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BUSINESS DYNAMICS IN EUROPE

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BUSINESS DYNAMICS IN EUROPE

Nicola Brandt*
OECD

Abstract

This study presents evidence on firm entry and exit, growth and survival derived with new data from Eurostat, covering nine European Union member countries. One contribution of the study is an analysis of the role of data quality for studies of firm demographics. Confronting results obtained with the Eurostat data with those of a previous OECD cross-country firm-level data project reveals that different size thresholds and difficulties in distinguishing genuine firm entry and exit from mergers & acquisitions, ownership changes or changes in legal form can have sizeable impacts on results. Cross-country differences in firm entry and exit rates are analysed with a special emphasis on detailed information and communication technology (ICT) related sectors, which has not been possible with previously available cross-country data. After controlling for some basic factors, such as countries' industry composition, cross-country differences in entry and exit rates in mature sectors turn out to be negligible, while differences in entry and exit rates in the younger ICT related industries are much larger. This suggests that a potential role for policies and institutions to shape business dynamics may be especially important in those sectors which are thought to have played an important role for innovation and technology adoption in recent years. Hazard rates differ more across countries on average than birth rates, suggesting that policies and institutions might be more important for new firm survival than for entry in all but the youngest and most dynamic industries.

JEL Classification: L11, G33, M13, C81

Keywords: entry, exit, survival, micro data

* This paper has benefited from comments and suggestions from Paul Atkinson, Andrea Bassanini, Eric Bartelsman, Merja Hult, Duncan Mills, Satu Nurmi, Dirk Pilat, Paul Schreyer and Andrew Wyckoff. Elena Anton-Zabalza, Beatrice Jeffries, Julie Branco-Marinho and Paula Venditti have provided excellent support. All remaining errors are those of the author, as are the views and opinions expressed in this paper. They do not necessarily reflect the views of the OECD or its member countries.

DYNAMIQUE DES ENTREPRISES EN EUROPE

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Résumé

Cette étude présente, à partir de nouvelles statistiques d'Eurostat qui couvrent neuf pays membres de l'Union européenne, des données sur l'entrée, la sortie, la croissance et la survie des entreprises. Elle comporte notamment une analyse de l'importance que revêt la qualité des données dans les études sur la démographie des entreprises. La confrontation des résultats obtenus à l'aide des données d'Eurostat avec ceux d'un projet précédent de l'OCDE sur des données internationales au niveau de l'entreprise révèle que les différences de seuils de taille ainsi que les difficultés liées à la distinction entre ce qui constitue véritablement des entrées ou sorties d'entreprises d'une part et les fusions et acquisitions d'autre part, les transferts de propriété et la modification de la forme juridique peuvent avoir des effets non négligeables sur les résultats. L'étude analyse les différences internationales en ce qui concerne les taux d'entrée et de sortie des entreprises, en faisant une place particulière aux secteurs liés aux technologies de l'information et des communications, ce qui n'avait pas été possible avec les données internationales dont on disposait auparavant. Une fois pris en compte certains facteurs fondamentaux, tels que la structure industrielle des pays, les différences internationales en ce qui concerne les taux d'entrée et de sortie dans les secteurs parvenus à maturité se révèlent négligeables, tandis qu'elles sont beaucoup plus prononcées dans les industries plus jeunes liées aux TIC. Il y a donc lieu de penser que les politiques et les institutions ayant vocation à agir sur la dynamique des entreprises pourraient se révéler particulièrement importantes dans les secteurs auxquels on attribue un rôle important dans l'innovation et l'adoption de la technologie ces dernières années. Les taux de risque – qui expriment la probabilité conditionnelle de sortie d'entreprises à un âge déterminé, la condition étant qu'elles aient survécu jusque là – varient davantage entre pays que les taux d'entrée. Ceci suggère que les politiques et institutions d'un pays pourraient être plus importantes pour la survie des entreprises que pour leur entrée, hormis dans les industries les plus jeunes et plus dynamiques.

JEL Classification : L11, G33, M13, C81

Mots clés : entrée, sortie, survie, microdonnées

* Cette étude a bénéficié des observations et suggestions de Paul Atkinson, Andrea Bassanini, Eric Bartelsman, Merja Hult, Duncan Mills, Satu Nurmi, Dirk Pilat, Paul Schreyer et Andrew Wyckoff. Elena Anton-Zabalza, Beatrice Jeffries, Julie Branco-Marinho et Paula Venditti y ont également apporté une solide contribution. Les éventuelles erreurs pouvant subsister sont à imputer à l'auteur, comme les vues et opinions exprimées dans l'étude, qui ne correspondent pas nécessairement à celles de l'OCDE ou de ses pays membres.

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Introduction

1. The creation of new businesses and the decline or market exit of less productive firms are often regarded key to business dynamism and economic growth in OECD economies. New firms are thought to be especially innovative and play an important role as job creators. Moreover, there is evidence that the process of firm entry and exit plays a role in reallocating resources from low to higher productivity units (Scarpetta *et al.*, 1992; Foster, Haltiwanger and Krizan, 1998). In addition, firm entry and exit may have a more indirect impact on productivity by increasing the competitive pressure in a market. This would force both new and incumbent firms to innovate and increase their efficiency, thus helping to boost overall productivity and output growth.

2. With these effects in mind, it is often assumed that countries with higher rates of firm creation and turnover also have better business performance. Institutional settings that impinge on firm turnover, new firm growth and survival are often suspected to have a negative impact on a country's overall economic performance. For this reason, enterprise demography is currently of great policy interest. However, only few studies are available at the international level to allow for an analysis of the role of institutional settings for firm dynamics. This scarcity of cross-country evidence is partly due to some thorny measurement problems.

3. This study analyses some basic patterns of business demography with new data from Eurostat covering Belgium, Denmark, the Netherlands, Spain, Italy, Portugal, Finland, Sweden and the United Kingdom over the period 1997-2000. Eurostat has since also published data on Norway and Luxembourg, while data on the remaining European Union countries will be added in the near future. The findings presented in this study are intended to lay a basis for further research studying more concretely the impact of policies and institutions on firm demographics as well as the role of firm turnover on countries' economic performance. As a unique feature, the Eurostat data are available at a very fine sectoral breakdown for ICT-related industries. The data therefore lend themselves to a close look at firm dynamics in younger industries, which have played an important role in technological change in recent years. This is explored in some detail, as it has not been possible to do the same with previously available cross-country data sets.

4. Studying the role of policies and institutions for enterprise demography requires internationally comparable data. So far, only very few studies are available that aim at assembling and analysing reasonably comparable cross-country data. To assess the role of data quality, results obtained with the Eurostat data are confronted with those of a previous cross-country firm-level data project conducted by the OECD Economics Department (Scarpetta *et al.*, 2002; Bartelsman *et al.*, 2003). A number of countries are covered by both data sets and in many cases the source data are the same. However, due to the methodology of data collection and the coverage as a result of the size threshold used the Eurostat data differ from the data of the OECD firm level project. In particular, the Eurostat data: *i)* cover all firms including those without employees, which is in contrast with the data from the OECD firm level project; and *ii)* seem to be more apt at distinguishing genuine firm births and deaths from other demographic events, such as mergers and acquisitions (M&A). These differences in data characteristics both change the results quite considerably. For example, including zero-person firms and excluding mergers and acquisitions will lead to a much smaller average size of new firms, as many new small firms will be included and many large "entrants" will be excluded. One contribution of this paper is to assess the measurement problems concerning both the Eurostat and the OECD data set as far as possible to lay a basis for interpreting results and judging their reliability.

5. The outline of this paper is as follows. Some theoretical background for the analysis of firm dynamics is briefly provided at the beginning, including a discussion of the potential role of policies for

firm demographics. While studying this link more concretely is beyond the scope of this work, it is important to keep these aspects in mind when interpreting basic patterns of firm dynamics and observed cross-country differences presented in this paper. Key measurement problems are discussed thereafter, some of which are illustrated by comparisons between the Eurostat and the OECD data. In the following, basic patterns of firm entry and exit are explored and cross-country differences are analysed in some detail to get a first impression whether or not there may be a role for policies and institutions to explain some of these. Finally, post-entry behaviour is investigated by taking a look at new firm growth and survival. The final section draws some conclusions and proposes further steps to explore links between policies, firm dynamics and economic performance.

Firm dynamics from the perspective of Schumpeterian models of creative destruction

6. Firm entry and exit are ascribed an important role in theories that stress the process of "creative destruction" as a mechanism that facilitates innovation or new technology adoption, helping to shift resources from less productive units to more productive ones.

7. One class of these "Schumpeterian" models focuses on the role of entrepreneurial learning under uncertainty. In the passive learning model (Jovanovic, 1982), entering firms can observe market incumbents' costs, but they have no knowledge about their own potential profitability. Upon investing the – unrecoverable – entry costs, they start to learn about the distribution of their profitability based on noisy information from realised profits. Drawing on this constantly updated learning process, new firms may decide in any one period to expand, contract or exit the market. The active learning model (Ericson and Pakes, 1995) is similar, but firms explore their economic environment actively. Faced with competitive pressure both within and outside the industry, they invest to enhance their profitability. Both potential and actual profits of each firm change over time as a result of its own investments, those of other actors in the economy and changes in the economic environment.

8. These models imply some testable features of firm dynamics. Firm creation and destruction are part of a process of experimentation, where new firms first make their initial investments unsure of their potential success. Because of this initial uncertainty, firms do not start out positioning themselves at a unique optimal size, but they may decide to grow, once they have learned more about their chances to be profitable. The models of firm learning under uncertainty suggest that while many new firms may not survive for long, those who do should grow very fast to reach the average incumbent size. As they approach the minimum efficient scale, gain experience and accumulate assets, successful survivors increase their chances of staying in the market over time. Both average firm growth and its variability, but also the likelihood of failure should be expected to decrease with firm age and size according to firm learning models.

9. Some variants of vintage models of technological change stress the role of firm turnover for the adoption of new technologies. These models are based on the idea that new technology is often embodied in the most recent vintages of capital. These, however, do not only involve direct investment costs, but also costs of reorganising existing production processes and retraining workers to adopt the new technologies (see *e.g.* Solow, 1960; Cooper, Haltiwanger and Power, 1997). Some variants of these models ascribe to new firms an important role in the process of technology adoption (Caballero and Hammour, 1994; Campbell, 1997). Being better equipped to implement new technologies, entering firms that replace outpaced incumbents play a crucial role for productivity growth. At the same time, creation and adjustment costs slow down the process of technology adoption. This may lead to a coexistence of young firms operating the "state-of-the-art" technology side-by-side with older and less productive firms. Related to these ideas are creative destruction models of economic growth (Aghion and Howitt, 1992), according to which new firms play a crucial role in developing innovations. Innovators replace old firms and earn

monopoly profits until a new innovation comes along. At this point, the knowledge underlying the rents becomes obsolete.

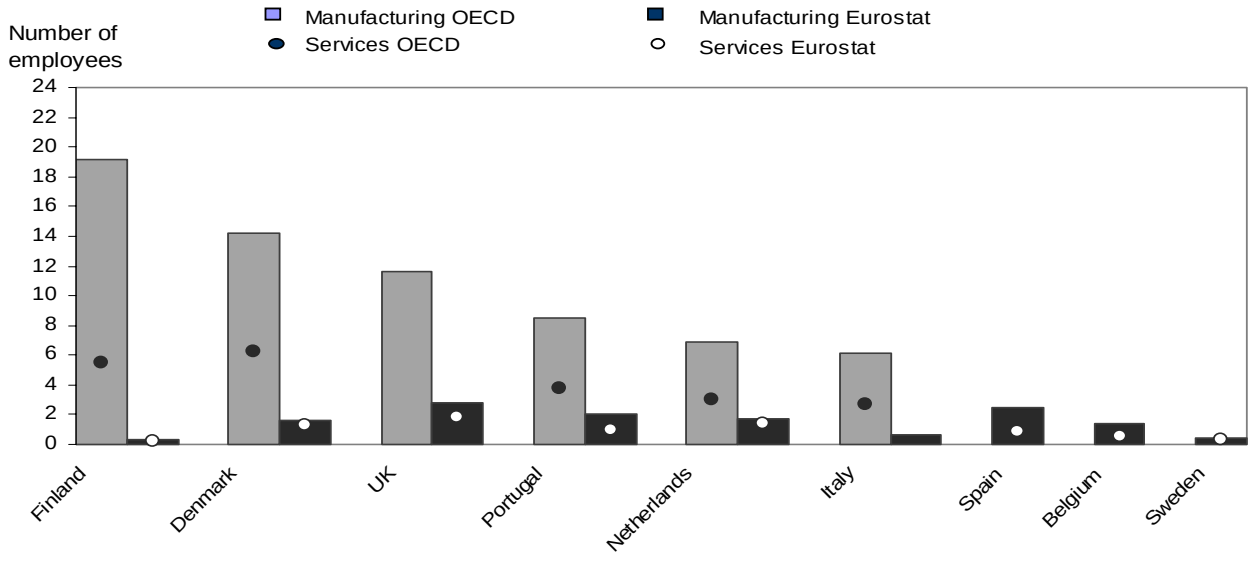
Key data and measurement problems

10. The main data sources to track firm entry, exit, growth and survival are business registers, social security databases, statistical surveys and private data. Since data collection is often tied to certain criteria, *e.g*. whether firms submit tax payments to the government, different databases differ considerably in terms of size thresholds and coverage of economic activity. Adequate and comparable measures of entry and exit rates, however, should preferably cover all or most sectors of the economy and all size classes. Further comparability problems arise because some data sets refer to establishments or local units, while others cover the enterprise or a legal unit.

11. In many databases, it is difficult if not impossible, to distinguish the establishment of an entirely new enterprise from mere changes in ownership, legal form, name or location. These demographic events are labelled "true" and "false firm birth" respectively by Eurostat (Hulten, 2003). Evidence from Canada suggests that "false births" can be sizeable: 6% of all births in 1993 were due to ownership changes, 2.6% to a reorganisation of the firm in new payroll units and 0.1% to a change in location (Baldwin *et al.*, 2000). In some private data sources, as much as 12% of firm entries are really purchases of existing businesses (Cressy, 1996). To the extent at which the number of "false births", their composition or evolution over time differs across countries, a failure to distinguish between "true" and "false" births may impede international comparability of entry and exit statistics. While M&A or ownership changes are of course not irrelevant for the entrepreneurial process, they are likely to have other economic causes and consequences than the establishment of genuinely new firms. It is therefore desirable to distinguish between these events.

Figure 1**. Average size of entering firms – Eurostat vs. OECD data**

(average number of employees per firm)



1. While the Eurostat data cover 1998-2000 for most countries, in some cases one of the years is missing. The longest available sample period in the 1990s has been used to calculate average entrant size with the OECD data. The sample period reaches 1998 only for Finland and Portugal.

2. The average firm size for Denmark is based on total employment rather than on the number of employees to match the OECD data, which is based on total employment for this country.

3. The employment data from Eurostat for Finland, Denmark and the Netherlands are based on full-time equivalents.

Source: Eurostat; OECD firm-level data project (www.oecd.org/EN/document/0,,EN-document-3-nodirectorate-no-1-35177-3,00.html)

12. The Eurostat data employed in this study are based on an effort to produce data on business demography with a harmonised methodology across countries and to distinguish adequately between genuine firm entry and exit and other demographic events, such as mergers and acquisitions and changes of legal form. These efforts have been supported by European Union regulation to harmonise business registers across member countries. In contrast, the OECD firm-level project was not able to clean the data for M&As and other demographic events involving third parties in a systematic and comparable manner (see Bartelsman *et al.*, 2003, page 8). The other major difference between the new data from Eurostat and the OECD data is the size threshold. While the Eurostat data impose no employment threshold, the OECD data cover only firms that have at least one employee for all countries analysed in this paper, with the exception of the Netherlands. This obviously can have substantial effects on the results.

13. Figure 1 shows that entering firms in both datasets are generally very small, which is in accordance with the firm learning models discussed above. Using the Eurostat data, Figure A1 in the appendix shows that new firms do not even reach a third of the average incumbent's size in most countries. Spain and Portugal are the only countries in which new firms are relatively large in relation to the active population, reaching almost 50% of the size of incumbents in services. However, the use of OECD rather than Eurostat data results in considerably higher average entrant size for all countries.

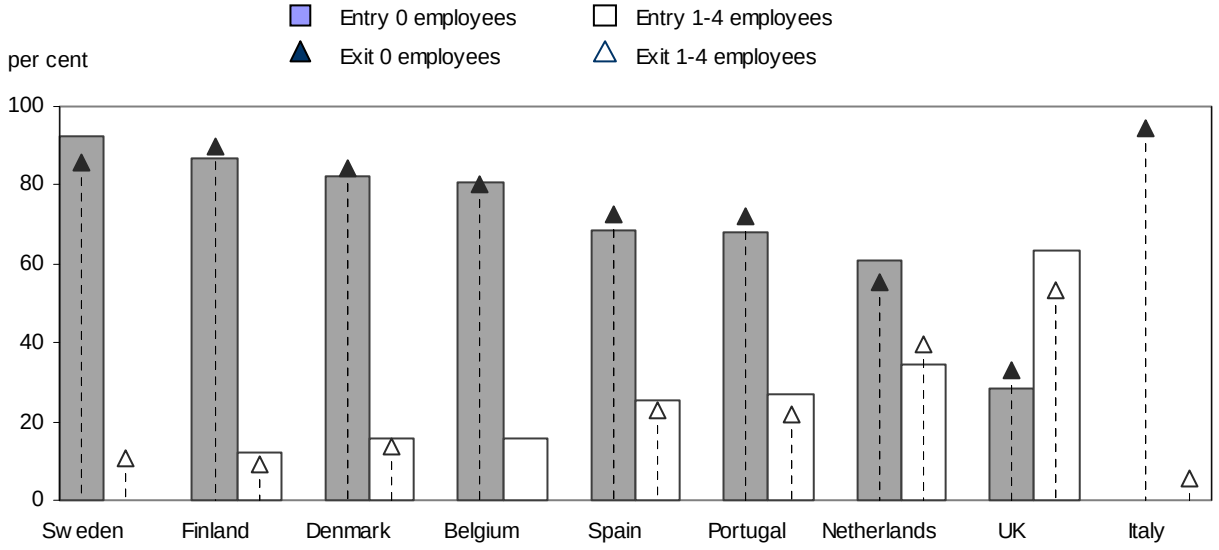
14. A first reason for this difference concerns the different sample period of the OECD data. For the calculation of average entrant size, the longest available sub-period of the 1990s was used to ensure a reasonable degree of comparability with the Eurostat results, but in no case does the OECD data reach 1999 or 2000. Yet, for a number of countries the differences in average firm size are so large that they can probably not only be attributed to a different sample period.

15. The second, and possibly most important, explanation for the larger average size of entrants according to the OECD data is the absence of firms without employees in the data set. The Eurostat data show that both firm entry and exit are heavily concentrated among the very smallest firms (Figure 2). In most countries well above 90% of all entering and exiting firms have less than five employees. With the exception of the United Kingdom (UK) the largest part of this is due to firms without employees. The peculiarity of the UK data, according to which the majority of enterprise births occurred in the size class with 1-4 employees, may be explained by differences in sources. Because of a relatively high value added tax (VAT) threshold, a good number of self-employed persons without paid employees are not included in the UK statistical business register (Hult, 2003). Thus, even if the UK data look a little different, it can be safely concluded from Figure 2 that it seems to be important to take firms without employees into account when examining firm dynamics.

16. To assess the quantitative importance of zero employee enterprises among incumbents, Table A1 in the appendix shows the size class distribution of all active firms in the Eurostat data. For most countries, firms without employees make up the largest part of all registered firms, although this share is smaller than in the population of entering firms. Unlike in all other countries, the proportion of firms with 1-4 employees in the UK and the Netherlands is larger than that of enterprises without dependent employment. Especially in the case of the UK this is likely due to the VAT threshold mentioned above, rather than to a different composition of the overall population of firms. Some comparability problems therefore seem to persist in the Eurostat data set.

Figure 2. **Proportion of firm entry and exit of firms with less than five employees in the Eurostat database**

(average over 1998-2000 for firm entry, 1997-99 for firm exit)



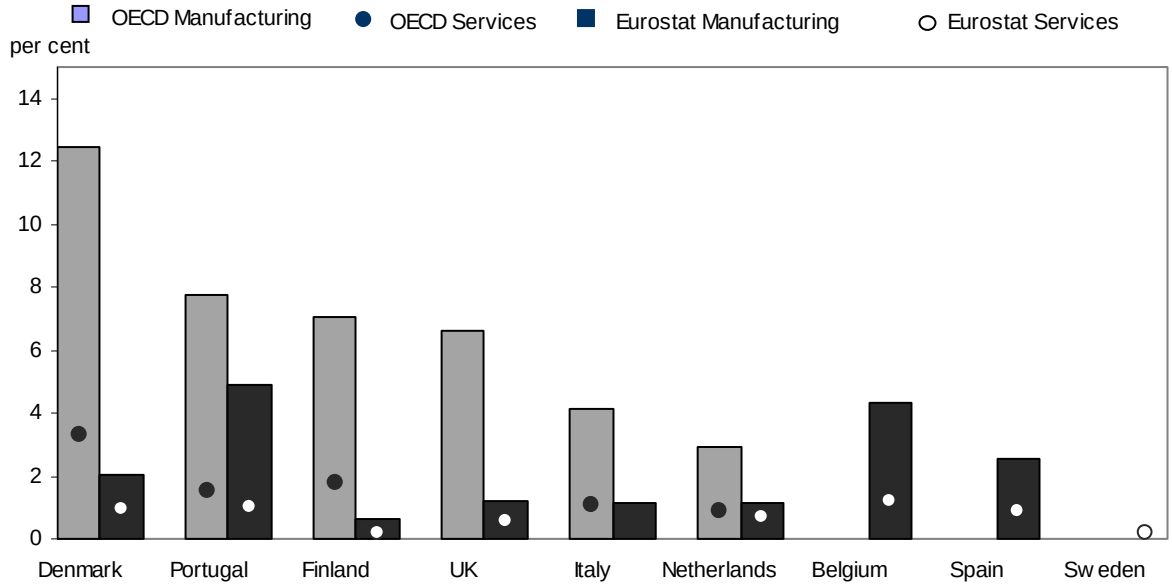
Source: Eurostat.

17. Although the share of firms without employees is anything but negligible especially among newly created businesses, there are often concerns that including them in enterprise demography studies may be problematic. The likelihood that a firm registers without ever becoming active is thought to be especially high for firms without employees. This concern can be dismissed as far as the Eurostat data are concerned, as it is verified that firms included in the data have either some turnover or employees. Yet, since there is no threshold for turnover as long as it is positive, the data also include part-time activities. Depending on the activity, this may sometimes be of questionable value when studying firm dynamics. Furthermore, taking firms without employees into account involves the problem of formally self-employed people who work regular hours on a long-term basis for a sole client, thus appearing more like dependent employees for most purposes. To the extent that people involved in this "false self-employment" have little intention to expand their business or innovate, they are of limited interest for studies investigating the role of the entrepreneurial process for technological change, employment growth and economic performance. In some sectors, the amount of "false self-employment" may be quite sizeable. Furthermore, it is likely to vary across sectors and countries, possibly depending on employment protection legislation (EPL) and on payroll costs. Unfortunately, there is no quantitative evidence regarding this problem. It is desirable to take single-person firms into account, because both theory and the empirical results suggest that firm entry is concentrated among the smallest units. It should be kept in mind, on the other hand, that this comes at the cost of counting a number of activities as separate enterprises, which are unlikely to have any sizeable impact in terms of employment creation, innovation and technology adoption.

18. The third explanation for the differences in average entrant size shown in Figure 1 becomes clear when taking a closer look at the proportion of large firms that enter or exit the market according to Eurostat data, on the one hand, and data from the OECD firm level data project, on the other. Figure 3 shows the number of entering firms with more than 20 employees as a proportion of all entering firms with at least one employee. To ensure the best possible comparison between the datasets, the proportions for the Eurostat dataset exclude firms with no employees. In both the manufacturing and the services sector, the proportion of large entering firms is considerably higher according to the OECD firm-level data. The picture is very similar for exiting firms (Figure 4). In Portuguese manufacturing the proportion of large

exiting firms is quite high according to both databases, but in most cases the OECD data suggest a considerably higher proportion of large exiting firms than the Eurostat data.

Figure 3. **Proportion of entering firms with more than 20 employees – OECD vs. Eurostat data**
(Eurostat data excluding zero employee firms)



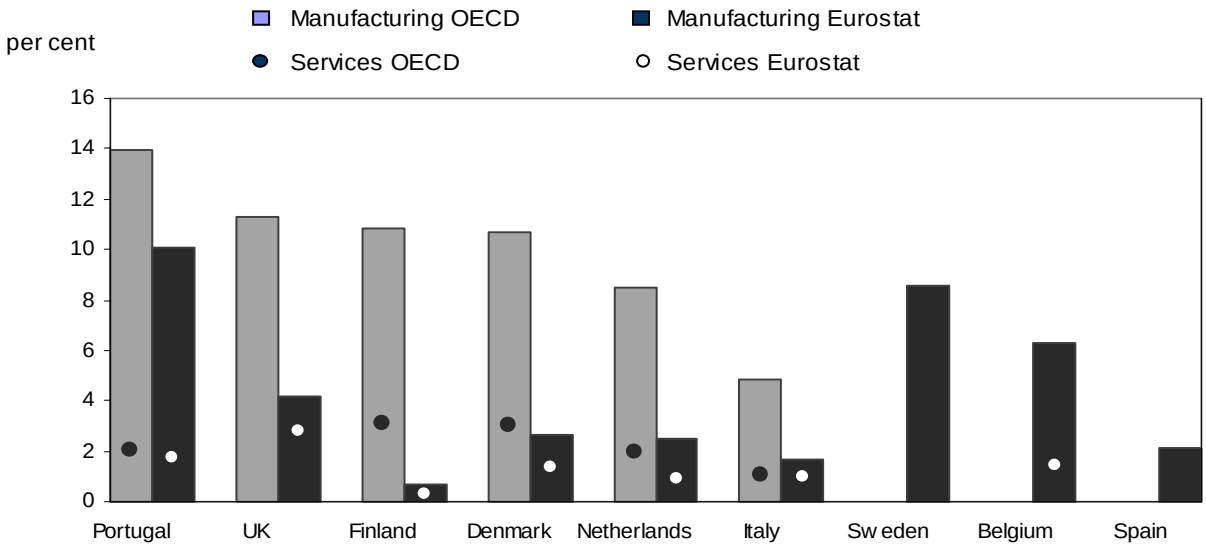
Note: To ensure comparability among the Eurostat and the OECD data, the proportions are calculated in relation to all active firms with at least one employee. Only data for the Netherlands include single person firms.

Source: Eurostat; OECD firm-level data project (www.oecd.org/EN/document/0,,EN-document-3-nodirectorate-no-1-35177-3,00.html)

19. From the point of view of the firm learning models discussed above, the Eurostat data seem more plausible than the OECD dataset. This is because it is hard to imagine that genuinely new firms would choose to start at a large size when they enter the market. Confronted with an uncertain environment, firms first have to learn about their own profitability and about market conditions. They are more likely to enter at a small size to minimise costs in case they are forced to contract or exit the market when failing to be profitable. However, if the firm is a spin-off of an already existing enterprise, if it stems from a mere change of legal form or a merger of companies that have operated for a long time, its management will already have acquired some experience. Thus, companies that have been created in this form may very well start at a considerably larger size than genuinely new firms, because there is less need for learning and experimentation. Spin-offs are considered "real births" in the Eurostat data, but mergers or changes in legal form are excluded. The OECD data, in contrast, have not been cleaned for demographic events involving third parties, which help explain the differences in the proportions of large firms shown in Figures 3 and 4.[1]

1. The problems in distinguishing changes in legal form from genuine firm creation within the OECD firm level data project may also partly explain the large average entrant size and the high percentage of relatively big entering and exiting firms in Finland. Especially in the early 1990s a sizeable number of large firms changed legal form in Finland, thus obtaining a different firm code in the business register, according to information from Statistics Finland. If this has been counted as firm creation in the OECD firm level project, this may in part be responsible of the large discrepancy between the Eurostat and the OECD results.

Figure 4. **Proportion of large exiting firms – OECD vs. Eurostat data**
(Eurostat data excluding zero-employee firms)



1. To ensure comparability among the Eurostat and the OECD data, the proportions are calculated in relation to all active firms with at least one employee. Only data for the Netherlands includes single person firms.

Source: Eurostat; OECD firm-level data project (www.oecd.org/EN/document/0,,EN-document-3-nodirectorate-no-1-35177-3,00.html)

20. This section has illustrated divergent characteristics of the OECD and the Eurostat data, focusing on differences in the size of entering and exiting firms. As such these may not be considered to be of major interest. Yet, the data differences unveiled by this exercise suggest that the quantitative impact of different size thresholds and the ability to distinguish between genuine firm entry and exit and other demographic events is not negligible. As far as possible, the impact of different data characteristics on results will be tracked in the following discussion on firm entry and exit, growth and survival. As it turns out, there are some differences in results across the OECD and the Eurostat data set, although a number of conclusions remain the same, showing that some of the key findings are robust to the dataset examined. However, the effect of the different data characteristics may become more important when business demographics are used to examine policies and economic performance in individual OECD countries, a task which is beyond the scope of this paper. To the extent that single-person firms are important for the entrepreneurial process of search and experimentation, excluding them may obscure empirical findings concerning their impact on innovative activity and economic performance. Likewise, genuine firm birth and death likely have different economic causes and consequences than demographic events involving third parties, such as M&A. This should be kept in mind when interpreting the results of the two different data sets.

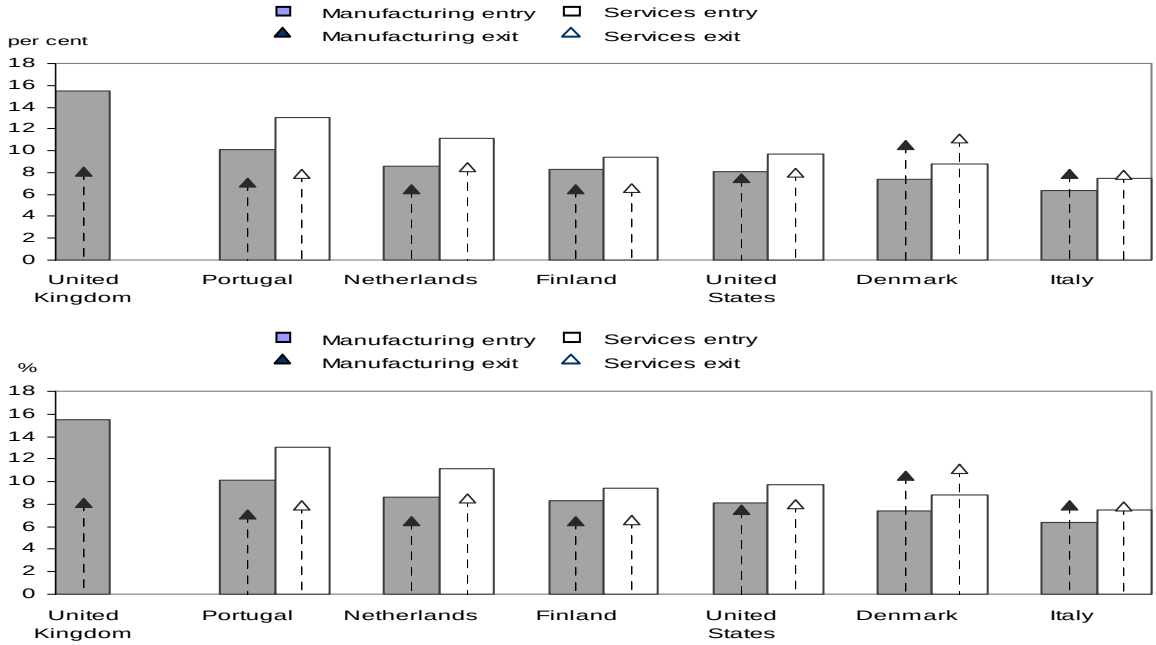
Firm entry and exit

Average entry and exit rates across countries

21. A large number of firms are involved in the process of firm turnover every year. Figure 5 shows average annual entry and exit rates calculated with the data from the OECD firm level project. In the manufacturing sector between 6% and 8% of all firms are new to the market on average every year. Exit rates vary in a similar range. Both firm entry and exit rates tend to be even higher in services than in manufacturing industries. While there are some differences in firm entry and exit across countries, these do not seem vast. Only the manufacturing sector of the UK seems to be a bit of an outlier having experienced average entry rates of almost 16% over the sample period.

Figure 5. **Firm entry and exit rates in OECD countries**

(OECD database, annual average for different sub periods of the 1990s)



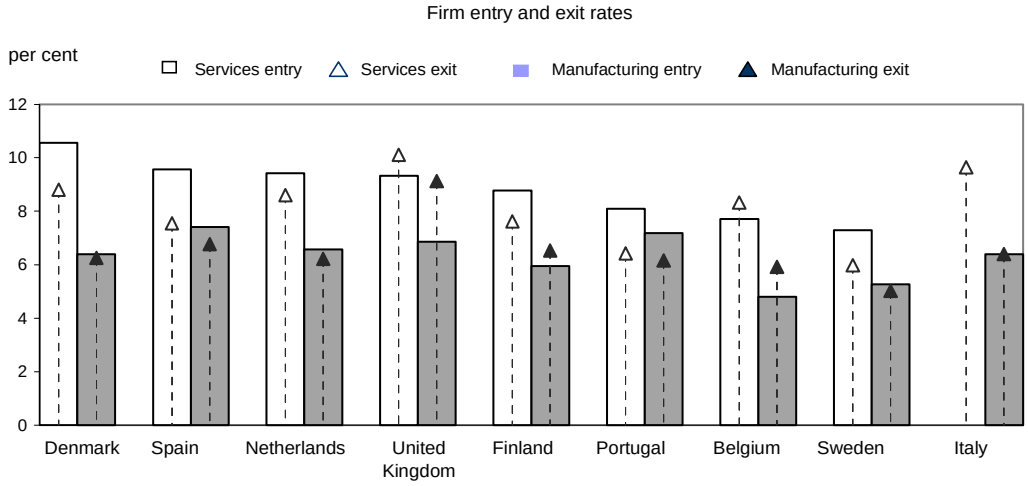
Source: OECD firm-level data project (www.oecd.org/EN/document/0, EN-document-3-nodirectorate-no-1-35177-3,00.html)

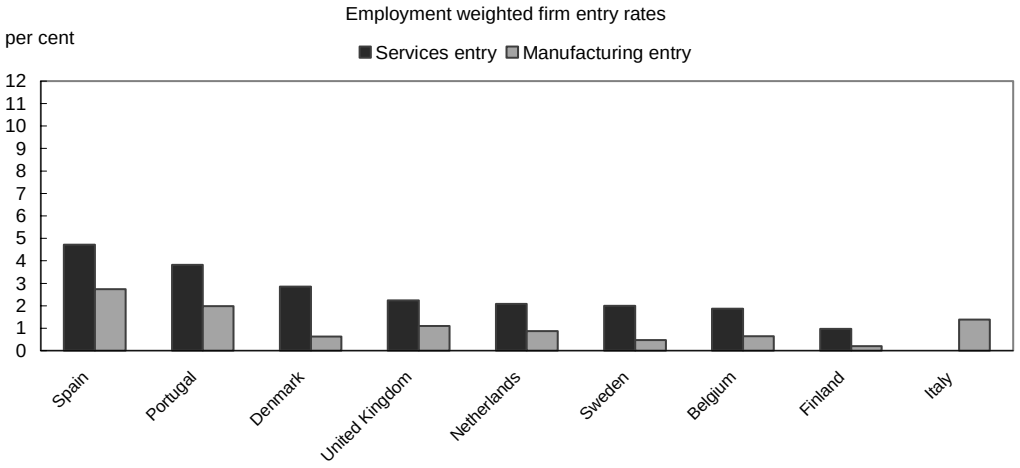
22. This general picture also emerges from the Eurostat data. The upper panel of Figure 6 suggests that entry and exit rates vary in a similar range in both data sets. However, this is not quite comparable with Figure 5, as the data from the OECD firm level project do not include firms without employees for most countries. Therefore, Figure 5 should be compared with the lower panel of Figure 6, which shows entry and exit rates calculated with the Eurostat data excluding firms with no employees. As it turns out, leaving these firms aside lowers entry and exit rates to a large extent. With the exception of the United Kingdom, entry and exit rates do not seem to be of a comparable size across the two data sets. Although OECD and Eurostat data cover different time periods, this large difference is hard to explain, unless "false" firm births and deaths should account for the largest part of what is identified as firm entry and exit in the OECD data set. This would be hard to believe, however. As this question remains unresolved, the constraints imposed by data quality have to be kept in mind when interpreting the results of business demography analysis, no matter which data set is employed.

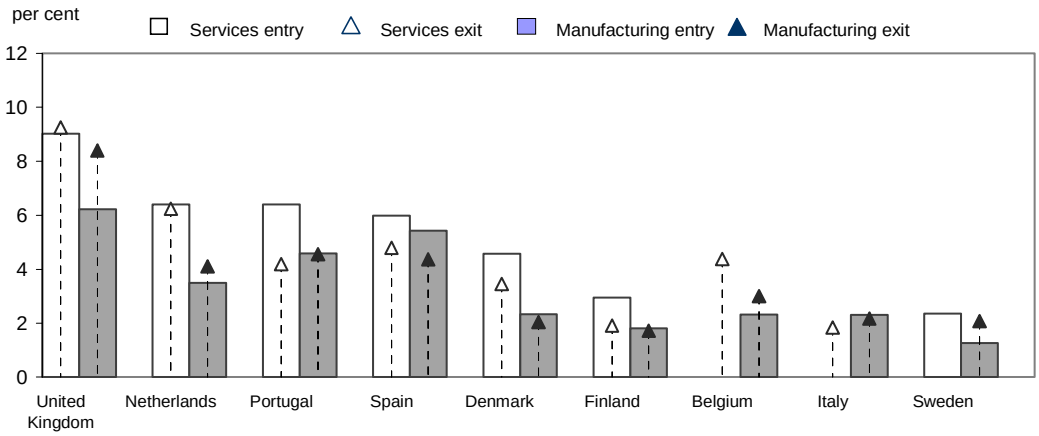
23. It should also be noted that the much higher than average entry and exit rates in the UK emerging from the Eurostat data when excluding firms without employees constitute somewhat of a puzzle. Since, according to Eurostat, mainly single-person firms are under-covered in the UK business register, entry and exit rates should be more comparable with those of other countries, once these firms are eliminated from the data. Instead, as can be seen in the lower panel of Figure 6, both entry and exit rates in the UK are more than twice as high as in most other countries, when firms without employees are not taken into account. Entry rates in the UK are also particularly high according to the OECD data, so this may lend some support to the idea that the business environment in the United Kingdom may indeed be much more dynamic than anywhere else. However, the difference between the UK and other countries is strikingly high, raising some doubts concerning the cross-country data comparability.

Figure 6. **Firm entry and exit rates in EU countries**

(averages over 1998-2000 for firm entry, 1997-99 for firm exit)







Note: The employment weighted entry rates are calculated as the total employment of entrant firms as a percentage of total employment in all active firms. The data for Finland, Denmark and the Netherlands are based on full time equivalents.

Source: Eurostat.

24. Reflecting the small average size of entrants relative to incumbents, job creation rates associated with firm entry are a lot lower than the firm entry rates. The number of persons employed in newly created firms amounts to less than 1% of total employment in Finland (middle panel of Figure 6). For most other countries, job creation associated with firm entry is well below 3% of total employment on average, reaching a maximum of only 4.7% in Spain.[2]

25. Studies of firm dynamics consistently reveal that high rates of firm entry and exit coincide at all times even within narrowly defined sectors of the economy. Entry and exit rates are positively correlated across industries, as can be seen in Table 1. In most countries this correlation is high and significant. Figures 5 and 6 suggest that net entry accounts only for a tiny fraction of gross entry and exit rates. This also holds for more narrowly defined sectors of the economy. As a result, changes in the total number of active firms are generally small despite high rates of gross entry and exit. This finding defies the idea that firm entry and exit occur as a response to sub- and supra-normal profits. According to that interpretation, supra-normal profits should prompt market entry, while firms should exit from markets where profitability does not attain normal market rates. However, if this was the main driving force of firm turnover, it should have a sizeable effect on the total number of firms active in a market. Firm entry and exit should be negatively correlated in that case. Rather than occurring primarily as a response to sub- or supra-normal profits, firm turnover seems to be part of a process of search and experimentation. This is more in line with theories of firm learning under uncertainty discussed above.

Table 1. **Correlation between entry and exit rates across industries**

(average entry and exit rates, 1997-2000)

Correlation between entry and exit rates			
	Correlation	T-Statistic	Obs.
Denmark	0.81***	10.98	64
Finland	0.65***	6.65	64
Belgium	0.52***	4.36	54
Netherlands	0.65***	6.77	64
Sweden	0.39***	2.95	49
Spain	0.50***	2.88	27
Portugal	0.60***	5.93	64
Italy	0.78***	9.48	61
UK	0.70***	7.77	64

Note: *** indicates significance at the 1% level, ** at the 5% level and * at the 10% level.

Source: OECD calculations based on Eurostat.

26. While firm birth and death occur simultaneously in all markets, the size of entry and exit rates differ considerably across industries (Table 2). The standard deviations of employment weighted entry rates are a little lower, as are those of exit rates. However, the variability of both entry and exit rates is substantial, while differing across countries.

2. Again it should be noted that the employment data for Finland, Denmark and the Netherlands is based on full time equivalents. However, this should not impinge too much on comparability with other countries when looking at percentages of total employment in entrant firms in relation to that of all active firms, which is how employment weighted entry rates are calculated.

Table 2. **Variability of entry and exit rates across industries**

(average entry and exit rates, 1997-2000)

	Standard deviation of:		
	Entry rates	Employment weighted entry rates	Exit rates
Denmark	9.04	5.38	4.52
Finland	5.44	2.37	3.04
Belgium	5.38	2.63	2.53
Netherland	6.33	2.85	3.21
Sweden	3.86	2.29	1.74
Spain	3.53	2.36	1.53
Portugal	4.14	2.83	3.40
Italy	6.48	3.46	2.60
UK	4.53	3.30	2.42

Source: OECD calculations based on Eurostat.

27. Because of the high variability across sectors, any conclusions from observed cross-country differences in average entry and exit rates, as displayed in Figures 5 and 6, should be drawn with care. In some countries, industries that are less dynamic in terms of firm turnover may simply account for a larger part of the economy. To explore this, firm entry rates from the Eurostat dataset are analysed with a regression exercise which helps measure differences in average entry rates across different industries and different countries at the same time. The technique thus controls for countries' specific industry composition when comparing their average firm entry rates. This is achieved by estimating industry and country specific constants, referred to as "fixed effects". Industry fixed effects help assess sector specific entry patterns, while controlling for countries' industry composition. The estimated country fixed effects should capture cross-country differences in entry rates that remain after the sectoral structure has been taken into account. For the interpretation of the results, it is important to keep in mind that the fixed effects do not measure the average entry rate in an industry or a country. For technical reasons, they measure its difference from the average entry rate in a reference sector or a reference country respectively.

The role of the industry dimension - entry rate regressions

28. Results of the entry rate regressions are shown in Table 3. The dependent variable is the industry firm entry rate. The entry rate data cover in most cases the sub-section industry level. However, for manufacturing of electrical and optical equipment, wholesale and retail trade as well as computer and business services, further detail is available, allowing for a closer look at narrowly defined sectors related to information and communication technologies (ICT).

29. Panel I of Table 3 shows the estimated country fixed effects stemming from a regression, where only time dummies are included to capture business cycle effects. The results have to be interpreted in relation to Denmark, which is the reference for this estimation. The reference sector is the food, beverages & tobacco industry. Accounting for industry, country and time specific effects explains more than 50% of the variation in entry rates. Fixed effects for all countries are estimated to be negative. This is significant except in the case of Spain. Thus, once the industry composition is taken into account, these countries seem to be marked by lower firm entry than Denmark. To give a more concrete example, the country fixed effect of Sweden has to be interpreted in the following way: after accounting for differences in industry composition, the number of new in relation to all active firms is on average 3.86 percentage points lower in Sweden than it is in Denmark.[3]

3. It should be noted that the merging of several administrative records in 1999 may have lead to some over-coverage in Denmark in this year. This could have resulted in somewhat overstated birth rates. Yet, a 1999 dummy for Denmark is significant only at a 10% level and changes estimates only slightly. Therefore, results obtained without the dummy variable are shown instead in Table 2.

Table 3. **Entry rate regression**

(Dependent variable: entry rate of industry j in country i estimated over 1998-2000; fixed effect estimator)

	I	II	III	IV	V	VI
	With year dummies	Also an output gap variable	Also ICT-specific country effects	Differentiated by size class	Without single person firms	weighted with employment
Constant	7.77***	7.26***	6.14***	5.68***	3.27***	1.68***
	(0.85)	(0.89)	(0.85)	(0.59)	(0.76)	(0.49)
Finland	-2.73***	-2.18***	-0.94*	-1.67***	-1.87***	-2.10***
	(0.40)	(0.50)	(0.50)	(0.34)	(0.43)	-0.29
Belgium	-3.37***	-2.45***	-1.49**	-1.60***	-1.19	-0.85***
	(0.41)	(0.65)	(0.63)	(0.46)	(0.77)	(0.37)
Netherlands	-0.89**	-0.76	0.15	2.05***	1.69***	-0.55**
	(0.46)	(0.46)	(0.48)	(0.31)	(0.39)	(0.28)
Sweden	-3.86***	-2.88***	-0.93	-1.75***	-2.41***	-1.04***
	(0.42)	(0.68)	(0.66)	(0.47)	(0.72)	(0.39)
Spain	-0.55	0.66	1.60**	1.64***	1.92**	1.60***
	(0.52)	(0.84)	(0.80)	(0.57)	(0.78)	(0.47)
Portugal	-2.23***	-1.74***	-0.09	1.72***	1.91***	0.56*
	(0.40)	(0.48)	(0.48)	(0.33)	(0.42)	(0.29)
Italy	-0.82**	0.32	1.36*	-0.77	-1.97***	0.98**
	(0.41)	(0.74)	(0.72)	(0.51)	(0.71)	(0.42)
UK	-2.11***	-1.33	0.28	1.21***	3.35***	-0.75**
	(0.40)	(0.59)	(0.58)	(0.39)	(0.52)	(0.34)
ICT effects by country:						
Finland			-7.91***	-2.79***	-4.03***	-2.96***
			(1.05)	(0.70)	(0.85)	(0.61)
Belgium			-6.14***	-3.51***	-8.08***	-4.22***
			(1.06)	(0.81)	(2.34)	(0.62)
Netherlands			-5.76***	-2.38***	-1.51	-3.24***
			(1.17)	(0.78)	(0.95)	(0.69)
Sweden			-12.42***	-6.00***	-7.00**	-4.21***
			(1.09)	(0.77)	(1.45)	(0.64)
Spain			-0.94	0.60		-2.27***
			(2.44)	(2.37)		(1.42)
Portugal			-10.50***	-6.17***	-5.51***	-3.13***
			(1.05)	(0.70)	(0.85)	(0.66)
Italy			-6.55***	-4.64***	-5.99***	-4.12***
			(1.05)	(0.76)	(1.24)	(0.62)
UK			-10.24***	-4.76***	-3.77***	-2.21***
			(1.05)	(0.69)	(0.85)	(0.61)
Size classes:						
0 Empl.				6.07***		
				(0.20)		
5-9 Empl.				-3.51***		
				(0.21)		
10-19 Empl.				-4.93***		
				(0.22)		
more than 20 Empl.				-6.83***		
				(0.21)		
DUM99	-1.25***	-1.42***	-1.42***	-0.57***	-0.82***	-0.67***
	(0.26)	(0.27)	(0.26)	(0.18)	(0.24)	(0.15)
DUM2000	-1.43***	-1.94***	-1.93	-0.43*	-0.42	-0.68***
	(0.26)	(0.38)	(0.36)	(0.24)	(0.32)	(0.21)
GAP		0.38*	0.39**	-0.03	-0.25	0.05
		(0.21)	(0.20)	(0.14)	(0.19)	(0.11)
Adjusted R^2	0.59	0.59	0.63	0.52	0.62	0.64
No. of Obs	1516	1516	1516	6744	1133	1458

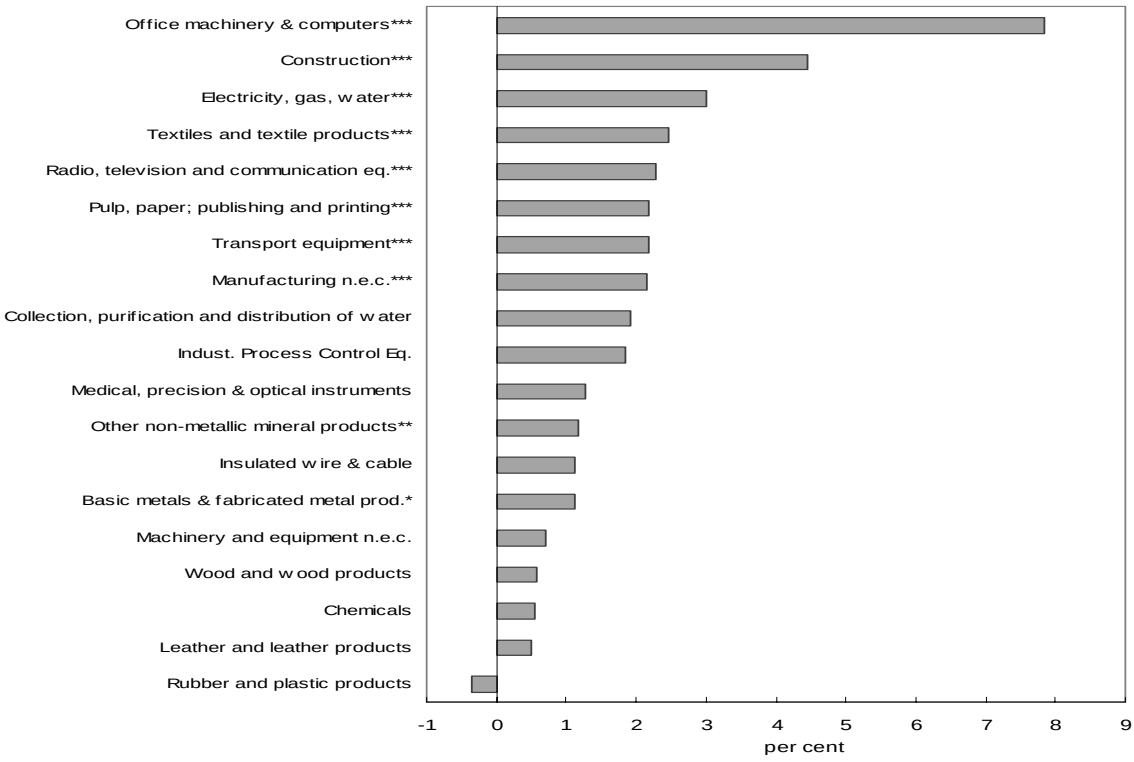
1. Each equation includes industry dummies. The reference group is the food, beverage & tobacco industry in Denmark. In equation IV the size class with 1-4 employees is the reference.
2. A * indicates significance at the 10% level, ** at the 5% and *** at the 1% level.
3. Standard errors in parentheses.

Source: OECD estimations based on Eurostat data. Output gap variable from the OECD Economic Outlook.

30. The data from Eurostat, cover only a very short time period which constituted boom years with high output and employment growth rates essentially for all of the investigated countries. However, the output gap variable from the OECD Economic Outlook indicates that countries operated at different levels of capacity. Panel II of Table 3 suggests that once the output gap variable is taken into account, the gap between Denmark and other countries in terms of entry rates narrows, as all country fixed effects become smaller in absolute size, many of them turning insignificant. This seems to imply that accounting for countries' relative cyclical positions explains some of the difference in entry rates. However, it should also be noted that the estimated impact of the output gap variable is insignificant in equations IV-VI, so all in all evidence for the presence of cyclical effects is rather weak. Data over longer time periods seem to be needed to obtain more reliable results concerning the impact of the business cycle.

31. To gain some insights into differences across industries concerning firm entry dynamics, Figure 7 shows the estimated industry fixed effects for manufacturing industries, as well as for construction and utilities. The estimates stem from equation II in Table 3. Similar as the country fixed effects they have to be interpreted as the difference in average entry rates of a particular industry in relation to the reference sector, the food, beverages & tobacco industry. For the sectors displayed in Figure 7, the estimated industry fixed effects are generally low and in most cases insignificant, indicating that entry rates do not differ much from those in the reference sector. A notable exception is the manufacturing of office machinery and computers industry, where entry rates are on average almost 8 percentage points higher than in the food and beverages industry.

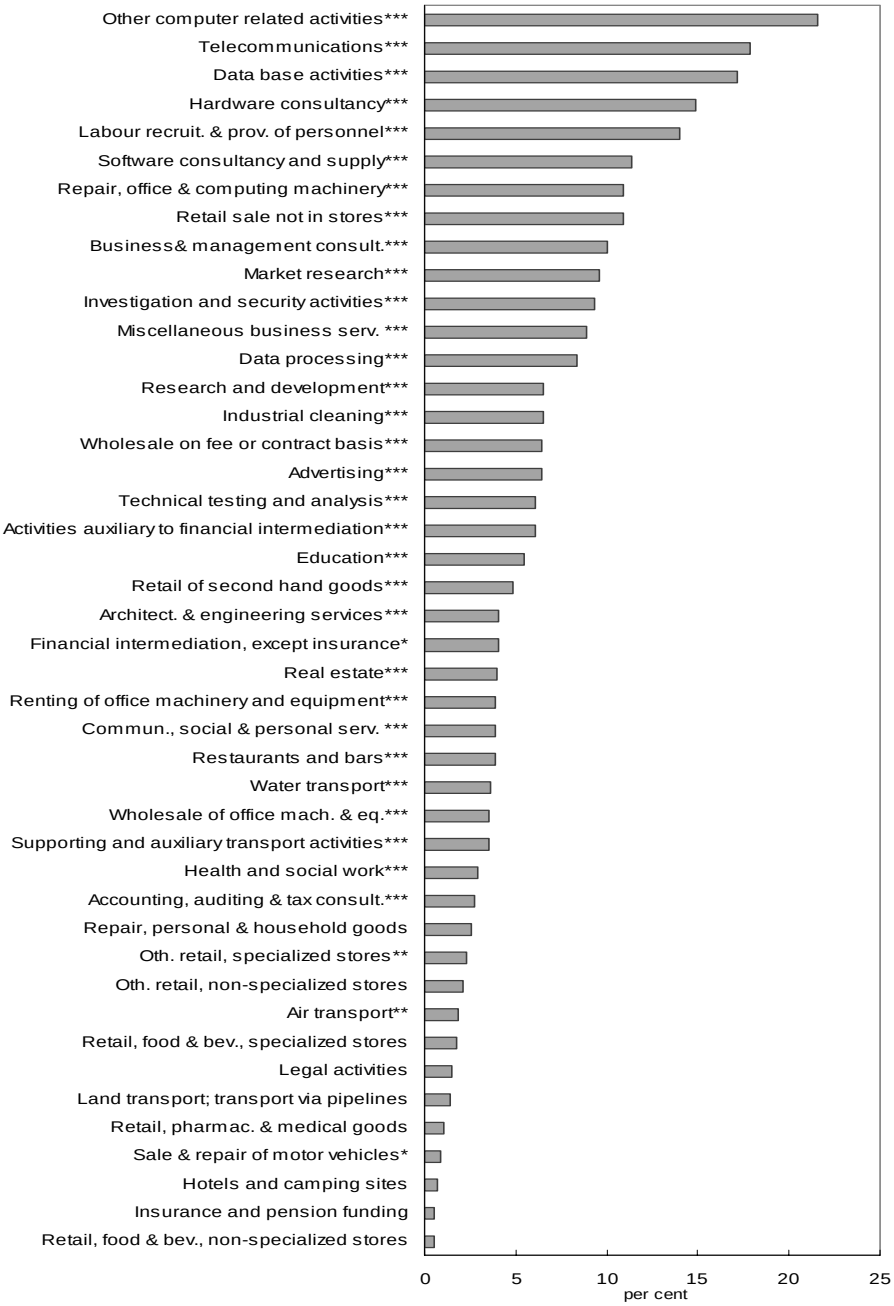
Figure 7. **Industry fixed effects of the entry rate regression for non-service industries**



Note: The estimates stem from equation II in Table 3. The fixed effects shown in this graph measure the difference between the average entry rate in an industry and that of the reference sector, the food, beverages & tobacco industry. As an example, the estimated fixed effect of 7.8% in manufacturing of office machinery and computing means that entry rates in this industry are on average 7.8 percentage points higher than in the reference sector. This difference is said to be significant if a formal statistical test rejects the hypothesis that it is zero. * indicates significance at the 10% level, ** at 5%, *** at the 1% level, where the significance level corresponds to the probability that the hypothesis of the fixed effect being zero is rejected on the basis of the statistical test, when it is really true.

32. The finding that entry rates are particularly high in ICT-related industries also emerges from Figure 8 which displays industry fixed effects for services industries from the same estimation. The largest entry rates are found in telecommunications and computer related services, such as hardware and software consulting and database activities. Higher than average entry rates for ICT related industries have also been found in the OECD firm level data study (Bartelsman *et al.*, 2003).

Figure 8. **Industry fixed effects of the entry rate regression for services**



Note: The estimates stem from equation II in Table 3. The fixed effects shown in this graph measure the difference between the average entry rate in an industry and that of the reference sector, the food, beverages & tobacco industry. As an example, the estimated fixed effect of 17.9% in telecommunications means that entry rates in this industry are on average 17.9 percentage points higher than in the reference sector. This difference is said to be significant if a formal statistical test rejects the hypothesis that it is zero. * indicates significance at the 10% level, ** at 5%, *** at the 1% level, where the significance level corresponds to the probability that the hypothesis of the fixed effect being zero is rejected on the basis of the statistical test, when it is really true.

Source: OECD estimations based on Eurostat data.

33. The particularly high birth rates in ICT related industries fit into the findings of product life cycle studies, which suggest that firm entry should be particularly high in young industries. Earlier studies of firm demographics have shown that while there are differences in firm turnover between industries, these often do not persist for long (Geroski, 1995). Rank correlations of entry rates tend to decline over longer time periods. Micro studies covering specific products or markets suggest that entry and exit vary over the product life cycle. After commercial introduction of a new good, there tend to be high rates of firm creation. Net entry levels off after approximately a decade. This is often followed by a contraction phase at later stages of the product life cycle, during which more firms exit than enter the market (Gort and Klepper, 1982).

34. Furthermore, ICT related industries have generally been associated with fast technological change in recent years. Therefore, the high entry rates in these sectors can also be interpreted as supportive evidence for vintage models of technological change as well as economic growth models which stress the importance of creative destruction for innovation. These theories imply that innovative activity and new technology adoption are associated with higher firm churning, as new and innovative units replace outpaced ones.

35. Comparing Figures 7 and 8 also confirms that firm entry rates are generally higher in services than in manufacturing industries, a finding which has emerged from many earlier business demography studies. For most services industries, the estimated industry fixed effects are significantly positive. They differ quite considerably across sectors, however, being relatively low in most retail and wholesale industries, in transport industries, as well as in hotels and restaurants. Apart from ICT related industries, high entry rates can also be found in research and development and in some business services, such as advertising, business & management consulting and labour recruitment & provision of personnel.

36. Industry fixed effects are a lot larger in absolute size and differ considerably more amongst each other than the country fixed effects. This result does not emerge from a similar fixed effect regression on entry rates performed by Bartelsman *et al.,* (2003) with the OECD firm-level data. Two factors may explain this difference in results. First, the industry breakdown of the OECD data is not as detailed as that of the Eurostat data. This may often entail an aggregation of young sectors with more mature ones in a single industry. A finer breakdown of industries, as in the Eurostat data, is more likely to unveil the high firm turnover that is typical of young markets. Moreover, Bartelsman *et al.,* (2003) break down their entry rate data by size class, an exercise which is also performed in equation IV of Table 3 in this paper. According to the Eurostat data there is little genuine firm entry and exit among firms with more than 20 employees. Thus using a relatively large size class comprising firms with 20-49 employees as the reference, Bartelsman *et al.,* (2003) may have underestimated cross-industry differences in genuine firm entry which are related to industries' maturity. Part of what they capture with their entry rate data in their reference size class might be due to demographic events involving third parties, such as M&A, rather than to genuine firm entry. While de novo firm entry has previously been shown to differ quite significantly depending on the maturity of the industry, this does not necessarily hold for alternative demographic events.

37. Recent developments in information and communication technologies are often interpreted as a technological revolution. Since these technologies are associated with high rates of innovation and often substantive adoption costs, firm entry and exit in industries related to them are of special interest from the point of view of the Schumpeterian theories of creative destruction discussed above. To study the specific characteristics of these sectors and potential cross-country differences related to them, the estimation was also performed with country-specific effects for ICT-related industries. Estimation results displayed in Panel III of Table 3 reveal that a sizeable part of Denmark's lead is in fact due to particularly high entry rates in ICT-related industries. Most of the estimated country fixed effects become insignificant, once differences in terms of firm entry in these young and dynamic sectors are taken into account. In the case of

Spain and Italy they turn significantly positive, suggesting that entry rates in the non-ICT related industries of these countries are higher than in Denmark. Again with the exception of Spain, the ICT-industry effects are significantly negative for all countries. They are very large in absolute size when compared with the overall country fixed effects, and they differ considerably across countries. This suggests that institutional factors and policies may be more important as determinants of business dynamics in young industries associated with high rates of innovation and new technology adoption than in more mature sectors.[4]

38. The data are broken down by firm size classes in equation IV, which reveals that entry rates decline monotonically by size class. The reference is the group of enterprises with 1-4 employees. To assess the effect that a size threshold might have, Panel V of Table 3 displays the same regression as in equation III, however estimated with entry rate data that exclude single person firms. Note that both variations to the basic regression, equation I, change the ranking of countries in terms of entry rates considerably, as the estimates of country fixed effects now indicate that Spain, Portugal, the UK and the Netherlands have experienced higher firm entry than Denmark. Lastly, the entry rate regression is also performed with employment weighted entry rates (Panel VI). The constant of this estimation is a lot smaller than in all other cases reflecting the small size of entering firms.

39. Country fixed effects, although not large in any case, are quite sensitive to the specification of the estimation equation. The ranking of countries in terms of entry rates is altered when the data are broken down by size classes, when single person firms are included or when entry rates are weighted by employment. Industry fixed effects are a lot larger in absolute size and they differ considerably more amongst each other than the country fixed effects. Regardless of the specification of the estimation equation, the general results concerning industry fixed effects remain robust. They are generally small and insignificant in manufacturing industries, but larger and significant in services. ICT-related industries and some business services consistently stand out as having particularly high entry rates.

40. Taken at face value, these results seem to indicate that technological factors and the maturity of industries may be more important as driving forces of firm entry than aggregate factors, including institutional frameworks and countries' policies. Nevertheless, recent OECD findings (Scarpetta *et al.*, 2002) suggest that regulation in both product and labour markets deters entry. Moreover, the results presented in Table 3 suggest that cross-country differences in entry rates are rather small on average, but quite large in the young and dynamic ICT-related industries. This may imply that the role for policy is especially important in young and dynamic sectors, where an ongoing process of search and experimentation is thought to be decisive for innovation and technology adoption. It could also be argued that the moderate cross-country variation of entry rates might be a special feature of the group of countries investigated in this paper, which have all been subject to European Union legislation and do not differ too much in terms of policies and institutions amongst each other. Yet, the OECD firm level data project which includes non-European countries, such as Canada and the United States (US), reveals equally moderate cross-country variation of entry and exit rates.

Exit rate regressions

41. Since entry and exit rates are highly correlated, the results of exit rate regressions should essentially mirror those of entry rate regressions. However, there are some notable differences. Results are shown in the appendix. Mirroring the findings of the entry rate regressions, exit rates in most countries are significantly lower than in Denmark. A notable exception is the UK, for which the country fixed effect is

4. It should be noted that the data for Spain is not available for most of the detailed ICT-related industries. For this reason, the estimated ICT-industry effect for Spain rests on solely three observations, so it has to be interpreted with some caution.

significantly positive. Including the output gap variable increases standard errors of most country fixed effects, some estimates turning insignificant. Given that the output gap variable is not statistically significant itself, however, this result should not be taken too seriously. It is often assumed that firm exit rates increase during cyclical downturns. This hypothesis cannot be tested with the available data, because none of the investigated countries experienced a major downturn during the sample period. However, prior research suggests that firm exit is not responsive to the business cycle (Boeri and Bellmann, 1995). This is at odds with the view that recessions are times of cleansing where less productive firms are driven out of the market as a result of a "creative destruction" process. At the same time, the finding is reassuring as it suggests that while the available sample period is short, the fact that it does not cover contractionary periods should not affect results too much.

42. The industry fixed effects of the exit rate regressions displayed in Figures A2 and A3 in the appendix by and large mirror the picture of entry rate regressions in terms of cross industry variation, although the estimates tend to be lower. Industry fixed effects of manufacturing industries are generally low and insignificant, an exception being again the manufacturing of office machinery and computers industry. An interesting difference to the picture of entry rates is that the estimated fixed effects are comparatively high and significant in the textiles and the leather industry. This fits into the findings concerning product life cycles discussed above. Both sectors can be regarded as examples of mature industries, which are already in a phase of consolidation, with firm exit exceeding entry. In contrast, the industry fixed effects of the young and dynamic industries are much higher in the entry than in the exit rate regressions. Since the estimated constant has nearly the same size in both regressions, this implies that these industries are expanding.

43. The observed high correlation between entry and exit rates may be due to new and innovative firms mainly driving old and less productive ones out of the market. However, the positive correlation may also simply be a result of high infant firm mortality. Wherever many firms enter the market, a large part of these will have to exit again soon after this. This leads to the question on how long newly created firms survive.

Survival and growth

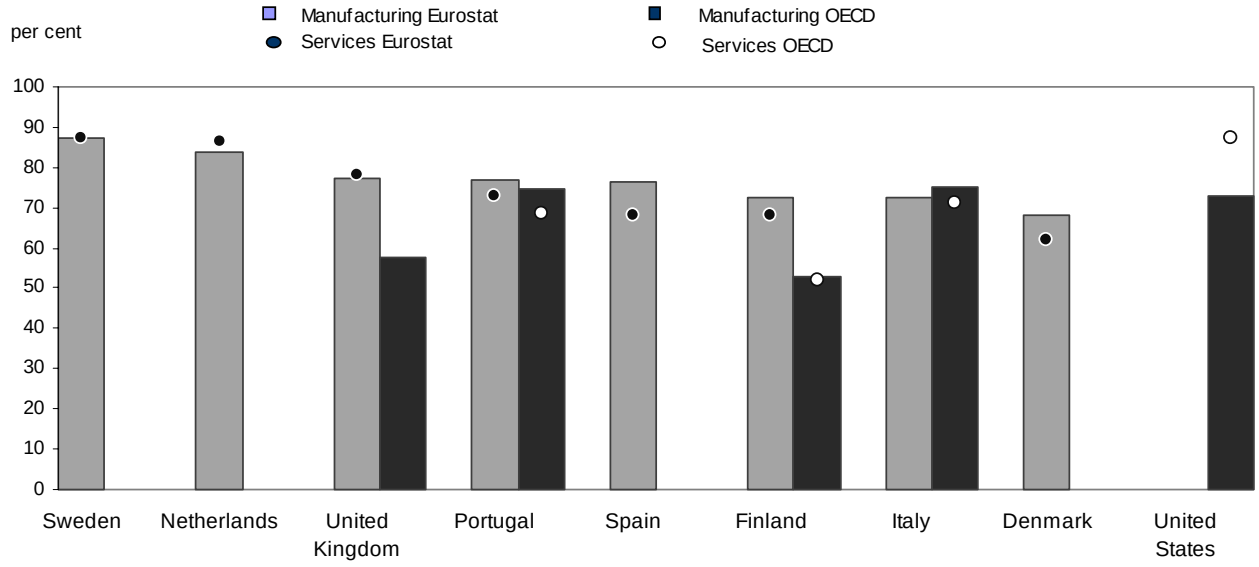
44. It is a frequently reported finding in the business demographics literature that most new firms do not survive for long. Chances of survival are especially low for firms that start small, as they usually do. Unfortunately, the Eurostat series are not long enough to study firm survival over a longer period of time. However, two-year survival rates for firms born in 1998 do confirm that there is a high risk for newly created firms to be forced to exit the market soon. Survival rates correspond to the number of firms of the same cohort that have survived a given number of years as a percentage of all firms that entered the same year with them. Figure 9 shows that according to the Eurostat data, in most countries between 20% and 40% of all new firms had failed already after the first two years, as the survival rates vary between 60% and 80%. The Eurostat data suggest that survival rates are particularly high in Sweden and the Netherlands, where they reach almost 90%.

45. Figure 9 also includes average two-year survival rates from the OECD firm-level data project. While these estimates confirm the general result that the probability of death in early life is high, the estimated two-year-survival rates differ quite substantially across data sets for some countries. It should be kept in mind, however, that apart from the data differences discussed before, the OECD data cover a considerably longer time period including both economic upturns and downturns for a number of countries. In addition to this, their sample period does not overlap with the sample period covered by the Eurostat data for most countries. This may account for some of the observed differences in results. Moreover, Bartelsman *et al.*, (2003) were able to study also longer term survival. Their results show that conditional on surviving the first two years, prospects of survival seem to improve a little bit after this. Firms that

remained in business after the first two years had a 50% to 80% chance of surviving five more years. Yet, depending on the country only 30% to 50% of entering firms in a given cohort survived more than seven years.

Figure 9. **Firm survival**

(average two-year survival rates)



1. Survival rates in this figure are measured as the number of firms surviving at least until two years after entry as a share of all firms that entered the same year with them.

2. The Eurostat data concern firms that were born in 1998. OECD data refer to average survival rates estimated for different cohorts of firms that entered the market from the late 80s to the 90s.

Source: Eurostat; OECD firm-level data project (www.oecd.org/EN/document/0,,EN-document-3-nodirectorate-no-1-35177-3,00.html).

46. Survival rates specify the probability that a firm from a given cohort will have a lifetime in excess of a given duration. They correspond to the number of firms of the same cohort that have survived a given number of years as a percentage of all firms that entered the same year with them. Another way to look at firm survival is to estimate hazard rates, which correspond to the conditional probability of leaving the market after a certain life span. These are calculated as the share of exiting firms in the number of survivors of the same cohort as of the previous year. While survival rates decline with firm age by construction, a priori there is nothing that precludes hazard rates from being comparable at different durations. Thus, hazard rates for different firm ages are more appropriate to be pooled for econometric analysis than survival rates.

47. In most countries entry and hazard rates are positively and significantly correlated across industries. However, the correlation between entry and hazard rates is lower in most cases than it is between entry and exit rates (compare Tables 1 and 4). This suggests that in dynamic sectors both older and very young firms are driven out of the market. In a number of countries, the correlations between hazard and entry rates are not significant. In those cases, older firms seem to be driven out of the market more frequently than the very young firms. Moreover, significance and size of the correlation often differ depending on the duration. Thus, there is some evidence that life is more hazardous for young firms in industries with a lot of firm entry, although it is not completely robust.

Table 4. **Correlation of entry and hazard rates across industries**

(averages over 1998-2000)

	One-year hazard rates		Two-year hazard rates	
	Correlation	T-Statistic	Correlation	T-Statistic
Denmark	0.44***	3.82	0.25**	1.99
Finland	0.24**	1.97	0.10	0.77
Netherland	0.35**	2.93		
Sweden	-0.11	-0.75	0.21	1.42
Spain	0.58**	3.67	0.56**	3.47
Portugal	0.12	0.92	0.40**	3.44
Italy	0.19	1.52	0.32***	2.63
UK	-0.004	-0.03	0.23*	1.84

1. *** indicates significance at the 1% level, ** at the 5% level and * at the 10% level.

Source: OECD calculations based on Eurostat.

48. As in the case of entry and exit rates, the variability of hazard rates across industries is quite substantial. This can be seen in Table 5, which shows the standard deviation of one- and two-year hazard rates across industries for each country. Again, it seems to be important to control for industry specific effects when comparing firm survival across countries. Therefore, an analogous regression exercise as for entry and exit rates was performed. It should be noted that because of the short size of the sample period, any conclusions drawn from the estimations are tentative. As a dependent variable, the regressions include industry specific one-year hazard rates for firms born in 1998 and 1999, as well as two-year hazard rates for firms born in 1998. The industry breakdown is the same as in the entry and exit rate regressions. The duration, indicating whether firms have survived the first or already the second year of their life, is accounted for with fixed effects.

49. In the hazard rate regression, very few industry fixed effects are significant. This indicates that industry characteristics, which are similar across countries, are less important for young firms' prospects to survive than for entry and exit. In fact, the cross-country variation of hazard rates within each industry is a lot higher than it is for birth rates. Country-specific ICT-industry effects are not significant, either, implying that although firms in these industries are exposed to a lot of turbulence, the risk of failure for very young firms in these sectors does not seem to differ a lot from that in other industries, or at least not in any systematic way across countries. Table 6 therefore shows only regression results without these dummies.

Table 5. **Variability of hazard rates across industries**

(standard deviation 1999-2000)

	Hazard rates at duration	
	one year	two years
Denmark	5.34	9.65
Finland	7.67	8.25
Netherlands	5.63	
Sweden	1.40	5.49
Spain	5.00	5.53
Portugal	2.55	12.08
Italy	4.48	5.63
UK	3.34	4.53

Source: OECD calculations based on Eurostat.

50. The estimated country fixed effects are significantly negative for all countries. This implies that while entry is comparatively high in Denmark, especially in ICT-related industries, so is infant firm mortality. In line with what Figure 9 suggests, the risk of failure for young firms is especially low for Sweden. This is a consistent finding that results from all estimations shown in Table 6. The country fixed effects in the hazard rate regression are a lot larger in size than in the entry rate regression and they vary

considerably across countries. More concretely the constant of equation I in Table 6 suggests, as an example that around 18% of young firms fail on average in the Danish food and beverages industry during the first year of life. In Sweden, hazard rates are more than 15 percentage points lower than in Denmark on average across all industries, implying that only around 3% of new firms fail in their first year of life in the reference industry. Including an output gap variable reinforces the observed difference between young firms' mortality in Denmark and other countries. The output gap variable is significantly negative, indicating that in booming economies young firms face lower risks of failure. Unlike in the case of entry rates, this result is robust to the set up of the estimation equation.

51. The extremely large cross country differences in hazard rates seem to suggest that there might be more of a role for policies and institutions for new firm survival than for firm entry, which differ a lot less across countries for all but the very young and dynamic ICT-related industries. A tentative interpretation for this result could be that product and labour market regulations, which constitute barriers to entry to different degrees in different countries do not result in very large cross-country differences in entry rates in most industries, an exception being relatively young and dynamic sectors. Yet, institutions that shape young firms' opportunities to survive and prosper, such as the development of high-risk capital markets and the education system which determines the availability of high-skilled labour, seem to have a considerable impact on young firm survival causing it to differ sizably across countries.

52. Countries with relatively low entry rates tend to have high survival rates and vice versa, at least this seems to be true for Denmark and Sweden. This could be interpreted tentatively as a pre-entry selection process taking place in countries where entry and/or exit barriers are high. In countries with low entry and exit barriers, firms may be more prone to try and enter the market with little information to discover their own profitability in a learning by doing process, exiting soon in case they turn out to be unprofitable. Firms may invest more in gathering information about market conditions, competitors and their own potential profitability prior to entering the market in countries where entry and/or exit barriers are higher. Firms which find out that they have little chances to survive and prosper might often refrain from entering the market, causing both lower entry and higher survival rates than in countries where trial and error is less costly.

53. The ranking of countries in terms of hazard rates is quite different from what emerges from a similar fixed effects regression in Bartelsman *et al.,* (2003), as is the size of country fixed effects. These are a lot smaller than what Table 6 suggests, when the impact of duration on the size of hazard rates is assumed to be the same across all countries, although country fixed effects are a lot larger when allowing for country specific duration effects. Apart from the data differences discussed already, it should be kept in mind that the OECD data have the advantage of covering a considerably longer sample period.

54. The estimated fixed effects for the two-year hazard rates indicate that the risk of failure is higher in the second year than in the first. This type of "honeymoon" effect has also been identified in Bartelsman *et al.*'s (2003) study for the US, and to a lesser degree for Italy and UK manufacturing. Similarly, Wagner (1994) found with a panel of German firms that hazard rates increase in the early years and decrease non-monotonically thereafter. Equation IV estimates this effect separately for each country. As it turns out, it is not significant in Spain and Italy and only weakly so in Denmark, while it is large and significant in the United Kingdom, Portugal and Sweden.

Table 6. **Hazard rate regressions**

(Dependent variable: hazard rate of industry j in country i at different durations estimated over the period 1999-2000, fixed effects estimator)

	I	II	III	IV
	With industry fixed effects and year dummies	also with an output gap variable	country-specific duration effects	differentiated by size class
Constant	17.70***	21.44***	21.46***	11.60***
	(1.51)	(1.70)	(1.62)	(1.57)
Finland	-5.06***	-6.47***	-6.24***	-5.00***
	(0.67)	(0.73)	(0.86)	(0.72)
Netherlands	-3.57***	-3.76***	-4.97***	3.22***
	(0.96)	(0.95)	(0.92)	(0.82)
Sweden	-15.15***	-18.82***	-19.98***	-13.28***
	(0.70)	(1.05)	(1.10)	(1.09)
Spain	-4.67***	-9.46***	-7.10***	-5.96***
	(0.88)	(1.34)	(1.41)	(1.30)
Portugal	-11.21***	-13.56***	-17.41***	-7.99***
	(0.67)	(0.83)	(0.89)	(0.78)
Italy	-5.07***	-11.05***	-8.61***	-9.43***
	(0.68)	(1.44)	(1.45)	(1.42)
UK	-10.20***	-14.34***	-14.95***	-5.02***
	(0.67)	(1.11)	(1.14)	(1.07)
Size class:				
0 Empl.				8.51***
				(0.47)
5-9 Empl.				-2.70***
				(0.52)
10-19 Empl.				-2.10***
				(0.55)
more than 20 Empl.				-0.24
				(0.64)
duration:				
two-year-dummy	4.84***	5.69***		5.22***
	(0.40)	(0.44)		(0.42)
by country:				
Denmark			1.57*	
			(0.94)	
Finland			2.31**	
			(1.03)	
Sweden			8.37***	
			(0.98)	
Spain			-0.82	
			(1.38)	
Portugal			15.45***	
			(0.93)	
Italy			0.19	
			(0.94)	
UK			7.47***	
			(0.93)	
GAP		-1.83***	-1.24***	-1.93***
		(0.39)	(0.38)	(0.39)
Adjusted R^2	0.42	0.43	0.51	0.2
No. of Obs.	1271	1271	1271	4415

1. Each equation includes industry dummies. The reference group is the food, beverage & tobacco industry in Denmark. In equation IV the size class with 1-4 employees is the reference.

2. A * indicates significance at the 10% level, ** at the 5% and *** at the 1% level.

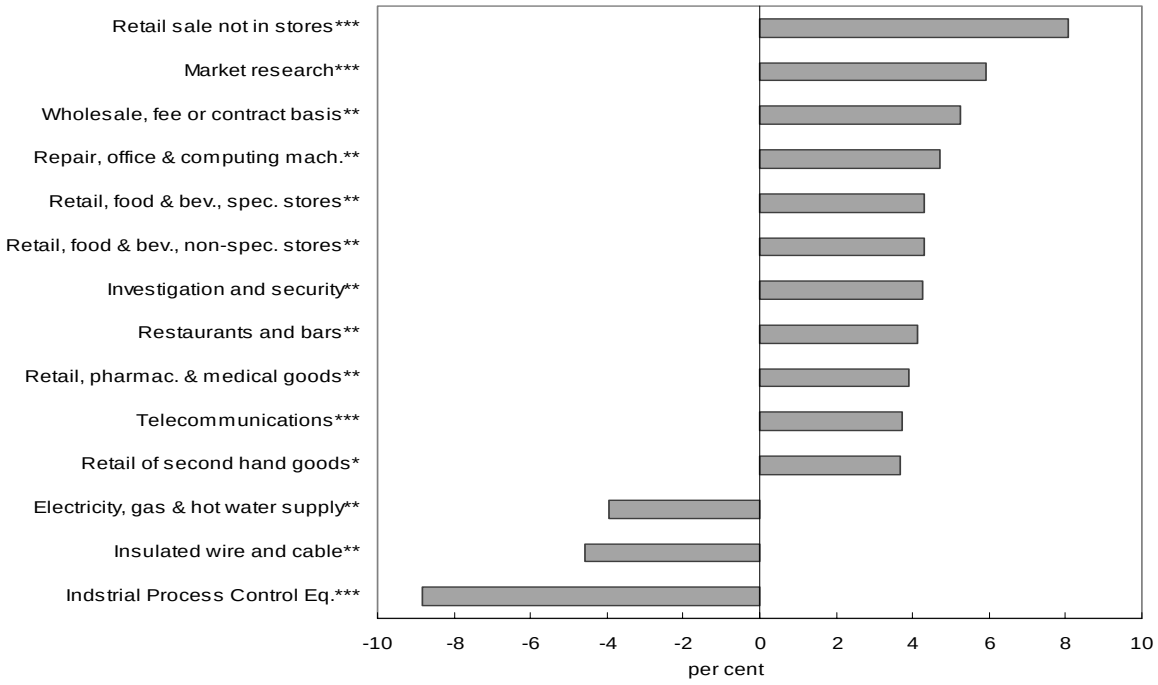
3. Standard errors in parentheses.

Source: OECD estimations based on Eurostat data. Output gap variable from the OECD Economic Outlook.

55. In line with many earlier findings, the estimated size class fixed effects in equation III of Table 6 indicate that smaller firms face higher risk of failure, although hazard rates do not increase monotonously with size class. The reference is the size class with 1-4 employees. Single person firms face higher risks of failure, while the fixed effect for the size classes with 5-9 and with 10-19 employees is lower. On the other hand, the fixed effect for firms with more than 20 employees is not statistically significant. However, one should bear in mind that the population of very young firms with more than 20 employees is extremely small in most industries. When this is the case, even the failure of a single firm can result in very large hazard rates.

56. Figure 10 shows the estimated fixed effects for those industries where they are significant. In general, hazard rates do not differ significantly across sectors, although there are two industries, industrial control equipment and insulated cable and wire, where hazard rates are even lower than in the food & beverages industry. In contrast, the risk of failure for young firms seems to be a little bit higher in some services industries, especially in retail and wholesale sectors, but also telecommunications.

Figure 10. **Industry fixed effects for hazard rates**



Note: Equation II in Table 6. For an explanation how to interpret industry fixed effects see Figures 7 and 8.

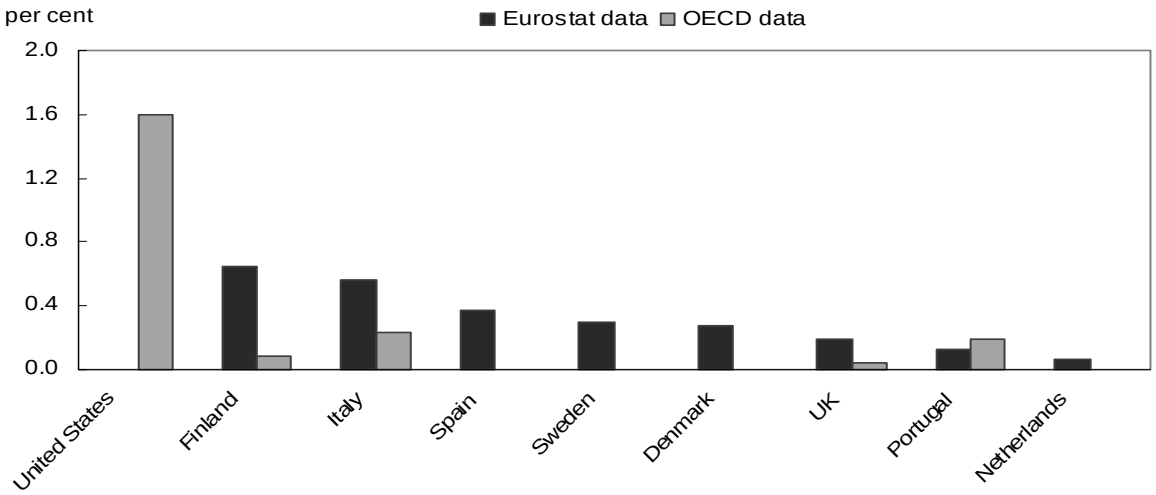
Source: OECD estimations based on Eurostat data.

57. Many studies have found that those firms that do survive generally grow very fast. The time period covered by the Eurostat data is too short to study the growth of new firms thoroughly. However, it does allow for a look at two-year employment gains to get a first impression. Figure 11 compares two-year growth rates of new firms for the Eurostat data and the OECD firm-level data. Growth is defined as total employment in all firms that have survived two years as a percentage of total employment in those same firms when they entered two years earlier. This means that the employment growth of each firm is weighted by the relative size of this firm in terms of initial employment, accounting for the concern that it is of course easier for small firms to experience very fast growth rates, since they start from a lower base.

58. One important result that emerged from the earlier OECD firm level study was the substantial difference in new firm growth between the US and European countries. Figure 11 shows that for most European countries covered by both data sets, new firm growth is a lot higher according to the Eurostat data than according to the OECD data. It is in the range of 10% to 20% of initial employment when the OECD data are used to calculate average net employment gains of surviving firms, while it varies between 13% and 65% when the Eurostat data are consulted instead. Neither of the data sets suggests that European firms reach two-year employment gains anywhere close to 100% as do US firms according to the earlier OECD study. Yet, the difference between new firm growth in the US and in Europe does not seem as large anymore when comparing the new Eurostat figures to the US data analysed by Bartelsman *et al.*, (2003). It should be noted that the Eurostat data cover a boom period only, while the OECD data cover both periods of economic upturns and of downturns for most countries. This may explain at least partly why young firms in some countries appear to grow faster according to the Eurostat data. In some cases, most notably Finland, the difference in estimated employment gains seems so large, however, that it can probably not be attributed to different sample periods alone.

Figure 11. **Two-year employment gains of surviving firms**

OECD vs. Eurostat data



1. The data report net gains as a percentage of initial employment.

2. UK, Dutch and Italian data cover the manufacturing sector only.

3. OECD data are averaged across different cohorts born in the 1990s. Eurostat data cover the cohort born in 1998 only.

Source: Eurostat; OECD firm-level data project (www.oecd.org/EN/document/0,,EN-document-3-nodirectorate-no-1-35177-3,00.html)

59. Some of what is identified as new firm growth with the OECD firm level data may be due to younger firms merging with other enterprises. Earlier research on firm growth suggests that whether or not mergers and acquisitions can be distinguished from genuine firm growth may have substantial effects on results (Schreyer, 2000). In a Swedish panel of firms analysed in that study, only one third of employment gains of a set of high-growth firms is due to internal growth, the rest being a result of mergers and acquisitions and related demographic events. It could be the case, that M&A activity during the 90s has been somewhat larger in the US than in most other countries. This might explain a part of the large observed difference in post-entry growth which has been found in the OECD firm-level study. This underscores once again that it is important to be aware of the data characteristics when drawing conclusions from business demographics results. Size thresholds and the ability to differentiate between genuine firm entry and exit, growth or survival and other demographic events, may have an impact on findings.

60. A further explanation for the fact that the Eurostat data suggest higher new firm employment gains for Finland, Italy, and the UK than the OECD data may be that firms without employees are excluded from the latter. It is a frequently documented finding that smaller firms tend to grow faster, and in many studies this is also found to be true when employment growth rates are weighted with firm size. Consequently, not covering the smallest firms is likely to result in lower estimated growth rates. This also implies that new firm growth should be expected to be higher for the US, as well, once single-person firms are included in the data. While some of observed difference in post-entry growth found in the OECD firm-level study may be due to data problems, the general result that entrant's employment growth is higher in the US than elsewhere is likely to persist. This may partly be due to the larger market size in the US resulting also in a larger average firm size. Successful entrant firms therefore have to grow faster to reach the minimum efficient scale.

61. The analysis in this section, although only tentative due to a short time horizon of the data, suggests that there are considerable cross-country differences in new firm survival and growth. Small new firms face a higher risk of failure. Yet, if they do survive, they grow fast approaching the average incumbent's size. These findings fit well into the theories of firm learning discussed above, if some scale effects are assumed to be present. Faced with an uncertain environment, firms enter at a smaller than optimal size. These young and small entrants have to grow fast to reach the minimum efficient scale. Before they have done so, they face a high risk of failure. Yet, older firms that have reached the minimum efficient scale are less likely to fail. There is some evidence that the relation of firm size and firm age with growth and survival is a lot less clear-cut in the services industries (Audretsch, *et al.*, 1997). This fits into the minimum efficient scale interpretation, since economies of scale are less prevalent in service than in manufacturing industries.

Conclusions and directions for further research

Empirical results

62. The analysis of firm demographics with a new Eurostat data set confirms a number of stylised facts, while also revealing some features that have not been discussed in the prior literature.

- Firm turnover is considerable. In any given year, it involves 10% to 15% of manufacturing firms. In services industries it is even higher, reaching almost 20% on average in a number of countries. This involves less than 1% of total employment in some countries, however, reflecting the fact that entrants are a lot smaller on average than incumbents. The lion's share of firm entry is due to firms that have no employees at all.

- While the average size of entrant firms suggests that entry is easier for small firms, the risk of failure is higher for them as well. Only a few new firms survive for long, yet, those who do survive often grow very fast. This pattern is in line with learning models developed by Jovanovic (1982), according to which firms learn about market conditions and their own efficiency only upon entering the market. To minimize cost in the case of failure, they prefer entering at a small size. If they turn out to be profitable and stay in the market instead, they have to grow fast to reach the minimum efficient scale, otherwise they risk failing.

- Entry and exit rates are highly correlated across industries and net entry constitutes only a tiny fraction of gross entry and exit rates. This suggests that firm entry and exit are an element of a process of search and experimentation, where new firms replace outpaced incumbents without affecting much the total number of enterprises in the market.

- Firm entry and exit vary a lot across industries. They seem to be closely linked to the maturity of sectors. Market entry is relatively low in mature industries, many of them belonging to the manufacturing sector. In contrast, a large number of firms enter in young markets; during the late 1990s especially in those related to ICT. This suggests that the experimentation process associated with firm entry and exit is important for the development and adoption of new products and technologies. Shifting resources to new and promising markets involves a large amount of firm turnover, as many young firms fail trying to implement their ideas.

- Results presented in this paper reveal that average cross-country differences in entry rates are a lot lower than differences across industries. Taken at face value, this seems to imply that technological factors and the maturity of industries are more important as determinants of firm entry than country specific factors. However, the cross-country variation of entry rates in young and dynamic industries particularly those related to ICT is considerable. This suggests that country specific factors, including policies and institutions, are an important driving force for the process of firm entry and exit, which is crucial for shifting resources to young and promising markets. Country-specific factors seem to be less important in more mature industries.

- Cross-country differences in new firm survival and growth are larger than differences in firm entry, suggesting that if the role for policies and institutions in shaping firm entry is limited at least in the more mature industries, it seems to have a sizeable impact on chances for new firms to survive and prosper.

63. The comparison of results obtained with Eurostat data and with OECD data respectively, shows that different size thresholds and the ability to distinguish between genuine firm entry and exit and demographic events involving third parties can affect data characteristics considerably. This has a sizeable impact on the measured size of entering and exiting firms. There are indications that some conclusions concerning patterns of firm entry, survival and growth change due to the data differences, although a number of stylised facts emerge from both data sets in the same way. However, the data problems may prove more important, once the link between policies and firm dynamics and their role for economic performance are studied more concretely. Genuine firm birth and subsequent survival are likely to be affected differently by policies and institutions than mergers and acquisitions, ownership changes and changes in legal form. While genuine firm birth is important for technology adoption and innovation according to various models of Schumpeterian creative destruction discussed above, it is less clear on the basis of these theories whether a similar link exists between economic performance and mergers and acquisitions or related events. The restructuring often associated with M&As may also boost productivity growth, but the dynamics of this process are likely to be different from that associated with new firm entry. The largest effect of young firms on overall productivity is often found to occur after a process of learning and selection has taken place (Baldwin and Gu, 2003). Since M&As involve firms that have already gained market experience, their effect on productivity may occur faster. Therefore, it is desirable to be able to rely on data that identify genuine firm birth as best possible, when studying links between policies, firm dynamics and economic performance. Ideally, the role of alternative demographic events should be analysed separately.

The potential role for policies and institutions

64. According to Schumpeterian theories of creative destruction a process of search and experimentation associated with high rates of firm entry and exit is vital for innovation, technology adoption and thus productivity growth and overall economic performance. The data support the notion that firm entry and exit are part of an experimentation process, which is particularly lively in young industries associated with new technologies. Since the highest rates of firm entry have occurred in ICT related

industries during the late 1990s, the data seem to support the idea that new firms have an advantage in developing and adopting new technologies.

65. These findings call for a focus of policy attention on creating framework conditions that foster the survival and growth of profitable firms, while hindering the experimentation process associated with firm entry and exit as little as possible. This also involves allowing the market exit of unprofitable firms.

66. Since new firms seem to be especially important for innovation and technology adoption, product market regulations which constitute direct or indirect barriers to entry may impinge on a country's innovative activity. Prior OECD research (Scarpetta *et al.*, 2002) has shown that product and labour market regulations have had a negative impact on both firm entry and productivity in OECD countries. Therefore, legal barriers to entry should be avoided unless their benefits are likely to outweigh the cost that consists in hindering the potential of young firms to help shift resources to new and productive uses, innovate and adopt new technologies. To avoid impinging on firm entry, administrative procedures required for the establishment of new enterprises should be simple, transparent and fast and fees associated with them should not be unduly high. It may also be worthwhile to discuss whether governments should actively promote the creation of new firms and their survival, e.g. by providing cheap credit to newly created firms and organising fairs to help them establish business contacts.

67. The finding that on average cross-country differences in new firm survival and growth are much more accentuated than differences in firm creation rates suggests that policy attention should also focus on post-entry performance. However, rather than trying to ensure survival and growth of young firms at all costs, countries should provide framework conditions that help profitable firms to survive and prosper, while allowing unprofitable firms to exit the market. Administrative procedures and regulations that are simple and transparent without imposing unduly high costs on firms are as important for young enterprises to survive and grow as they are for the decision of potential entrepreneurs to enter the market. In addition, a number of framework conditions are important to enhance the chances of new firms to prosper.

68. For new firms with risky projects and often little assets it is important to find well-developed capital markets. While there is no single type of financial system that is best for providing funds efficiently to new firms, countries' financial market regulations should allow the development of new market segments and financial instruments, as these might be important for channelling funds to innovative, but potentially risky projects. At the same time, as long as financial market institutions are such that new firms with a potential to be profitable have access to funds, more traditional financial instruments may prove just as useful. Depending on the existing financial market system in a country, there may be a variety of policies and institutions to achieve this goal.

69. Young firms developing and implementing new products and technologies often depend on high-skilled labour and managerial aptitude. Well-developed education systems can enhance the provision of both. Countries should ensure a high quality of teaching, especially in sciences and engineering, to increase the pool of high-skilled labour from which enterprises can draw. With well-designed programs, schools and universities may also help foster the entrepreneurial spirit of a society and equip students with some managerial skills. At the same time, policies and institutions that encourage entrepreneurship, with bankruptcy laws allowing owners of failed enterprises to take second chances, may also contribute to building a society with an elaborate pool of entrepreneurial skills and experience.

70. Market exit of young firms that have turned out not to be profitable should be considered an integral part of the process of search and experimentation which leads to innovation and new technology adoption. The findings of this paper suggest that countries' policies and institutions should not unduly hinder market entry *or* exit, since both firm creation and destruction are indispensable for the learning and experimentation process which is vital for flourishing entrepreneurship. Since firms know that they might

be forced to exit the market in the eventuality of failure, barriers to exit may discourage them from entering the market much in the way as entry barriers would. Likewise firms have lower incentive to grow if they know that they will face high costs when being forced to shrink later. Thus, excessively stringent bankruptcy laws or employment protection regulation (EPL), which make it very costly for firms to exit the market or contract in case they turn out not to be profitable, should be avoided. Rather, flexible and transparent institutions facilitating both market entry of new firms and exit of failed enterprises would be in the spirit of the interpretation of entrepreneurship as a process of search and experimentation indispensable for innovation, technology adoption and economic growth.

Ongoing OECD research and some suggestions for the future

71. While it is important to study the role of policies and institutions for firm entry, exit and survival, it is not *a priori* clear whether higher or lower rates of firm entry and exit are preferable or whether or not high rates of firm survival should be pursued. It is therefore desirable to take a closer look at the link between firm dynamics and countries' economic performance. The Schumpeterian theories discussed above suggest that new firms play an important role for innovation and the adoption of new technologies. New firms may have an innovative advantage, because unlike incumbents they do not have to retool their production process to adopt new technologies. At the same time, competitive pressure due to firm entry and exit might force both incumbents and entrants to innovate in order to be able to stay in the market. High entry rates in ICT related industries suggest that new firms may have been important for the development and adoption of information and communication technologies.

72. Previous OECD research (Scarpetta *et al.*, 2002) has shown that firm entry and exit help increase aggregate productivity growth by shifting resources from old and less productive firms to new and more productive ones. This has been studied by decomposing aggregate productivity growth into the contribution of individual firms' productivity growth (within effect), of shifting market shares between firms with different productivity (between effect) and of firm entry and exit. A decomposition with an alternative technique for Canada shows that because new firms are much more productive than exiting firms, net entry contributes significantly to aggregate productivity. Entering cohorts become more productive on average over time both as a result of selection and of learning, as competition forces the less productive firms to leave the market, while surviving young firms improve their productivity (Baldwin and Gu, 2003).

73. However, firm turnover may not only affect overall productivity growth by the virtue of reallocating resources from low- to high productivity units, but also because the competitive pressure associated with it forces all firms, old and new alike, to innovate and improve their productivity. Ongoing research at the OECD is taking a closer look at the link between firm entry rates and subsequent productivity growth and innovation activity in industries. First results reveal that there is a link between firm birth and economic performance especially in the service sector, which comprises many of the young and dynamic ICT–related industries. Industries with high entry rates tend to experience higher than average employment and output growth. Moreover, high firm entry in a given sector seems to entail higher than average investment in innovation and higher productivity growth subsequently. This relationship is less clear-cut in the manufacturing sector comprising mainly mature industries, which are often subject to considerable scale economies, while experiencing relatively low firm turnover. This seems to suggest that the product life cycle may have some important implications for the relationship between firm entry and economic performance. Young industries, in which the number of firms increases as a result of high net entry, also expand in terms of employment and output. This expansion most likely occurs in response to unexploited business opportunities in younger markets. A further, albeit somewhat tentative conclusion for these results would be that small-scale innovative activity occurring as part of a trial and error process, which involves many new firms, seems important for productivity growth in services. In manufacturing, where scale effects are more prevalent, formal research and development projects conducted by full-time

researchers in large-scale laboratories outweigh the impact of young and small firms' innovative activity on productivity.

74. Given the results of this paper, it would also be helpful to devote future efforts to investigating the role of policies and institutions for firm dynamics more concretely, giving a special emphasis to ICT-related industries. The effect of product and labour market regulations on firm entry has been investigated in previous OECD work (Scarpetta *et al.*, 2002). This could be complemented by an investigation of the role of the development of high-risk capital markets, bankruptcy laws and the availability of highly-skilled labour. The results of this paper suggest that policy factors are likely to have a stronger impact on post entry performance than on firm creation. This could be investigated further by linking policy variables to new firm survival and growth.

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APPENDIX

Table A1. **Size class distribution of all active firms**

(average, 1997-2000)

Year	Size Class	Belgium	Denmark	Italy	Finland	Spain	Netherlands	Portugal	UK	Sweden
All	0 Empl.	62.61	58.18		61.19	56.35	37.87	56.06	26.54	63.80
	1-4 Empl.	19.49	27.79		27.88	32.37	45.49	31.51	52.32	24.94
	5-9 Empl.	1.35	6.52		5.45	5.89	6.54	6.21	10.66	5.61
	10-19 Empl.		3.85		2.86	2.96	4.27	3.41	5.93	2.97
	20+ Empl.	0.73	3.66		2.63	2.42	5.84	2.81	4.55	2.67
Manufacturing	0 Empl.	47.00	47.64	51.51	55.39	34.82	32.96	44.10	18.69	54.23
	1-4 Empl.	26.93	23.02	25.25	24.76	36.30	31.21	28.64	44.33	23.01
	5-9 Empl.	9.59	10.10	9.78	7.55	12.06	11.91	9.93	14.29	8.77
	10-19 Empl.	6.52	7.76	7.42	5.11	8.28	9.59	7.87	10.27	5.97
	20+ Empl.	9.95	11.47	6.04	7.19	8.53	14.33	9.46	12.43	8.02
Services	0 Empl.	64.16	60.12		62.68	60.09	37.04	55.69	25.74	65.55
	1-4 Empl.	25.93	28.22		27.98	31.66	48.67	34.15	53.92	24.75
	5-9 Empl.	4.94	5.71		4.90	4.68	5.82	5.83	10.70	5.10
	10-19 Empl.	2.67	3.18		2.43	2.03	3.58	2.60	5.72	2.53
	20+ Empl.	2.30	2.77		2.01	1.54	4.90	1.73	3.91	2.08

1. The table entries correspond to the number of firms belonging to a certain size class as a share of all firms in the same sector.

Source: *E*urostat.

Table A2. **Exit rate regression**

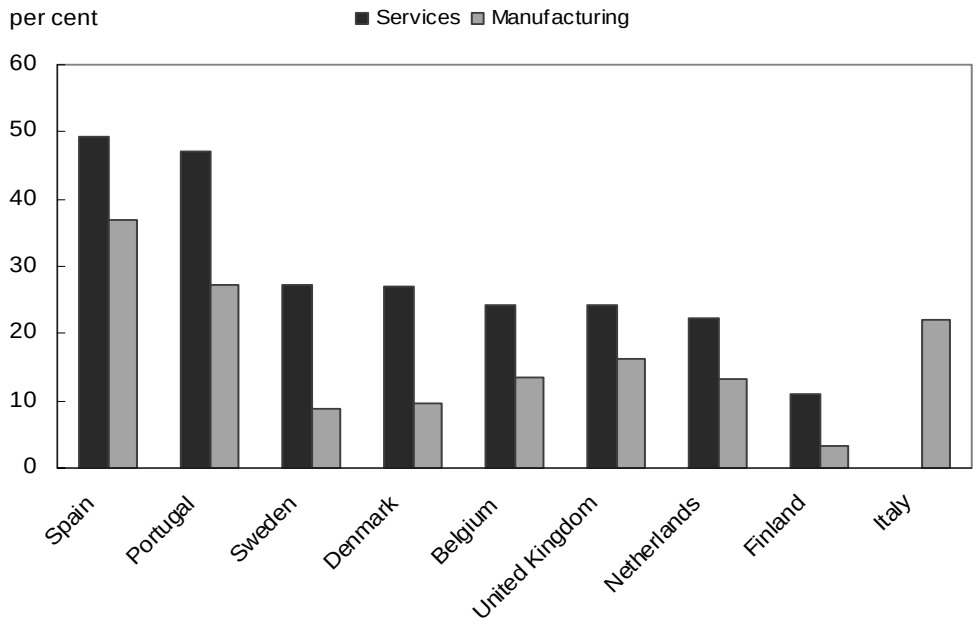
(dependent variable: exit rate of industry j in country i estimated over 1997-1999, fixed effects estimator)

	I	II	III
	With industry fixed effects and year dummies	also with an output gap variable	also with country-specific ICT-effects
Constant	7.41***	7.30***	6.80***
	(0.53)	(0.54)	(0.85)
Finland	-1.32***	-1.02**	-0.47
	(0.26)	(0.40)	(0.41)
Belgium	-1.44***	-1.12***	-0.47
	(0.26)	(0.43)	(0.44)
Netherlands	-0.78***	-0.74	-0.56*
	(0.29)	(0.60)	(0.31)
Sweden	-3.15***	-1.62***	-1.88***
	(0.26)	(0.33)	(0.49)
Spain	-1.22***	-0.51	-0.24
	(0.33)	(0.40)	(0.59)
Portugal	-1.81***	-1.62	-1.22***
	(0.25)	(0.33)	(0.34)
Italy	-0.79***	-0.51	0.18
	(0.26)	(0.40)	(0.40)
UK	1.29***	1.50***	1.99***
	(0.25)	(0.34)	(0.35)
ICT effects by country:			
Finland			-3.49***
			(0.68)
Belgium			-3.99***
			(0.69)
Netherlands			-1.20***
			(0.76)
Sweden			-5.54***
			(0.68)
Spain			-3.56**
			(1.58)
Portugal			-2.50
			(0.68)
Italy			-4.37***
			(0.68)
UK			-3.10***
			(0.68)
DUM98	-0.31*	-0.39**	-0.39**
	(0.16)	(0.18)	(0.18)
DUM99	-0.002	-0.12	-0.12
	(0.16)	(0.21)	(0.20)
GAP		0.11	0.11
		(0.12)	(0.12)
Adjusted R^2	0.5	0.5	0.52
No. of Obs.	1534	1534	1534

1. OECD estimations based on Eurostat. Each equation includes industry dummies. The reference group is the food, beverage & tobacco industry in Denmark.
2. A * indicates significance at the 10% level, ** at the 5% and *** at the 1% level.
3. Standard errors in parentheses.
4. Output gap variable from the OECD Economic Outlook.

Figure A1. **Relative average entrant size in terms of employment per firm**

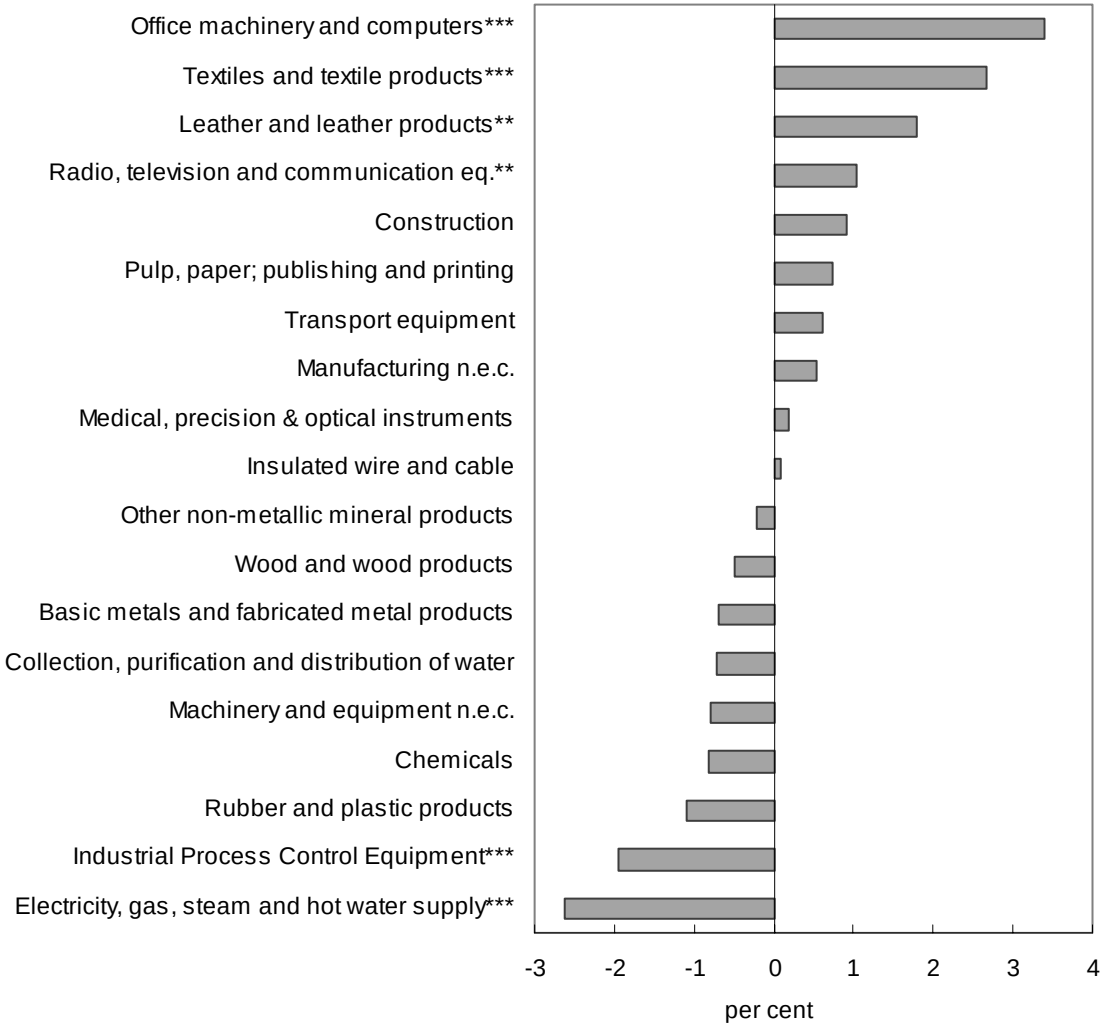
(as a percentage of the average size of all active firms, 1997-2000)



1. The relative average entrant size is measured as the average total employment per entrant firm as a percentage of total employment per firm averaged over all active enterprises.

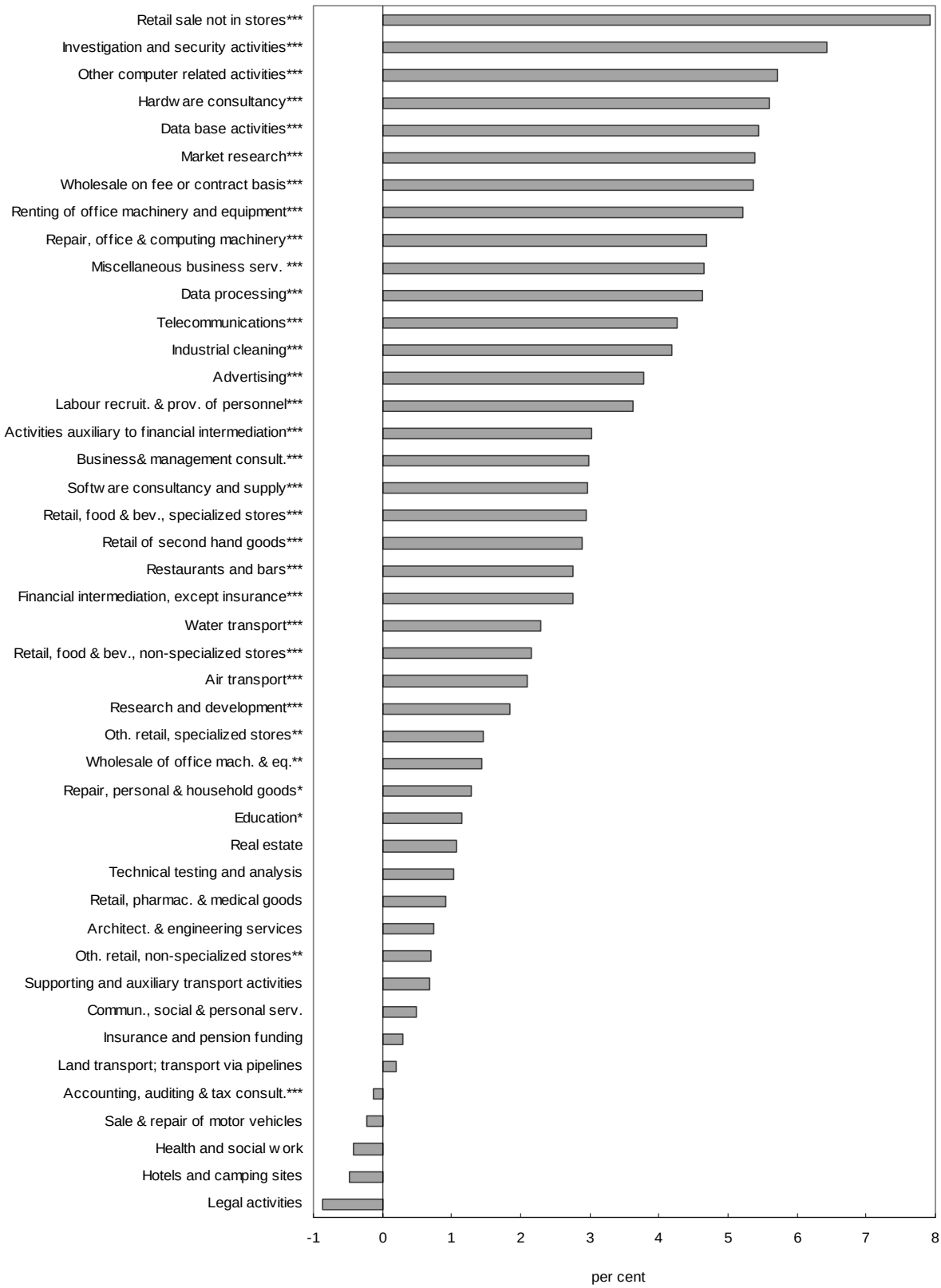
Source: Eurostat.

Figure A2. **Industry fixed effects of the exit rate regression for non-service industries**



1. Equation II in Table A2.* indicates significance at the 10%, ** at 5%, *** at the 1% level. For an explanation how to interpret industry fixed effects see Figures 7 and 8.

Figure A3. **Industry fixed effects of the exit rate regression for services**



1. Equation II in Table A2.* indicates significance at the 10%, ** at 5%, *** at the 1% level. For an explanation how to interpret industry fixed effects see Figures 7 and 8.