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SMEs and Employment
Creation: Overview of
Selected Quantitative
Studies in OECD Member
Countries

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**SMEs AND EMPLOYMENT CREATION: OVERVIEW OF SELECTED QUANTITATIVE STUDIES
IN OECD MEMBER COUNTRIES**

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SMEs and Employment Creation: Overview of Selected Quantitative Studies in OECD Member Countries

Paul Schreyer*

High and rising unemployment rates in the early 1990s have moved the employment question centre-stage in the policy debate. Among the structural aspects, the relation between firm size and employment creation has attracted policy makers' attention, triggered by empirical work on the United States which showed that the small business sector had been a major source of net job creation. This work and the rising interest by policy-makers led to further studies of the subject, the identification of important methodological and data questions and a broader body of empirical research about the relation between firm size and job creation.

This document aims at identifying common results and trends from national studies, as well as identifying "best practices" of analysis and data gathering, and thereby promoting international harmonisation of such analytical work. Principal results from a survey of national studies include: (a) both the rates of gross job creations and gross job losses are significantly higher among small firms than among large ones, reflecting greater turbulence among small firm employment; (b) gross flows of employment creation and losses tend to be dissociated from net flows. In periods of overall strong employment losses (gains), there are still sizeable flows of gross job gains (losses); (c) many studies find also a clear negative relationship between net job creation rates and the size of establishments or firms; (d) methodology matters, certainly for the magnitude of the relation between net job creation and firm size and in several cases also for the direction and quality of this relation.

Au début des années 90, le niveau élevé et croissant des taux de chômage a porté la question de l'emploi sur le devant de la scène dans le débat sur l'orientation de l'action des pouvoirs publics. Parmi les aspects structurels, le lien entre la taille de l'entreprise et la création d'emplois a retenu l'attention des responsables de l'action gouvernementale, des études économétriques réalisées aux Etats-Unis ayant montré que le secteur des petites entreprises est une importante source de création nette d'emplois. Ces travaux, ainsi que l'intérêt croissant manifesté par les autorités, ont amené à effectuer d'autres études sur ce sujet, à poser d'importantes questions méthodologiques et statistiques et à élargir les recherches économétriques concernant la relation entre la taille de l'entreprise et la création d'emplois.

Ce document vise à déterminer les tendances et les résultats communs aux études nationales, ainsi que les "meilleures pratiques" d'analyse et de collecte de données, afin de favoriser l'harmonisation, au plan international, de ce genre de travaux. Un examen des études nationales montre que les principaux résultats qui s'en dégagent sont les suivants : (a) les taux de création brute et de perte brute d'emplois sont nettement plus élevés parmi les petites entreprises que parmi les grandes, ce qui reflète des mouvements de main d'oeuvre plus importants dans les petites entreprises ; (b) les flux bruts de création et de perte d'emplois tendent à se dissocier des flux nets. Dans les périodes de forte baisse (augmentation) de l'emploi au niveau global, on observe encore des flux non négligeables de gains (pertes) bruts ; (c) de nombreuses études mettent aussi en évidence une relation négative marquée entre les taux de création nette d'emplois et la taille des établissements ou des entreprises ; (d) la méthodologie a une importance certaine dans l'intensité de la relation entre la création nette d'emplois et la taille de l'entreprise et, dans plusieurs cas, également dans la direction et la qualité de cette relation.

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Introduction

1. In 1992, the OECD Industry Committee requested its Working Party No. 9 on Industrial Statistics to compile quantitative information on small and medium-sized enterprises (SMEs) with a view to supporting the more policy-oriented work of the OECD Working Party on SMEs. In line with interests of this Group, “SMEs and employment creation” was one of the areas for which national quantitative studies were compiled. This report aims at identifying common results and trends from national studies, as well as identifying “best practices” of analysis and data gathering, and thereby promoting international harmonisation of such analytical work. The following sections rely both on studies that were specifically transmitted to the Secretariat by OECD Member countries and on other material available to the Secretariat, in particular papers presented to the OECD High-Level Workshop on *SMEs: Employment, Innovation and Growth*, held in Washington, DC in June 1995. No claim is made to be exhaustive in the coverage of relevant studies.

SMEs and job creation

2. High and rising unemployment rates in the early 1990s have moved the employment question centre-stage in the policy debate. The effects of the business cycle as well as underlying structural questions have been the subject of a large body of research and policy recommendations. Among the structural aspects, the relation between firm size and employment creation has attracted policy makers’ attention, triggered by empirical work by David Birch (1981, 1987), who pointed out that, in the United States, the small business sector had been a major source of net job creation. Birch’s work and the rising interest by policy-makers in employment issues led to further studies of the subject, both in the United States and in other countries. Soon a debate emerged, mainly in academic circles about the robustness of Birch’s results with respect to their validity across countries, sectors and over time and several important methodological and data questions were identified. This led to an improvement in methods of analysis and the understanding of the importance of firm size in job creation.

3. Nearly all empirical studies dealing with the subject of firm size and job creation use data at the firm and/or establishment level. Traditional aggregate data can provide useful information about the development of employment by size class over time, the size distribution of firms or establishments by industry or the links with other performance indicators such as productivity or exports (see, for example, Small Business Administration (1994) or Ministère de l’Industrie (1995)), but micro-level data is needed to trace the *dynamics* of job creation by size class. As firms or establishments may change size classes over time, a comparison of aggregate data cannot be used to get indications about the dynamics of the process, i.e. about the relation between firm size and job creation or job losses. Although the use of longitudinal, micro-level data has opened new perspectives of analysis, there are several methodological issues concerning the quality of the underlying data set and the methods to draw inference from this data set.

Box 1 Firms vs. establishments as statistical units

In most national statistics, firms (businesses, enterprises) are those units that make up a legal or administrative entity whereas establishments are production units at a single location. Thus, there is at least one establishment per firm. For micro-enterprises and often also for small enterprises, the two categories coincide.

The case for the use of *firm*-level data relies on several arguments:

- It is usually at the firm level that decisions are taken about products, prices, markets, suppliers, investment and R&D, with the resulting impact on the firm's economic performance.
- The firm level corresponds closer to the notion that underlies the public debate on job creation.
- Many policy-measures targeting SMEs are tied to the criterion of firm size.
- Firms as legal entities are typically the unit that deals with public authorities, for example concerning income or profit statements or taxation. These administrative links open up statistical sources that can provide the bases for SME statistics.

The following points favour the use of *establishment*-level data:

- If the size dimension of the production process is a determinant of performance, observations at the establishment level are preferable to observations at the firm level.
- Different establishments of one firm may be engaged in quite distinct activities with diverging technical and organisational characteristics. If, for example, establishments are organised as profit centres of one firm, it is the establishment level at which many economic decisions are taken.
- Measurement problems of births and discontinuances resulting from a change in ownership are more common at the firm level than at the establishment level.
- Spatial aspects can be central to the study of certain policy issues such as rural or regional development. For this type of issues, the establishment level appears more appropriate than the firm level as a statistical unit.

Although the choice of one or the other unit can depend on the specific question to be addressed with the data, the OECD experts group on SME statistics felt that, on balance, firms would be the most promising basic unit for data collection.

Picot and Dupuy (1995) report on differences between assigning industry codes at the firm and at the establishment level for Canadian data. They point out that: "for the economy as a whole, the impact was relatively small. When industry was coded at the firm level, 95.3 per cent of employment had the same 3-digit SIC code as when industry was determined at the establishment level. Particular industries in which there is substantial vertical integration, such as forestry and petroleum, may [however] display significant differences in the codes."

4. **Choice of sources.** Private and public business registers and specifically conducted surveys are the typical source for longitudinal studies. Unlike business registers, survey-based data are collected on an ad-hoc basis and provide fewer details about the evolution over time. On the other hand, specific surveys can be designed with greater depth, looking at a broader set of variables and linking, for example, firm-size, employment and innovation. A recent Canadian study (Statistics Canada (1994)) provides an example for the design and exploitation of a survey of this kind, combining information on strategies of SMEs with their innovation and employment performance. It is interesting to note that the sample of firms surveyed in this study was actually chosen on the basis of information from longitudinal data: as the purpose of the study was to give a picture of growing SMEs, only those firms were eligible for the study

that had grown in employment, sales and assets between 1984 and 1988. This information came from Statistic Canada's longitudinal file linking firms over this period (see Box 2).

5. Work has also started at the international level to bring together firm or establishment-level databases, in the context of a major project on business registers conducted by Eurostat and in the context of a three-country comparison of data sets at the OECD.

6. **Definition of size-classes.** The definition of size-classes is one of the recurrent problems in the work with firm or establishment-size data. Several issues arise: first, which variable is used to define size? Most frequently, the choice falls on employment although a case could be made to use value-added or turnover. The choice of the size-class boundaries that represent "small" and "medium-sized" entities is a second issue. Average firm or establishment size varies between countries. Significant international differences in the notion of SMEs reflect this fact. Where national size classes are different, this requires either resource-intensive conversion procedures or seriously impairs international comparability. International proposals exist on employment size classes, defined, for example, by OECD and Eurostat.

7. **Manufacturing industry versus total economy.** For historical and technical reasons, certain longitudinal databases cover only manufacturing industry or the goods producing sector. One example is the Longitudinal Research Database (LRD) at the Centre for Economic Studies in the United States Bureau of the Census. LRD contains plant level data for the manufacturing sector of the US economy. Therefore, several U.S. studies on firm size and employment dynamics are confined to manufacturing industry. As SMEs play an important part in the service sector of the economy and as the service sector has been a source of employment growth, the limitation of analyses to manufacturing industry would seem to be a drawback. However, trade-offs have to be considered: as Davis et. al. (1994), point out, LRD contains the most detailed information on plant characteristics and so allows a careful treatment of the statistical sampling frame and the best treatment of entry and exit. Also, if analysis of these data shows that SMEs account for a disproportionately high share of net job creation in *manufacturing*, a good case can be made that results carry over to the service sector. If results turn out differently, however, this claim cannot be made.

8. **Firms, establishments, plants.** Different longitudinal data sources are often based on different units which include firms, establishments and plants. No *a-priori* answer exists which unit is preferable for analysis. Choices depend on data availability and on the specific subject of investigation (see Box 1).

9. **Definition of start-up, discontinuance and failure.** The definition of the creation of a firm or establishment may be unclear, in particular concerning micro-enterprises where the distinctions between activities undertaken by a firm and those undertaken by an individual are blurred. In the United States, for example, no official register or definition of new businesses exists [for a discussion see Duncan and Handler (1994)]. Discontinuance, i.e. the closure of a firm for any reason, must be distinguished from failure which is one possible discontinuance and consists of closing down with outstanding debts. Yet another tricky question concerns the treatment of mergers and majority controls of firms.

10. **Head counts versus full-time equivalent** As always when employment measures are used, a clear distinction must be made between measuring the number of heads of persons employed and measuring full-time equivalent persons. This distinction could weigh heavily in the analysis of SMEs and employment creation: part of the more rapid employment creation observed in small firms relates to the more rapid growth of part-time employment in small business relative to large business.

11. **Choice of time interval.** In longitudinal studies, the length of the period chosen for analysis has a significant impact on the attribution of job creation to birth and expansion and to different size cohorts.

“Take the example of a birth in the smallest size class in 1990 which has expanded rapidly in 1991. In a two year study starting at end-1989, when the firm did not exist, the only information available would be the employment at end-1991 and hence all the job creation would be attributed to a large birth. In a year-by-year study, each of the components of job creation -- a small birth and then a substantial expansion of a small firm -- would have been detected and attributed accordingly. In general, the proportion of gross jobs created that is attributed to births will increase with the length of the time interval used in a study. This causes a serious problem for comparison of studies which use different time intervals.” (Department of Trade and Industry, 1995). This choice of the time dimension and the distinction between long-term and short-term effects can have marked influence on results [for a detailed discussion and a comparison of methods see G. Picot et al. (1994)].

12. **Allocation to size class.** The time dimension of the measurement of size has also a potential impact on the data used and the conclusions derived: opinions vary whether size is measured as initial size, or as average size. In the first case, a firm is classified as "small" if it corresponds to the criterion "small" in a *base period*. The subsequent net job creation is then attributed to this particular size, irrespective of whether the firm under consideration has moved into a different size class during the period of observation. It has been shown that such a base-year size allocation can lead to the **regression-to-the-mean bias** and potentially misleading interpretation of the results. The bias arises from transitory deviations of employment from long-term size¹. To avoid the bias, other methods for the allocation to a particular size class have been proposed, in particular the classification of a firm or establishment as "small" if it corresponds to the criterion "small" on average *over the period of observation*.

13. Several recent studies (see Table 2) have used both allocation methods to test for sensitivity of results. As the overview of these studies shows, there is no clear-cut answer to the question about the empirical importance of the regression-to-the-mean bias. However, quantitative results tend to be sensitive to switching methods of firm-size allocation although the direction and quality of results do not necessarily change as the example from Canada shows. Sensitivity tests were also carried out by other researchers, for example by Davidsson (1994) for Sweden and by Van Hoesven et al. (1994) for the Netherlands. Direction and quality of their results do not change with different methods of firm size allocation. On the other hand, the relation between firm size and job creation rates loses significance in a study on the United States (Haltiwanger, 1994) and Germany (Wagner, 1995) if average size allocation replaces base-year allocation of firms to size classes.

14. **Cost of longitudinal studies.** The volume and complexity of data to be handled, questions of confidentiality and the administrative burden for responding firms or establishments make longitudinal databases costly to construct and maintain. Picot and Dupuy (1995) report on a comparison collected through periodic surveys of large samples of firms or establishments. Survey costs have, for example, led to significant reductions in the sample size of the Australian Bureau of Statistics' quarterly Survey of Employment and Earnings. Other countries have tried to use existing data sources to obtain longitudinal data. Examples of the use of such existing administrative and survey data include the creation and update of longitudinal databases in Canada and in Sweden (see Box 2 and Box 3). Private sector databases provide another source of information at the firm or establishment level. Several studies in the United States and the United Kingdom use the Information Services File of Dun and Bradstreet, a consultancy firm.

15. **Methodology.** The methodology to investigate the relationship between firm or establishment size and employment dynamics typically involves three steps:

First, net employment changes over a particular period are measured for each firm or establishment. Net employment changes are the difference between gross employment creation (due to firm births and firm expansions) and gross employment losses (due to firm discontinuance and firm contractions).

Second, each firm or establishment is allocated to a particular size class, either on the basis of its size at the beginning of the observation period or on the basis of its average size during the observation period.

Third, for each size class, net job creation is put in proportion to initial employment to obtain net job creation *rates*. These job creation rates are then compared across size classes. An alternative presentation consists of comparing a size class' share in total net employment changes with its share in total initial employment. This is equivalent to evaluating relative job creation rates, i.e. the job creation rate in a particular size class relative to the job creation rate of all size classes. If this ratio (also labelled *net fertility index*, e.g. in the United Kingdom) exceeds unity, it is concluded that this particular size class contributes more than proportionally to employment creation.

Table 1 Job creation rates and distribution of gross job flows

	Percentages				
	Gross job creation ¹		Gross job losses ²		Net job creation
	Percent of initial employment ³	Distribution by size class	Percent of initial employment	Distribution by size class	Percent of initial employment
Canada 1978-92					
Base year size allocation⁴					
0-19 employees	26.7	48.0	-18.6	37.0	8.1
20-49	14.9	13.0	-14.6	14.0	0.3
50-99	13.0	8.0	-13.8	9.0	-0.7
100-499	11.1	13.0	-11.9	16.0	-0.8
500+	5.9	17.0	-7.1	23.0	-1.2
Total	13.4	100.0	-12.1	100.0	1.3
Average size allocation⁵					
0-19	23.4	42.0	-20.2	40.0	3.3
20-49	15.9	14.0	-14.2	14.0	1.7
50-99	14.4	9.0	-13.0	9.0	1.4
100-499	12.2	15.0	-11.2	15.0	1.0
500+	6.8	20.0	-6.6	22.0	0.1
Total	13.4	100.0	-12.1	100.0	1.3
Denmark					
1985-86					
Base year size allocation⁴					
1-9	30.3	40.7	18.6	33.2	11.7
10-49	15.5	30.8	11.5	30.3	4.0
50-99	13.2	9.2	11.9	11.0	1.3
100-499	12.6	14.1	10.4	15.5	2.2
500+	7.6	5.2	11.0	10.0	-3.4
Total	17.1	100.0	12.9	100.0	4.2
1989-90					
Base year size allocation⁴					
1-9	25.1	40.7	21.4	33.3	3.7
10-49	12.5	31.9	14.5	35.3	-1.9
50-99	10.3	8.9	13.1	10.8	-2.7
100-499	9.4	13.1	11.1	14.8	-1.7
500+	7.0	5.4	7.8	5.8	-0.8
Total	13.9	100.0	14.5	100.0	-0.6
Finland 1986-91					
Base year size allocation⁴					
1-19 employees	..	52.7	..	38.4	..
20-99	..	24.7	..	26.9	..
100-499	..	17.3	..	23.9	..
500+	..	5.3	..	10.8	..
Total	..	100.0	..	100.0	..
Italy 1984-92					
Base year size allocation⁴					
1-19 employees	..	65.4	..	56.2	..
20-99	..	17.5	..	20.0	..
100-499	..	9.0	..	11.0	..
500+	..	7.8	..	12.8	..
Total	..	100.0	..	100.0	..

Table 1 (cont'd) Job creation rates and distribution of gross job flows

Percentages

	Gross job creation		Gross job losses		Net job creation
	Percent of initial employment	Distribution by size class	Percent of initial employment	Distribution by size class	Percent of initial employment
Japan 1987-92					
Base year size allocation ⁴					
30-99 employees	..	45.5	..	50.9	1.2
100-199	..	18.3	..	17.5	1.4
200-499	..	17.4	..	15.0	0.2
500-899	..	7.7	..	5.8	1.6
900-1499	..	4.7	..	3.2	1.6
1500+	..	6.5	..	7.6	0.3
Total	..	100.0	..	100.0	1.2
Germany 1978-93					
Base year size allocation ⁴					
1-19 employees	14.7	12.3	14.0	10.0	0.7
20-49	9.0	18.6	8.0	14.2	1.0
50-99	6.6	13.4	6.5	11.7	0.1
100-249	5.5	18.7	5.3	15.6	0.2
250-499	4.5	13.2	4.8	12.5	-0.3
500-999	3.3	8.6	4.6	10.7	-1.3
1000-2499	2.7	7.0	4.9	10.9	-2.3
2500-4999	1.2		4.8		-3.6
5000+	1.7	8.2	2.5	14.3	-0.8
Total	..	100.0	..	100.0	..
Average size allocation ⁵					
1-19 employees	12.1	10.1	15.6	11.2	-3.5
20-49	9.3	19.5	8.2	14.2	0.7
50-99	7.1	14.4	6.7	11.8	-0.1
100-249	5.4	18.6	5.4	16.0	0.0
250-499	4.4	13.0	4.8	12.5	-0.5
500-999	3.4	8.9	4.5	10.4	-1.1
1000-2499	3.5	9.2	4.7	10.4	-1.2
2500-4999	1.3		4.3		-3.0
5000+	1.7	6.2	2.5	13.5	-0.9
Total	..	100.0	..	100.0	..
New Zealand 1987-92					
Base year size allocation ⁴					
1-19 employees	..	55.6	..	41.8	..
20-99	..	26.2	..	30.4	..
100-499	..	13.8	..	18.5	..
500+	..	4.4	..	9.3	..
Total	..	100.0	..	100.0	..
Netherlands 1979-91					
Average size allocation ⁵					
10-99 employees	12.9	..	11.2	..	0.6
100+	4.6	..	6.1	..	-1.4

Table 1 (cont'd) Job creation rates and distribution of gross job flows

Percentages

	Gross job creation		Gross job losses		Net job creation
	Percent of initial employment	Distribution by size class	Percent of initial employment	Distribution by size class	Percent of initial employment
Sweden 1985-89					
Base year size allocation ⁴					
Simplex	5.2	45.4	4.2	42.4	1.1
Tops	2.5	6.6	2.5	7.8	0.0
Branches	3.0	48.0	2.7	49.8	0.3
Total	3.7	100.0	3.2	100.0	0.6
United Kingdom 1985-91					
Base year size allocation ⁴					
1-19 employees	15.0	50.4	10.7	45.4	4.7
20-49	8.2	9.5	7.7	11.3	0.6
50-99	8.1	8.0	5.7	7.2	2.6
100-499	7.4	12.7	5.7	12.8	1.7
500+	4.0	19.4	3.7	23.3	0.3
Total	8.2	100.0	6.4	100.0	1.9
United States 1973-88					
Average size allocation ⁵					
0-19 employees	18.7	10.7	23.3	11.8	-4.5
20-49	13.2	12.5	15.3	13.0	-2.1
50-99	12.2	14.0	13.5	13.8	-1.3
100-249	9.6	19.5	10.7	19.5	-1.1
250-499	7.7	13.6	8.7	13.6	-1.0
500-999	7.0	10.4	7.6	10.1	-0.6
1000-2499	6.3	8.5	7.3	8.8	-1.0
2500-4999	6.1	4.7	7.5	5.1	-1.3
5000+	5.4	5.0	5.6	4.6	-0.2
Total	..	100.0	..	100.0	..
United States 1987-92					
Base year size allocation ⁴					
30-99 employees	..	34.4	..	27.7	0.5
100-199	..	19.8	..	17.8	-0.3
200-499	..	21.1	..	21.0	-0.8
500-899	..	9.3	..	9.8	-0.9
900-1499	..	5.0	..	6.2	-1.6
1500+	..	10.3	..	17.5	-2.8
Total	..	100.0	..	100.0	-1.0

1. Gross job creation = employment gains from business openings and expansions.

2. Gross job losses = employment losses from business closures and contractions.

3. For most countries, gross and net job flows are measured on an annual basis. For any two years, gross job flow rates are measured as a percentage of the employment in the first year. The percentage reported in the table corresponds to the mean of these annual gross or net job flow rate. No annual measurements were available from the studies concerning Japan, Sweden, the United Kingdom and the United States (1987-92). In these cases, annualised gross or net job flow rates are reported in the table.

4. Base-year size allocation: the employment gains or losses of a firm or establishment between years are allocated the size class to which the firm or establishment belonged in the initial year.

5. Average size allocation: the allocation of a firm or an establishment to a particular size class is determined by the average size of the firm between two or more periods. Accordingly, employment gains or losses are allocated. Average size allocation reduces the regression-to-the mean bias.

Sources: for Canada, Denmark, Japan, Germany, Netherlands, Sweden, the United Kingdom and the United States see Table 2, for all other countries see OECD (1994) *Employment Outlook*.

Results

16. The following common features emerge from the sample of studies surveyed for this report (Table 1 and Table 2):

First, both the rates of gross job creations and gross job losses are significantly higher among small firms than among large ones. This reflects the general volatility and dynamics of small firms. This observation of greater turbulence among small firms is present in all studies although variations in the extent of turbulence exist across countries, sectors and over time.

Second, many studies find also a clear negative relationship between net job creation rates and the size of establishments or firms. However, for certain countries it was found that the highest net job creation-employment ratios were among very small firms whereas small to medium-sized firms (i.e., the size class of 20-49 employees) did not perform significantly better than large firms.

Third, gross flows of employment creation and losses tend to be dissociated from net flows. In periods of overall strong employment losses (gains), there are still sizeable flows of gross job gains (losses).

Fourth, methodology matters, certainly for the magnitude of the relation between job creation and firm size and in several cases also for the direction and quality of the relation.

Implications for analysis

17. There is a clear view among the authors of the various studies that, even if the important role of SMEs as net job creators is empirically well established, policy conclusions based on this fact need careful consideration. For example, the observed role of SMEs does not necessarily imply a justification for government support of SMEs. This carries over to the question *why* firm size plays a significant role in net job creation. It has been pointed out (OECD, 1994) that it may not be firm size *per se* that is critical for job creation. If links and interaction between firms of different size are key to economic success it would seem important to have a mix of large, small and medium-sized enterprises with strong links between them.

18. If firm size does, however, play a role *per se*, it is necessary to examine the determinants of firm size and its distribution and to relate empirical results to them. Economic theory offers several general factors to explain changes in firm size and its sectoral, regional and international distribution (for a survey see You, 1995). They include:

a) Structural effects. The expansion of the service sector and shifts away from primary and manufacturing industries entail a decrease in the average firm size, thus increasing the role of SMEs in job creation. Such structural shift can, however, only explain part of the SMEs' performance as the specific role of SMEs in job creation has also been observed in sectoral studies examining, for example, only manufacturing industry.

Table 2 Overview of studies and qualitative results

Country/Author	Period	Sector	Allocation to size class ¹	Gross job creation rates	Net job creation rates
Canada Picot, Baldwin, Dupuy (1994)	1978-92	Business sector	Base-year	fall with firm size	fall with firm size
	1978-92	Business sector	Average	fall with firm size	fall with firm size
	1978-92	Manufacturing	Base-year	fall with firm size	fall with firm size
	1978-92	Manufacturing	Average	fall with firm size	fall with firm size
Denmark Leth-Sorensen, Boegh-Nielsen (1995)	1985-86	Business sector	Base-year	fall with firm size	fall with firm size
	1989-90	Business sector	Base-year	fall with firm size	only micro-firms show high net job creation rates - no systematic relationship for other size classes
Germany Wagner (1995)	1978-93	Manufacturing	Base-year	fall with firm size	highest net job creation rate in 20-49 size class
	1978-93	Manufacturing	Average	fall with firm size	no relationship
Japan OECD (1995)	1987-92	Manufacturing	Base-year	..	no systematic relationship
Netherlands Broersma and Gautier (1995)	1979-91	Manufacturing	Average	fall with firm size	job creation rates in firm with less than 100 employees exceed job change rates of firms with more than 100 employees
Sweden Davidsson (1995)	1985-89	Business sector	Base-year	fall with firm size	smallest firms show largest net creation and destruction rates
United Kingdom Gallagher et al.	1982-91	Business sector	Base-year	fall with firm size	highest net job creation rates for micro enterprises, weaker performance of 20-49 size class
United States Haltiwanger (1995)	1973-88	Manufacturing	Base-year	fall with firm size	fall with firm size
	1973-88	Manufacturing	Average	fall with firm size	no relationship
United States Dennis et al.	1977-90	Business sector	Base-year	fall with firm size	fall with firm size
United States OECD (1995)	1987-92	Manufacturing	Base-year	..	fall with firm size

1. See footnotes 4 and 5 of Table 1.

b) Cyclical effects. The effects of a recession or a boom will vary across industries but may also have different impacts on different size classes of firms. As Hall (1995) points out, the pattern of SMEs' contribution to job creation is cyclical with SMEs contributing more in downturns and less in upturns. Hall explains this with the need for larger firms to search efficiencies during downturns rather than growth. Efficiencies are achieved through labour shedding. Self-employment and setting-up of small businesses by employees made redundant is then more frequent during downturns. The studies provide little evidence on the matter as periods of observation tend to be short and different across countries

c) Technological changes. Technical developments that reduce the minimum efficient scale of operation may improve the performance of small firms relative to larger ones. The surveyed material provides no evidence on the question whether technical developments have worked in this direction or not.

d) Changes in the market environment. Job creation in new businesses has also received much attention as an indicator of enterprise culture, in line with private initiative, deregulation and promotion of competition in the market place. Globalisation, increasing international competition and uncertainties of the market environment such as exchange rate volatility place a premium on flexibility and rapid adjustment which is an important source of competitive advantage for small firms. The observation of significant and rising turbulence in the job creation process among small businesses fits with this view of an increasingly competitive environment that is at the heart of the dynamics of job creation and industrial performance. At the same time, further investigation is needed across countries to examine the relation between the size of gross employment flows, business demography and industrial performance. From the studies in Table 1 and Table 2, no clear link emerges between gross and net flows of job creation.

e) Change in tastes. demand for customisation and specialisation has generally been rising and offered niche production opportunities for small firms. It could be argued that this trend is even more important in the service sector where closeness to customers plays an essential role in businesses' success. The data seems to support this view in that SMEs' relative performance tends to be more accentuated in the service sector than in other areas of the economy.

19. In addition to analyses about the determinants of small and large firm performance in job creation, the question of the **type and quality of jobs** created has also received increasing attention. Distributional implications, job security, and the extent of involuntary part-time work are related issues. While the treatment of these questions requires different methods from the studies surveyed in this document, the information base is often the same (longitudinal, micro-level data bases) so that supplementary analyses can be carried out without large additional cost.

Implications for statistical work

20. While progress has been made towards homogenising national definitions and data gathering mechanisms, much remains to be done to increase **international comparability**. Major differences among countries arise from diverging size-classes, different underlying units (firms, establishments), data availability for varying periods and varying industry classifications and international studies using longitudinal data are still rare. In addition to problems of comparability, the main reasons for the lack of international studies are the sheer volume of the data sets involved (raising problems of data handling) and the question of confidentiality. Despite these problems, efforts to collect international longitudinal data sets are undertaken, for example, by OECD (for Japan, France and the United States) and by Eurostat (for European countries).

21. Currently, perhaps the biggest impediment to comparing national studies is the **heterogeneity of the observation periods** across countries. The choice of more homogenous time-periods of sufficient length to distinguish between short-run and longer-run effects and to control for the influence of business cycles would add significantly to the usefulness of international analyses.

22. **Confidentiality of data points** complicates the transmission and use of national data at the international level. This problem, which concerns particularly smaller countries, arises frequently when data is disaggregated by firm size and by detailed industry. However, analytical work at the international level does not necessarily require transmission of entire data sets. If data treatment is harmonised across countries or if more aggregate data sets are treated at the international level, useful analysis could be carried out.

23. Often, relevant SME data can be collected cost-effectively and with little additional burden on business by **using existing surveys** and adding a criterion “firm or establishment size” In many surveys, this is already the case. However, the coverage of enterprises is typically biased if surveys are carried out among firms with minimum size only. Total coverage of the enterprise population or the choice of representative samples could greatly enhance the value of data sources for SME analysis.

Box 2 Canada's Longitudinal Employment Analysis Program (LEAP)

The LEAP universe. LEAP is a company-level file where "company" relates to the legal entity reporting to Revenue Canada for taxation purposes. In Canada, employing businesses are required to register with Revenue Canada using payroll deduction accounts (PD accounts) and to issue to each of their employees a record of employment earnings for tax purposes ("T4-slip"). This process creates a link between the employee and the company through the payroll deduction account. This link is the backbone of LEAP, and the reported payroll allows estimates of annual employment to be made. Self-employed that do not draw a salary and businesses composed solely of individuals or partnerships are excluded from LEAP.

PD accounts are also the primary means by which the business register (BR) identifies new businesses. In 1992, there were 980883 PD accounts representing 925 221 separate legal entities. Hence, most legal entities, and in particular small and medium-sized ones, have a single PD.

Establishment of industry affiliation and payroll. The industry affiliation (SIC) and total payroll for each legal entity is established both at the provincial and national level. Industry affiliation is based on the industrial classification of a company's employees. This information comes from Statistics Canada's monthly establishment survey of payrolls and hours that assigns industry codes at the establishment level. A company is assigned the industry code that is dominant among the employment in the establishments.

There is some concern that assigning industry codes at this higher (company) level will introduce error in the coding, since many large companies are multi-establishment, multi-industry entities. To determine the impact of assigning industry codes at the company rather than at the establishment level, a comparison of the codes assigned was done. For the economy as a whole, the impact was relatively small. In particular industries, however, the coding can be quite different at the company and establishment level.

Average labour units. Employment estimates are derived in LEAP by converting payroll to employment. The result is referred to as an average labour unit (ALU). It is calculated at the provincial level by applying a conversion factor to the payroll of each business. Prior to 1989, all sizes had the same conversion factor. This resulted in a bias since smaller firms tend to pay lower average wages than larger firms. Methodological improvements have since removed this bias. The resulting ALU is conceptually identical to an employment measure based on head counts as it does not distinguish between full- and part-time employees. Each year, checks are carried out by comparing total ALUs with other statistical sources of employment figures. Levels tend to be different but trends are similar.

Creating a longitudinal file. Once business records with information on SIC, payroll and ALUs are compiled, a longitudinal file is created through linking records over a series of years. Links are established using the legal entity identification number. Considerable methodological verification takes place to ensure that the longitudinal linkage of the companies is reliable. One of these verification procedures is "labour tracking". This approach tracks workers from one year to the next, through record linkage methods. It is then possible to determine if the worker stays with the same company or moves to another. Those situations are selected where the majority of the workforce has moved collectively as such movements may suggest that the two firms are the same and that there was a false creation or death of a firm.

Despite labour tracking, mergers or buyouts make it often difficult to decide whether a company with a different identification number is a different entity from one year to the other. The longer the period over which companies are tracked longitudinally, the more likely this will be a problem. Investigation showed that the bulk of such changes was taking place between larger firms. This would have a tendency to increase gross creation and destruction rates in larger size categories. However, with respect to the analysis of job creation by firm size, the possible bias introduced by mergers and acquisitions is likely to be small. This is because only mergers and acquisitions that involve two firms of different size classes would have consequences for job creation analyses by size class. Those mergers which are among large firms would have no effect on results. If a smaller firm is acquired by a larger one, this would show up as a death in the small firm class and employment expansion in the large. Thus, the conclusion that small firms are important sources of employment creation would, if anything, be an underestimate.

Source: G. Picot and R. Dupuy (1995).

Box 3. Sweden: Construction of a longitudinal data base

The construction of a longitudinal data set in Sweden started from a number of criteria that the data set should fulfil to be a useful analytical tool. The data set should:

- Include only commercially active business units in the private sector;
- Permit to monitor individual businesses over time to identify births, deaths, expansions and contractions and the associated employment changes;
- Identify autonomous small firms;
- Group units according to industrial sectors;
- Group unit according to employment size group.

Various data bases are used as sources for the construction of longitudinal information. These include the Central Firm and Establishment Register, the Regional Employment Register, the Register of Groups of Companies and the Register of Establishments and Firms with Foreign Ownership. These data have, in turn several origins. Partly, the data originate from administrative routines, partly from mandatory surveys. In total, some 400000 units are combined in the longitudinal database. The data set includes sole proprietorships, partnerships and incorporated businesses. Primary industries such as agriculture and forestry and public utilities are excluded for analysis.

The Swedish data set offers information on both establishments and firms: different years of the Central Firm and Establishment Register allow the linking of individual units by means of identification numbers. However, for purposes of analysis, establishments rather than firms were chosen because identification codes change more frequently at the firm level, even though no real birth or death has occurred. Three types of establishments were distinguished: simples, tops and branches.

A *Simple* is a single-establishment firm with autonomous ownership, i.e. it is not part of a corporate structure. In this case, firm and establishment coincide.

A *Top* is the top unit within a multi-establishment firm or company.

A *Branch* is a unit other than the Top within a multi-establishment firm or company.

While practically all Simples are SMEs with less than 200 employees (98 per cent of all Simples have less than 20 employees and 89 per cent have less than four employees), SMEs are not necessarily all Simples. For example, a small firm with three establishments would be registered as one Top and two Branches. As the size class data relates to establishments, it is not possible to determine with certainty the share of Tops and Branches that are SMEs. Several adjustment procedures allow, however, to alleviate this potential problem so that Simples can be broadly identified with SMEs.

Box 4 United Kingdom: The use of longitudinal data for employment studies

Sources. The principal data source in the United Kingdom is the business information database of the credit rating, marketing and information services company, Dun and Bradstreet. The database holds a range of information on UK enterprises with relevant information, in particular employment, industry classification and starting date. Each business is uniquely identified, which allows to link information over time.

Coverage. Some 400 000 businesses out of 1.6 million VAT registered businesses are covered, although coverage of firms varies according to sector and firm size. The reason for this is that the principal use of the database is credit rating. At the broadest sectoral level, businesses in the production sector are better represented on the database. At a more detailed level, within the service sector, there is a bias towards retail businesses.

In general, a single grossing-factor has been used across all sectors. This could lead to unreliable findings if there is substantial variation across sectors in the contribution of firms of different sizes to the job creation process. The analysis by broad industry sector for 1987-89 showed some difference between production and service sectors. For smaller firms higher rates of job creation were found in production whereas the reverse was true for larger firms. As the database coverage is biased towards manufacturing, these findings suggest that, in the overall analyses, the job creation performance of firms with fewer than 20 employees has been slightly overstated at the expense of larger firms.

The database's coverage of larger firms is believed to be more or less complete but it is much sparser for smaller firms. The majority of sole traders and partnerships are small and are therefore poorly represented on the database. Conversely, the coverage of registered companies is good. The key issue in job generation studies, which use separate grossing factor for each size band, is whether the smaller firms on the Dun and Bradstreet database are representative of the wider population of small firms in terms of employment changes.

It has been claimed that, of small firms, it is the fast growth firms which are the most likely to enter the database. However, even if this claim was true, it does not necessarily follow that such rapid growth will be captured in the job creation studies and, as a result, bias the findings. Firms are only included in the analyses if they are births or were on the database at the start of the study period. So, for any rapid growth to be counted, the firm involved would need to be added to the database before any expansion had taken place.

Updates. Information on numbers of employees is collected at most every nine months, though for some companies the period between updates can be as long as three years. The irregular time between updates can have implications for job creation analysis. Comparison of the components of job creation of firms of different sizes will be affected by variations in the average time between updates for firms of different sizes. In addition, comparisons with other data sources, whether for grossing-up or as an external check of the reliability of net employment changes, are more difficult.

Validation. All the UK job creation studies using the Dun and Bradstreet database have included a range of validation checks to reduce the effect of any inaccurate or inappropriately recorded employment changes. These checks include:

- Exclusion of enterprises with missing employment data;
- Check whether latest update of record falls within the period under study;
- Classification of businesses into "matches", "births" and "deaths";
- Systematic checks of all births and deaths of firms with at least 500 employees;
- Sample checks of births and deaths of smaller firms;
- Systematic checks of all firms with very large increase/decrease in employment;
- Sample checks of less significant changes in employment;
- Introduction of penal weighting for large expansions by firms in 1-4 size cohort to counterbalance potential bias through over-representation of small firms which grow fast
- Adjustments to allow for effects of mergers and take-overs;
- Adjustments to exclude employment outside the country;

Grossing up. The coverage of larger firms in the Dun and Bradstreet database is very good but only a sample of smaller firms are covered. While some results can be obtained from ungrossed figures, there is clearly much to be gained from grossing up the figures in some way to give a representative picture of the whole economy. To gross up, the number of validated records in each size cohort is compared with external estimates of the number of enterprises of that size. The 1985-87 and subsequent studies have all used the size distributions based on those published in "Enterprises in Europe" (see, e.g. Eurostat (1994)). If grossing factors are also applied to births the result is invariably that there appear to be more deaths than births even when external evidence indicates the contrary. The reason for this discrepancy is the delays in new firms being added to the database, which are believed to be longer than the delays in deaths being recorded. Thus, adjustments to the grossing factors have been introduced. These are equivalent to assuming an average delay of four months in recording births.

Sources: Department of Trade and Industry (1995), M. Daly et al. (1991).

Box 5 The IDA database in Denmark

Between 1988 and 1990, Danmarks Statistik started to develop its Integrated Database for Labour Market Research (IDA). The main purpose is to follow persons, jobs and establishments over time to provide micro-level information for analyses of job flows and mobility.

Coverage. The IDA database contains information on all persons in the population, all jobs and establishments employing persons. It covers some 5 million persons, about 2.5 million jobs and about 200000 establishments. for the period 1980-91. Units are characterised by a wide range of variables (about 300), including, for example the type of occupation, the hourly earnings or the seniority of jobs, the sex, age, marital status etc. of persons or the industry class and the wage level of establishments. A unique feature of IDA is the possibility to identify both individual establishments and persons over time.

Sources. The IDA database is developed on the basis of statistical registers such as the Central Population Register, different tax registers and the register on unemployed persons. IDA combines this information by means of a number of statistical procedures (for a more detailed explanation, see Hansen (1989)).

Application for analysis. Although IDA was primarily conceived to address questions related to the labour market, the potential use of the database goes beyond questions of employment/unemployment. Three major applications of IDA are:

- Measurement of the flow of persons in the labour market and conditions of employment. This concerns mobility between establishments, mobility between industries and mobility in and out of the labour force. Conditions of employment concern the occupational pattern, working hours and wages.
- Measurement of changes in employment and wage formation. One important issue in this context is the analysis of employment changes by type of establishment, in particular by establishment size. Wage formation processes can also be analysed by means of information on wage differentials and establishment characteristics.
- Life-cycle analysis of establishments. IDA provides the information to describe the mobility of establishments, i.e. the incidence of openings and closures. This allows to address specific issues, including the role of SMEs.

NOTES

¹ To illustrate, take the example provided by Wagner (1995): “Consider an economy with only two firms that are divided into size class 1 (small firms with 1-19 employees) and size class 2 (large firms with 20 or more employees). In 1991, firm 1 had 16 employees (a small firm) and it grew until 1992 by 5 employees (or 31.25 percent); firm 2 had 24 employees in 1991 (a large firm), and it shrunk to 16 employees in 1992 (growth rate: -33.3 percent). Now assume that the employment movements were transitory and reversed themselves from 1992 to 1993: in 1992 firm 1 had 21 employees (a large firm) and it shrunk to 16 employees in 1993, having the same number of employees as in 1991; firm 2 was a small firm with 16 employees in 1992, and it grew by 8 employees to have, again, 24 employees in 1993. On average, the small (large) firm growth rate in the economy between 1991 and 1993 according to these calculations was 40.6 (-28.6) percent, but each firm has the same number of employees in 1991 and 1993.

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