a shift in optimal industry structure towards increased centralization and concentration throughout the first two-thirds of the previous century as a result of changes in the underlying technology along with other factors.

More recently, a series of studies has identified a change in the determinants underlying the industry structure that has reversed this trend. The most salient point of this change is that technology, globalization, deregulation, labor supply, variety in demand, and the resulting higher levels of uncertainty have rendered a shift in the industry structure away from greater concentration and centralization towards less concentration and de-

centralization. A series of empirical studies (Loveman and Sengenberger, 1991; Acs and Audretsch, 1993; Acs et al., 1999) have uncovered two systematic findings regarding the response of industry structure to changes in the underlying determinants. The *first* is that the industry structure is generally shifting towards an increased role for small enterprises. The *second* is that the extent and timing of this shift is anything but identical across countries. Rather, the shift in industry structures has been heterogeneous and apparently shaped by country-specific factors (Carree et al., 1999; Thurik, 1996 and 1999). Apparently, institutions and policies in certain countries have facilitated a greater and more rapid response to globalization and technological change, along with the other underlying factors, by shifting to a less centralized industry structure than has been the case in other countries. An implication of this high variance in industry restructuring is that some countries are likely to have industry structures that are different from "optimal".

While the evidence suggests that the restructuring paths of industry vary considerably across countries, virtually nothing is known about the consequences of lagging behind in this process. Do countries with an industry structure that deviates considerably from the optimal industry structure forfeit growth more than countries deviating less from the optimal industry structure? This question is crucial to policy makers, because if the opportunity cost, measured in terms of forgone growth, of a slow adjustment towards the optimal industry structure is low, the consequences of not engaging in a rapid adjustment process are relatively trivial. However, if the opportunity cost is high the consequences are more alarming. The purpose of this paper is to identify the impact of deviations in the actual industry structure from the optimal industry structure on growth.

In the *second* section of this paper, the shift in industry structure away from more to less concentrated production is documented and underlying explanations provided. In the *third* section, we use a data base linking industry structure to growth rates for a panel of 18 European countries spanning five years to test the hypothesis that deviations from the optimal industry structure result in reduced growth rates. Finally, in the *last* section conclusions are provided. In particular, we find that deviations from the optimal industry structure, measured in terms of the relative importance of small firms, have had an adverse effect on economic growth rates.

2. THE SHIFT IN INDUSTRY STRUCTURE

A wide range of studies identified systematic evidence documenting two imposing characteristics of industry structure over the first two-thirds of the previous century (Scherer and Ross, 1990; Chandler, 1990). The *first* is that the degree of centralization of production was steadily increasing over time. The *second* is that production was at its highest point of centralization and concentration in the 1970s. This reflected underlying technological and demand characteristics rendering large-scale production and organization more efficient.

Giant corporations were seen as the sole and most powerful engine of economic and technological progress in the early post war period. Schumpeter (1950) provided an image of large corporations gaining the competitive advantage over small and new ones and of giant corporations ultimately dominating the entire economic landscape. This advantage would be due to scale economies in the production of new economic and technological knowledge. These scale economies would result from the organization of teams of highly trained specialists working on technological progress in a routinized fashion. The large corporation was thought to have both superior production efficiency and superior innovative efficacy. Galbraith (1956) pointed out that in his world of countervailing power large corporations are superior to small ones in nearly every aspect of economic behavior like productivity, technological advance, compensation and job security. In his world all major societal institutions contributed to the maintenance of the stability and predictability needed for mass production. In these worlds of Schumpeter and Galbraith there is little room for small scale, experimenting firms thriving on the uncertainty of technological advance, whimsical markets and the individual energy of an obstinate entrepreneur. Only large industrial units were thought to be able to compete on global markets producing global products.

The exploitation of economies of scale and scope was thought to be at the heart of dictating an industry structure characterized by concentration and centralization (Teece, 1993). Chandler (1990) stresses the importance of investment in production, distribution, and management needed to exploit economies of scale and scope. Audretsch stresses the influence the image of the East-European economies and the perceived Soviet threat had on Western policy makers. “The fear in the West was not only that the accumulation of economic assets would lead to unprecedented productivity in the Soviet Union and Eastern Europe; of even greater concern was the assumed leaps and bounds in tech-

nological progress that would emerge from the huge and concentrated research and development programs being assembled. From the vantage point of the late 1950s and the early 1960s, the West seemed not only on the verge of losing the space race, but perhaps even more important, the economic growth race" (Audretsch, 1995, p. 2). It was a period of relatively well-defined technological trajectories, of a stable demand and of seemingly clear advantages of diversification. Audretsch and Thurik (1997) characterize this period as one where stability, continuity and homogeneity were the cornerstones and label it the managed economy. Small businesses were considered to be a vanishing breed.

Perhaps it was the demise of the economies of Central and Eastern Europe and the former Soviet Union that made it clear that concentration and centralization were no longer the cornerstones of the most efficient industry structure. At the same time, more and more evidence became available that economic activity moved away from large firms to small, predominantly young firms. Brock and Evans (1989) provided an extensive documentation of the changing role of small business in the U.S. economy. They were the first to attempt to understand these new developments filling the void of economic research concerning formation, dissolution and growth of businesses and concerning the differential impact of regulations across business size classes. The new role of small firms and their new interaction with large ones is described in Nooteboom (1994). Various authors have provided empirical evidence for this new role. Blau (1987) showed that the proportion of self-employed in the U.S. labor force began to rise in the late 1970s. Acs and Audretsch (1993) and Carlsson (1992) provided a survey of evidence concerning manufacturing industries in countries in varying stages of economic development. Acs (1996) shows that the self-employment rate in OECD countries declined until 1977 and increased between then and 1987.[1] Carlsson (1989) showed that the share of the Fortune 500 in total manufacturing employment dropped from 79% in 1975 to 73% in 1985. In the same period the share of these firms in total manufacturing shipments dropped from 83% to 78%. More recently, he shows that the share of the Fortune 500 dropped to 58% in 1996 and the latter to 75% (Carlsson, 1999).

There has been considerable documentation of the shift in the structure of American industry (Carlsson, 1999; Brock and Evans, 1989). Unfortunately, similar documentation for Europe has not been possible due to the absence of systematic data that is comparable across countries. However, Eurostat has begun to publish yearly summaries of the

1 See also Loveman and Sengenberger (1991) and Carree et al. (1999).

firm size distribution of EU-members at the two-digit industry level for the entire private sector, see Eurostat (1994 and 1996). The efforts of Eurostat are currently being supplemented by the European Network of SME Research (ENSR), a co-operation of 18 European institutes. This organization publishes a yearly report of the structure and the developments of the enterprise and establishment populations in the countries of the European Union.[2]

International data on business owners per labor force for 23 OECD countries are collected by EIM. The number of business owners, as a share of the labor force, is identified for each of these countries between 1974 and 1994.[3]

Table 1 shows that the countries with the lowest rate of business ownership are Austria, Denmark, Finland and Luxembourg. These countries have in common that they are small and that the rate of business ownership is below 7.5% in 1994. The weighted sample average in 1994 is 11%. There are four countries with a business ownership rate in excess of 15%: Greece, Italy, Portugal and Spain. Note that these are all Mediterranean countries. The number of business owners in the 23 countries grew from about 31 million in 1974 to about 43 million in 1994. The proportional growth of the labor force has been lower in this period so that the rate of business ownership increased from 10% to 11%.

2 See the various editions of European Observatory which provide an account of the state of small business in Europe like, for instance, EIM (1997).

3 Data sources include the OECD Labor Force Statistics 1974-1994. EIM completed the missing data by using ratios derived from other variables. Furthermore, EIM made a unified data set of business owners as the definitions of business owners or self-employed in the OECD statistics are not fully compatible between countries. In some countries business owners are defined as individuals owning a business that is not legally incorporated. In other countries, owner/managers of an incorporated business who gain profits as well as a salary are considered owners too. Australia, Canada, Denmark, France, Ireland, the Netherlands, New Zealand, Norway, Portugal, Spain and U.S. use the narrow definition, while the other countries apply the broader characterization. For the countries not following the broader definition, EIM made an estimation of the number of owners/managers using information derived from statistical offices in these countries. Another difference in definition is that in some countries unpaid family workers are included in the data as well. The unpaid family workers were eliminated from the data by using ratios derived from other variables. Data on the labor force are also from the OECD Labor Force Statistics 1974-1994. Again, some missing data have been filled up from other sources.

Table 1 Business owners per labor force in 23 OECD countries

	level			growth		country share in total business owners		
	1974	1984	1994	1984-74	1994-84	1974	1984	1994
Austria	0.067	0.053	0.059	-0.013	0.006	0.0065	0.0047	0.0054
Belgium	0.100	0.102	0.115	0.002	0.013	0.0126	0.0112	0.0116
Denmark	0.090	0.073	0.065	-0.017	-0.007	0.0072	0.0053	0.0042
Finland	0.065	0.067	0.073	0.003	0.006	0.0048	0.0046	0.0043
France	0.106	0.096	0.080	-0.010	-0.016	0.0762	0.0610	0.0473
Germany (West)	0.070	0.065	0.076	-0.005	0.011	0.0620	0.0495	0.0559
Greece	0.173	0.177	0.201	0.003	0.024	0.0184	0.0182	0.0196
Ireland	0.090	0.098	0.124	0.007	0.026	0.0033	0.0034	0.0041
Italy	0.144	0.165	0.181	0.021	0.016	0.0978	0.1024	0.0958
Luxembourg	0.091	0.075	0.056	-0.016	-0.019	0.0005	0.0003	0.0003
The Netherlands	0.097	0.081	0.097	-0.016	0.016	0.0184	0.0138	0.0163
Portugal	0.121	0.132	0.177	0.011	0.045	0.0155	0.0159	0.0199
Spain	0.148	0.144	0.169	-0.003	0.024	0.0643	0.0535	0.0616
Sweden	0.067	0.068	0.080	0.000	0.012	0.0088	0.0079	0.0079
United Kingdom	0.080	0.089	0.107	0.009	0.018	0.0661	0.0645	0.0709
Iceland	0.102	0.091	0.124	-0.011	0.033	0.0003	0.0003	0.0004
Norway	0.097	0.091	0.082	-0.006	-0.009	0.0054	0.0049	0.0041
Switzerland	0.075	0.079	0.085	0.003	0.006	0.0080	0.0070	0.0078
USA	0.091	0.109	0.116	0.018	0.007	0.2756	0.3353	0.3594
Japan	0.119	0.115	0.092	-0.003	-0.023	0.2033	0.1819	0.1426
Canada	0.063	0.076	0.087	0.012	0.011	0.0199	0.0261	0.0301
Australia	0.103	0.120	0.121	0.017	0.001	0.0201	0.0228	0.0249
New Zealand	0.116	0.129	0.147	0.014	0.018	0.0051	0.0053	0.0058
weighted average	0.100	0.107	0.110	0.006	0.004			
total business owners in thousands						30,995	37,551	42,990

Source: EIM, based on OECD

Clearly, the U.S. is the country with the highest number of business owners: nearly 36% of the total 43 million business owners in the 23 countries in 1994 are in the U.S. Countries with a business ownership growth of more than 2 percentage points in the period of 1984 through 1994 are Greece, Ireland, Portugal, Spain and Iceland. The former three countries experienced a growth of the business ownership rate also in the previous period of 1974 through 1984. There are five countries suffering a decline in the business ownership rate in both periods: Denmark, France, Luxembourg, Norway and Japan. The decline in Japan is particularly noteworthy since its share in total business owners dropped from more than 20% in 1974 to less than 15% in 1994.

Carlsson (1992) offers two explanations for the shift in the industry structure away from large corporations and towards small enterprises. The first deals with fundamental changes occurring in the world economy from the 1970s onwards. These changes relate to the intensification of global competition, the increase in the degree of uncertainty and the growth in market fragmentation. The second deals with changes in the character of technological progress. He shows that flexible automation has had various effects resulting in a shift from large to smaller firms. The shift in the nature of technological change particularly involving flexible automation facilitated product differentiation and led to a new division of labor involving more cooperation and less competition between large and small firms. Piore and Sabel (1984) argue that in the 1970s firms and policy makers were unable to maintain the conditions necessary to preserve mass production. Mass production was based upon the input of special-purpose machines and of semi-skilled workers and the output of standardized products. A fundamental change in the path of technological development led to the occurrence of vast diseconomies of scale. This market instability resulted in the demise of mass production and promoted flexible specialization. Piore and Sabel use the term *Industrial Divide* for the "reversal of the trend" from that toward more large firms to that toward more small ones. Jensen (1993) refers to the *Third Industrial Revolution* when describing the same phenomenon. Meredith (1987) discusses the advantages of a range of recently developed flexible production techniques for small-scaled enterprises. Audretsch and Thurik (2000) point at the role knowledge plays when explaining the shift from the managed economy to the entrepreneurial economy.

This shift away from large firms is not confined to manufacturing industries. Brock and Evans (1989) show that this trend has been economy-wide, at least for the United States. They offer four additional reasons as to why this shift has occurred: (1) the increase of labor supply; (2) changes in consumer tastes; (3) relaxation of (entry) regulations and (4) the fact that we are in a period of creative destruction. Loveman and Sengenberger (1991) stress the influence of two other trends of industrial restructuring: that of decentralization and vertical disintegration of large companies and that of the formation of new business communities. Furthermore, they emphasize the role of public and private policies promoting the small business sector.[4]

4 See also Carree (1997) and Carree et al. (1999) for literature surveys of the determinants of the shift away from a managed and toward an entrepreneurial economy.

The question whether this shift in industry structure has influenced economic performance has received limited attention. This has to do with a persistent lack in knowledge of market structure dynamics (Audretsch, 1995). In other words, there is a lack in knowledge concerning questions like who enters and exits, what determines this mobility and what are its effects, in particular on economic performance. Here we are concerned with one of the most important questions in economics: why do industries or economies grow? The link between industrial organization and economic growth has always been the subject of considerable debate. As discussed earlier, traditionally, the prevalent assumption was that giant companies are at the heart of the process of innovation and creation of welfare. This assumption is generally referred to as the *Schumpeterian Hypothesis.* Recently, the debate has centered on the question whether the process of decentralization and deconcentration, which virtually every industrialized country has experienced in the last two decades, has had positive welfare implications. Audretsch (1995) calls this shift in orientation of our social-economic thinking ' the new learning'.

The question of the link between the shift in the industry structure and subsequent growth can be answered in two ways. *First*, by investigating the many consequences of the shift in the locus of economic activity. For instance, one may study whether this shift has been favorable to the process of innovation and rejuvenation of industries.[5] *Alternatively*, one may focus on the discussion of the relation between the role of small firms on the one hand, and competition and industry dynamics on the other.[6] A different perspective on the link between the shifting industry structure and performance has been to examine the relationship between small firms and job creation.[7] *Lastly*, the role of small firms as a vehicle for entrepreneurship has been the focal point for a series of studies. For example, Baumol (1990) provides an extensive account of the role that entrepreneurial activities and their consequences for prosperity play throughout history. Acs (1992) brings it all together in a short descriptive manner and surveys some consequences of the shift of economic activity from large to smaller businesses. He claims that small firms play an important role in the economy serving as agents of change by their entrepreneurial activity, being the source of considerable innovative activity, stimulating industry evolution and creating an important share of the newly generated jobs.

5 See Acs and Audretsch (1990), Audretsch (1995) and Cohen and Klepper (1992 and 1996).
6 See Audretsch (1993, 1995), Oughton and Whittam (1997) and You (1995).
7 Davis, Haltiwanger and Schuh (1996) and Carree and Klomp (1996) provide some insights in the relationship between small firms and job creation.

The evaluation of the various consequences of this shift is difficult but necessary to establish whether it is desirable and whether it should be promoted by economic policy. It is difficult because none of these consequences is, in fact, independent of the other three and because the evaluation offers something of a series of trade-offs. Audretsch and Thurik (1997) contrast the most fundamental elements of the newly emerging entrepreneurial economy with those of the managed economy by identifying 15 trade-offs that are essential for these two polar worlds. For instance, small businesses may contribute to higher growth because of their contribution to the selection process due to their variety. On the other hand, the selection process may lead to a lower level of stability and, hence, to welfare losses. Or, while employment levels may rise as firm size declines, the lower average wages that small firms pay, may at least partly offset the welfare effect induced by the employment growth.

A *second* way to answer the question of how changes in the industry structure impact performance is to circumvent the intermediary variables between the shift in the industrial structure and growth like technological change, entrepreneurship, competitiveness and job generation. The question then becomes whether there is a direct empirical link between this shift and performance measures like employment, growth or productivity. Some preliminary empirical results of the relation between changes in the firm size distribution and economic growth are presented in Thurik (1996). His analysis shows a positive effect of an increase in the economy-wide share of small firms on growth in gross domestic product for some European countries. Schmitz (1989) presents an endogenous growth model relating entrepreneurial activity and economic growth. He shows that an increase of the proportion of entrepreneurs in the working force leads to an increase in long-run economic growth. His model also implies that the equilibrium fraction of entrepreneurs is lower than the social optimal level, providing a rationale for policies stimulating entrepreneurial activity. Holmes and Schmitz (1990) develop a model of entrepreneurship in the spirit of T.W. Schultz. They show how specialization in managerial tasks and entrepreneurship – responding to opportunities for creating new products and production processes – may affect economic development. Some evidence of a well-established historical (long-term) relationship between fluctuations in entrepreneurship and the rise and fall of nations is assembled by Wennekers and Thurik (1999). In this respect also the work of Eliasson (1995) on economic growth through competitive selection is of relevance. He demonstrates that such a relation is characterized by

significant time lags up to a couple of decades. There is more evidence on the relation between size class distributions and economic performance.[8]

3. ESTIMATING THE GROWTH PENALTY

In this section we test the hypothesis that the extent of the gap between the actual industry structure and the optimal industry structure influences subsequent growth. We start with the assumption that a country's growth can be decomposed into two components -- growth that would have occurred with an optimal industry structure, and the impact on growth occurring from any actual deviations from that optimal industry structure. This can be represented by

(1) $$\Delta GNP_{cp} = \Delta GNP^{*}_{cp} - \gamma \left| SFP_{cp-1} - SFP^{*}_{c} \right|,$$

where the dependent variable is the actual rate of economic growth. ΔGNP^{*}_{cp} is the rate of economic growth in country c in the case where the actual industry structure (SFP_{cp}) is at the optimal level at the start of the period p. For ease of exposition we assume that the optimal industry structure in a country remains constant for the total period under investigation. This is not vital to our analysis. Since we are considering only short-term periods (maximum five years) this may be a reasonable assumption.

Industry structure is multidimensional and spans a broad array of characteristics that defy measurement by a single statistic. However, as explained elsewhere (Audretsch and Thurik, 1997 and 2000), the most salient characteristic driving the shift in industry structure from the managed to the entrepreneurial economy is that the relative role of small and entrepreneurial firms has increased. Thus, we capture changes in industry structures by changes in the relative importance of small firms.

In equation (1) the parameter γ is positive. Deviations of the actual industry structure from the optimal industry structure negatively affect economic growth, both when the industry structure consists of too few or too many small firms. In either case there is a

8 For instance, see Nickell (1996), Nickell et al. (1997) and Lever and Nieuwenhuijsen (1999) who present evidence that competition, as measured by an increased number of competitors, has a positive effect on the rate of total factor productivity growth. Acs et al. (1999) point at differences in competition and entrepreneurship when comparing the more successful U.S. economy to that of Europe and Japan.

deviation from the optimal industry structure and number of small firms. Taking the first difference of equation (1) we obtain

(2) $$\Delta GNP_{cp} = \Delta GNP_{cp-1} + \Delta\Delta GNP^{*}_{cp} - \gamma\left(\left|SFP_{cp-1} - SFP^{*}_{c}\right| - \left|SFP_{cp-2} - SFP^{*}_{c}\right|\right).$$

In case both SFP_{cp-1} and SFP_{cp-2} are above the optimal small-firm share, the expression between brackets reduces to ΔSFP_{cp-1}. Indeed, in case the small-firm share is too high, adding small firms to the industry structure reduces economic growth. In case both SFP_{cp-1} and SFP_{cp-2} are below the optimal small-firm share, the expression between brackets reduces to $-\Delta SFP_{cp-1}$. An increase in the small firm share when this presence is below optimal enhances economic performance. Therefore, the sign of the parameter of ΔSFP_{cp-1} reflects whether the small firm presence is below or above the optimal levels for the countries under consideration. In case the parameter is negative, the industry structure consists of too many small firms. In case the parameter is positive, the reverse holds and the industry structure consists of too few small firms.

We will denote the parameter of ΔSFP_{cp-1} as κ. Note that this is not the same parameter as γ, since the sign of κ is dependent on whether the actual small-firm share is above or below the optimal one. So, κ can be both positive and negative whereas γ is necessarily positive.

We make some further assumptions to transform equation (2) into an equation that can be estimated using the data at hand. First, we approximate ΔSFP_{cp-1} by $\Delta SF_{cp-1} - \Delta LF_{cp-1}$, the difference between the growth of small firms and large firms in terms of value-of-shipments. Second, we assume that ΔGNP^{*}_{cp} is idiosyncratic with respect to time and country. Therefore country dummies and time dummies (the last to correct for European wide business cycle effects) are included. Thus, $\Delta\Delta GNP^{*}_{cp}$ is approximated by time dummies only because the country dummies drop out when taking first differences. Third, we add an error term e_{cp}. Summarizing we have

(3) $$\Delta GNP_{cp} = \Delta GNP_{cp-1} + \sum_{p=1}^{P} \beta_p D_p + \kappa(\Delta SF_{cp-1} - \Delta LF_{cp-1}) + e_{cp},$$

where D_p denote dummy variables for periods $p = 1,...,P$. Factors specific to each time period are reflected by β_p. A high value of this parameter indicates an unexplained increase in the extent of economic growth. In case of a low β_p the reverse holds. The contribution of the shift in the size class distribution of firms to the percentage growth of GNP is represented by κ. The influence of this shift on GNP growth is lagged. This

implies that $p = 1,..., P$ runs from 1990 through 1994 when applying equation (3) to our European data set.

To estimate equation (3), we use data provided by the European Observatory (EIM, 1993, 1994, 1995, 1996 and 1997). The European Observatory provides data on the annual percentage growth of real gross value added of the private sector, the annual percentage growth of value-of-shipments of small- and medium-sized firms (with employment less than 200 employees), as well as the annual percentage growth of value-of-shipments of large firms (with employment of at least 200 employees). These data are available for five years (1989 through 1993) for all fifteen member countries of the European Union (Europe-15), Iceland, Norway and Switzerland (including Liechtenstein).

Hence, our European data set consists of a total of 90 (18 countries times five years) observations. However, Germany had to be omitted for the entire period. Germany's then recent unification led to specific economic perturbations that render it inappropriate for inclusion in the estimation model. The remaining 85 observations are used for computing the regression coefficients. The period 1990-1994 is characterized by relatively vehement cyclical movements with 1992 being a recession year and 1994 being a year with an exceptional strong recovery.

In Table 2 the regression results for the period 1990-1994 are presented. Equation (3) does not contain country dummies. The ' mean' country effect is reflected by coefficient α while D_{1991} is left out of all computations to avoid full multicollinearity[9]. The two dummy variables with a significant contribution are D_{1993} and D_{1994}. This presumably reflects the strong economic recovery after the recession of 1992. We present both results with all time dummies included and with the two insignificant dummies excluded. In the first part of Table 2 weighted least squares results are presented, with total employment as the weighting variable. In the second part of the table ordinary least squares results are presented.

In each of the cases we find a significantly positive coefficient (at the 5% significance level) for κ. Its value ranges from 0.55 for the first column of Table 2 to 0.92 for the last column.

9 So, instead of estimating coefficients for all P time dummies as suggested by equation (3), we actually estimate P-1 dummy coefficients and a constant term α.

The empirical evidence suggests that the consequences for economic growth of not shifting the industry structure away from large business towards smaller ones are rather large. However, this result is qualified by the large standard deviation of the coefficient for κ. Another important qualification to these results is that measurement of the variables includes a number of estimates. Follow-up studies are required for corroboration of these results[10]. Still, κ is found to be significantly positive in all computations. We conclude that, based on the empirical findings, there is evidence that on average those countries that have experienced a shift in their industry structures away from large firms and towards small firms have also experienced greater economic growth, at least for a sample of Western European countries over a recent time period. Since our interpretation is that this shift is an indicator of the stage of the transition of the economy from a managed one to an entrepreneurial one, we conclude that European countries that progress on this transition track seem to have been rewarded with additional growth.

One has to be careful interpreting the estimation results for different countries. The estimated positive value of κ must be viewed as an average value of the (unobserved) κ_c's of the different countries. So, the positive value found for κ does not mean that in *all* countries in the sample an increase in small-firm presence is rewarded with additional growth. There may be countries in the sample where small-firm presence is indeed above the optimal level and consequently, a further increase in the number of small firms leads to a growth penalty instead of a growth reward. The estimation results do imply, however, that for the majority of countries in the sample, the number of small firms was too low in the period under consideration. In translating the positive value of κ in terms of implications for different countries, policy makers should compare small-firm presence in their own country with that in surrounding countries. If SFP is relatively low, small-firm presence is expected below optimum, given the positive value of κ. On the other hand, if SFP is relatively high, small-firm presence is not necessarily below optimum, despite the estimated κ being positive.

10 Carree and Thurik (1998, 1999 and 2000) provide complementary analyses showing the consequence of lagging behind in this restructuring process in manufacturing. Using a sample of 14 manufacturing industries in 13 European countries and 13 manufacturing industries in 12 European countries, respectively, they find that, on average, the employment share of large firms in 1990 has had a negative effect on growth of output in the subsequent four-year period. Thurik (1996) shows that the percentage growth of GNP is explained using a structural shift. This shift is captured by the difference between the annual percentage growth of value-of-shipments of large firms (with employment of at least 500 employees) and the annual percentage growth of value-of-shipments of small firms (with employment of less than 500 employees), using data for three distinct time periods: 1988-1990, 1989-1992 and 1990-1993 for all twelve old member countries of the European Union.

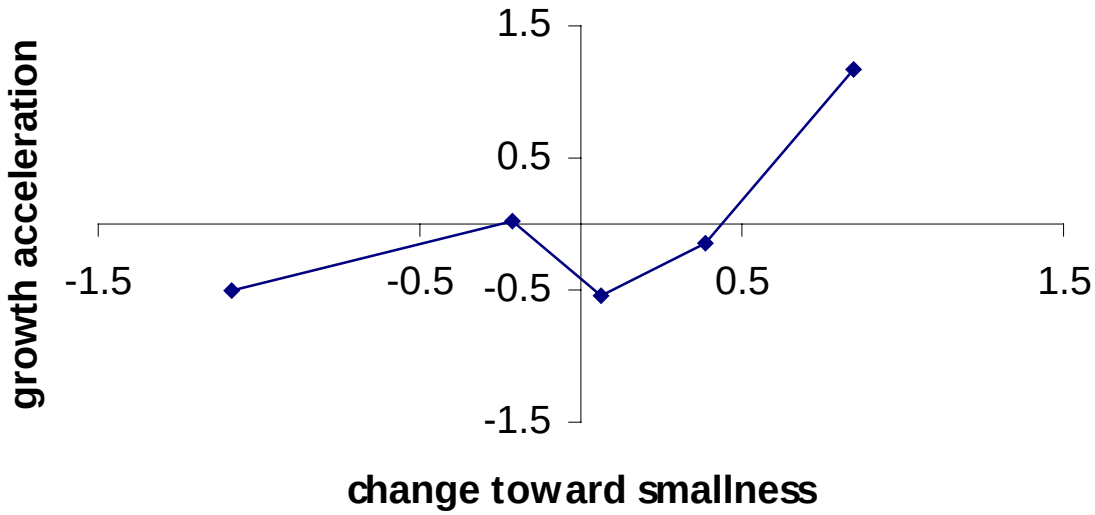
Table 2 Regression results for equation (3): relating growth to structure[1, 2]

	Weighted least squares[3]		Ordinary least squares	
α	-0.93 (-2.30)	-0.79 (-3.38)	-1.22 (-1.84)	-0.97 (-2.56)
β_{1990}	0.52 (0.89)		0.39 (0.41)	
β_{1992}	-0.08 (-0.14)		0.37 (0.39)	
β_{1993}	1.32 (2.26)	1.20 (2.50)	2.19 (2.32)	1.94 (2.53)
β_{1994}	4.35 (7.40)	4.25 (8.74)	4.72 (4.91)	4.48 (5.65)
κ	0.55 (2.14)	0.63 (2.58)	0.91 (2.20)	0.92 (2.27)
R^2	0.441	0.422	0.318	0.317
Adjusted R^2	0.406	0.401	0.275	0.291
DW	2.05	2.04	1.72	1.72
N	85	85	85	85

[1] Regression for 17 European countries over the period 1990-1994
[2] DW is the Durbin-Watson statistic. T-values between parentheses
[3] Weighting variable for WLS is total employment

The regression results are illustrated using Figure 1. We have grouped the growth-acceleration observations, $\Delta\Delta GNP = \Delta GNP_{cp} - \Delta GNP_{cp-1}$, on the basis of the degree to which the value-of-shipments shifted from large to small firms. That is, the $\Delta\Delta GNP$ observations have been sorted in order of the values of the (lagged) structural change variable, $\Delta SF - \Delta LF$. Both variables have been computed in deviation of the mean per year in order to correct for specific year effects. The 85 observations have been divided in 5 groups of 17 observations. The averages of both $\Delta SF - \Delta LF$ and $\Delta\Delta GNP$ are displayed in Figure 1. We see that, on average, a larger shift toward smallness is associated with a higher growth acceleration. Existing growth differences *between* countries do not disappear because of a change in structure, at least not in a period as short as our regression period. The derivation of our regression equation (3) shows that we have assumed optimal growth ΔGNP^* to be idiosyncratic per country. However, the changes in structure *do* affect growth rates *within* countries and this is exactly what is illustrated by the sorted growth acceleration averages in Figure 1.

Figure 1 Growth accelerations and the relative shift toward small firms[1]



[1] Averages of 5 groups of growth acceleration values, grouped on the basis of the degree of change toward small firms, in deviation of means per year

4. CONCLUSIONS

A large literature has linked the structure of industries to performance. However, little is known about the consequences of deviating from the "optimal" industry structure. The evidence provided in this paper suggests that, in fact, there is a cost of not adjusting industry structure towards the "optimal". This cost is measured in terms of forgone economic growth.

Most developed countries have experienced a shift towards a more decentralized industry structure in the last several decades. The magnitude of this shift and speed of adjustment varies considerably across countries. The evidence suggests that those countries that have shifted industry structure towards decentralization in a more rapid fashion have been rewarded by higher growth rates.

Our analysis is based upon whether excess growth of small firms over their larger counterparts has led to additional macro-economic growth for member countries of the European Union in the early 1990. The results of this investigation are meant to supp-

lement the intuition of many policymakers that the changes in industrial structure have had some real effects on economic performance.

European public policy has been preoccupied with generating economic growth and reducing unemployment. The resulting policy debate has typically focused on macroeconomic policies and instruments. The results of this paper suggest that an additional set of instrument may also be valuable in generating growth – policies focusing on adjusting the industry structure. As the evidence shows, just as countries reluctant to shift their industry structures will be penalized by lower growth rates, those nations able to harness the forces of technology and globalization by transforming their industry structures are rewarded by growth dividends.

REFERENCES

Acs, Z.J. and D.B. Audretsch (1990)
Innovation and Small Firms, MIT Press (Cambridge, MA).

Acs, Z.J. and D.B. Audretsch (1993)
"Conclusion", in Z.J. Acs and D.B. Audretsch (eds.), Small Firms and Entrepreneurship: an East-West Perspective, Cambridge University Press (Cambridge, UK), 227-231.

Audretsch, D.B, (1993)
Kleinunternehmen in der Industrieökonomiek: ein neuer Ansatz, Discussion paper FS IV 93-26, Wissenschaftszentrum Berlin.

Audretsch, D.B. (1995)
Innovation and Industry Evolution, MIT Press (Cambridge, MA).

Audretsch, D.B. and A.R. Thurik (1997)
Sources of growth: the entrepreneurial versus the managed economy, Discussion paper 1710, Centre for Economic Policy Research (London).

Audretsch, D.B. and A.R. Thurik (2000)
Capitalism and democracy in the 21st century: from the managed to the entrepreneurial economy, Journal of Evolutionary Economics 10, no. 1, 17-34.

Baumol, W.J. (1990)
Entrepreneurship: productive, unproductive and destructive, Journal of Political Economy 98, 893-921.

Blair, J.M. (1948)
Technology and size, American Economic Review 38, 121-152.

Blau, D. (1987)
A time series analysis of self-employment, Journal of Political Economy 95, 445-467.

Brock, W.A. and D.S. Evans (1989)
Small business economics, Small Business Economics 1, 7-20.

Carlsson, B. (1989)
The evolution of manufacturing technology and its impact on industrial structure: an international study, Small Business Economics 1, 21-37.

Carlsson, B. (1992)
The rise of small business: causes and consequences, in W.J. Adams (ed.), Singular Europe, Economy and Policy of the European Community after 1992, 145-169, University of Michigan Press (Ann Arbor, MI).

Carlsson, B. (1999)
Small business, entrepreneurship, and industrial dynamics, in Z. Acs (ed.), Are Small Firms Important? their Role and Impact, Kluwer Academic Publishers (Dordrecht, NL), 99-110.

Carree, M.A. (1997)
Market Dynamics, Evolution and Smallness, Thesis Publishers (Amsterdam, NL).

Carree, M.A. and L. Klomp (1996)
Small business and job creation: a comment, Small Business Economics 8, 317-322.

Carree, M.A. and A.R. Thurik (1998)
Small firms and economic growth in Europe, Atlantic Economic Journal 26, 137-146.
Carree, M.A. and A.R. Thurik (1999)
Industrial structure and economic growth, in D.B. Audretsch and A. R. Thurik (eds.), Innovation, Industry Evolution and Employment, Cambridge University Press (Cambridge, UK), 86-110.
Carree, M.A. and A.R. Thurik (2000)
Market structure and economic growth, in E. Galli and J. Pelkmans (eds), Regulatory Reform, Market Functioning and Competitiveness, Edward Elgar Publishing (Cheltenham, UK), 430-460.
Carree, M.A., A.J. van Stel, A.R. Thurik and A.R.M. Wennekers (1999)
Business ownership and economic growth, Research report 9809/E, EIM Business and Policy Research (Zoetermeer, NL).
Chandler, A.D. Jr. (1990)
Scale and Scope: The Dynamics of Industrial Capitalism, Harvard University (Cambridge, MA).
Cohen, W.M. and S. Klepper (1992)
The trade-off between firm size and diversity in the pursuit of technological progress, Small Business Economics 4, 1-14.
Cohen, W.M. and S. Klepper (1996)
A reprise of size and R&D, Economic Journal 106, 925-951.
Davis, S.J., J. Haltiwanger and S. Schuh (1996)
Small business and job creation: dissecting the myth and reassessing the facts, Small Business Economics 8, 297-315.
Dosi, G. (1988)
Sources, procedures and microeconomic effects of innovations, Journal of Economic Literature 26, 1120-1171.
EIM (1993)
European Observatory: first annual report, Zoetermeer, NL.
EIM (1994)
European Observatory: second annual report, Zoetermeer, NL.
EIM (1995)
European Observatory: third annual report, Zoetermeer, NL.
EIM (1996)
European Observatory: fourth annual report, Zoetermeer, NL.
EIM (1997)
European Observatory: fifth annual report, Zoetermeer, NL.
Eliasson, G. (1995)
Economic growth through competitive selection, paper presented at the 22nd Annual EARIE Conference, Juan les Pins, 3-6 September 1995.
Eurostat (1994)
Enterprises in Europe, third edition, Luxembourg.
Eurostat (1996)
Industrial Trends Monthly Statistics 1996/6, Luxembourg.
Galbraith, J.K. (1956)
American Capitalism: the Concept of Countervailing Power, Houghton Mifflin (Boston, MA).

Holmes, T.J. and J.A. Schmitz Jr. (1990*)*
A theory of entrepreneurship and its application to the study of business transfers, Journal of Political Economy 98, 265-294.
Jensen, M.C. (1993)
The modern industrial revolution, exit, and the failure of internal control systems, Journal of Finance 48, 831-880.
Krugman, P. (1991)
Geography and Trade, MIT Press (Cambridge, MA).
Lever, M.H.C. and H.R. Nieuwenhuijsen (1999*)*
The impact of competition on productivity in Dutch manufacturing, in D.B. Audretsch and A.R. Thurik (eds.), *Innovation, Industry Evolution and Employment*, Cambridge University Press, (Cambridge, UK), 111-128.
Loveman, G. and W. Sengenberger (1991)
The re-emergence of small-scale production: an international comparison, *Small Business Economics* 3, 1-37.
Meredith, J. (1987)
The strategic advantages of new manufacturing technologies for small firms, *Strategic Management Journal* 8, 249-258.
Nickell, S.J. (1996)
Competition and corporate performance, *Journal of Political Economy* 104, 724-746.
Nickell, S., P. Nicolitsas and N. Dryden (1997)
What makes firms perform well? *European Economic Review* 41, 783-796.
Nooteboom, B. (1994)
Innovation and diffusion in small firms, *Small Business Economics* 6, 327-347.
Oughton, C. and G. Whittam (1997)
Competition and cooperation in the small firm sector, *Scottish Journal of Political Economy* 44, 1-30.
Piore, M. and C. Sabel (1984)
The Second Industrial Divide: Possibilities for Prosperity, Basic Books (New York).
Romer, P.M. (1990)
Endogenous technological change, *Journal of Political Economy* 98, 71-101.
Scherer, F.M. and D. Ross (1990)
Industrial Market Structure and Economic Performance, Houghton Mifflin Company (Boston, MA).
Schmitz, Jr., J.A. (1989)
Imitation, entrepreneurship, and long-run growth, *Journal of Political Economy* 97, 721-739.
Schumpeter, J.A. (1934)
The Theory of Economic Development, Harvard University Press (Cambridge, MA).
Schumpeter, J.A. (1950)
Capitalism, Socialism and Democracy, Harper and Row (New York).
Teece, D.J. (1993)
The dynamics of industrial capitalism: perspectives on Alfred Chandler's scale and scope, *Journal of Economic Literature* 31, 199-225.

Thurik, A.R. (1996)
Small firms, entrepreneurship and economic growth, in P.H. Admiraal (ed.), *Small Business in the Modern Economy, De Vries Lectures in Economics*, Blackwell Publishers (Oxford, UK).
Thurik, A.R. (1999)
Entrepreneurship, industrial transformation and growth, in G.D. Libecap (ed.), The Sources of Entrepreneurial Activity: Vol. 11, Advances in the Study of Entrepreneurship, Innovation, and Economic Growth, (JAI Press, Stamford, CT), 29-65.
Wennekers, S. and A.R. Thurik (1999)
Linking entrepreneurship and economic growth, *Small Business Economics* 13, 27-55.
You, J.I. (1995)
Small firms in economic theory, *Cambridge Journal of Economics* 19, 441-462.