

Gross Job Creation and Destruction:  
Evidence and Implications for the Measurement of Employment  
Growth in Small and Large Employers

by

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**Introduction:**

The notion that small business is responsible for most if not all new jobs created over the last 10 to 15 years has almost come to be accepted as conventional wisdom. It is often quoted in the media, by prominent politicians and academics. This notion has been recently supported in studies by Birch (1987) and those emanating from the Small Business Administration in the United States. However, many have argued that such claims are unfounded, and are in fact myth (Davis, Haltiwanger and Schuh (1993), OECD (1994)). The whole debate centers around two main issues: first, on the suitability of the data used for analyzing the job generation process, and second, on the criteria used for assigning a size class to the unit of observation, which can either be at the firm or plant level.

Why do we want to measure this and what are the implications? The main reason is policy related: government policies are formed which grant special tax status and preferential loans to smaller firms based on the premise that providing these incentives will further enhance their job creation potential, one which is assumed to be relatively superior to that for larger firms. Furthermore, we are interested in measuring this phenomenon as it relates to empirical studies<sup>1</sup> which find that larger firms pay a higher wage, offer

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<sup>1</sup> Morissette (1993) and Brown and Medoff (1989), find a positive relationship between employer size and wages. In general, jobs in small firms pay a lower wage, even after controlling for

better fringe benefits, and are less likely to subject their employees to permanent layoffs. Efficiency wage theories suggest that these differences exist because employers are willing to pay economic rents. These rents are paid to the employee in return for higher productivity, to minimize turnover costs or simply because their need relatively less supervision. As such, this wage rigidity on the part of some employers is a major cause of unemployment. Gera and Grenier (1991) find that inflexible wages may have contributed to unemployment in high-wage industries in the 1980s. Displaced workers in these high wage industries remained unemployed longer and thus contributed to higher unemployment levels.

There are further implications for the study of labor market dynamics. Research has focused extensively on labor supply characteristics of those who are unemployed and for how long. Very little attention has been given to labor demand and how individual firm behavior impacts on how workers and jobs are matched, and the repercussions for unemployment.

Notwithstanding, this paper is mainly interested in the empirical measurement of job creation and destruction by employer size class. To this end, section 1 describes the basic concepts and definitions applicable to this topic. This is followed by a discussion of some

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differences in worker and job characteristics. They are also less likely to be unionized and thus tend to provide fewer fringe benefits. Gera and Grenier (1991) also find evidence of interindustry wage differences, which suggests evidence of efficiency wages.

of the statistical biases present in traditional measures used to quantify the differences in the job creation performance of large and small firms. Section 1 will also discuss the extent and nature of fluctuations in labor demand and how to interpret measured differences in employment growth by employer size. In section 2, we turn to a presentation of the results of studies by Davis, Haltiwanger and Schuh (1993), Picot, Baldwin and Dupuy (1994), and international data obtained from the OECD. This is followed, in section 3, by a presentation of original empirical research using monthly survey data. The results for cohorts of "continuing" establishments in commercial industries in Canada are presented.

## **1. Concepts and Definitions:**

In this section, we discuss the concepts and definitions common to most studies measuring this phenomenon and to the original empirical study presented in section 3.

### **1.1 Standard definitions:**

#### **1.1.1 Job:**

A job is defined as a "filled position" which is remunerated. There is no distinction made between full or part time positions and a job is not employee specific.

#### **1.1.2 Employer:**

There are basically two observational units of analysis used to

define an employer. Establishments generally correspond with a production unit or a plant (ex. of manufacturing), while firms usually correspond to legal (ownership) units<sup>2</sup>. Both are useful, however, establishment data is often favored because it is at this level that industrial activity takes place. Further, the use of establishment data does not mask intra-firm movements between production units in measuring gross job flows. On the other hand, decisions related to the work force are usually taken at the firm level. Therefore, the use of the unit of analysis should depend on what we are trying to measure or evaluate.

### 1.1.3 Scale:

An establishment or a firm's scale at any given point in time is determined by its number of employees. There are other measures of scale which are often used, such as revenue and assets. These are not exploited in this paper. Nevertheless, each measure of scale is sensitive to differences in the production processes between industries. Specifically, significant differences in labor intensiveness across industries will greatly influence what is considered "large" based on the number of employees variable alone.

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<sup>2</sup> The Central Frame DataBase (CFDB) of Statistics Canada defines a business entity as consisting of a single or many legal entities with consolidated operations and financial statements. A business entity will possess a legal structure, made up of companies or legal entities (firms) and an operational structure (made up of production centers) which is related to a statistical structure consisting of an enterprise, companies, establishments and locations. Companies typically correspond to a single legal entity, except if the enterprise's operational structure crosses legal entity boundaries. Establishments generally correspond to a production unit where industrial activity is measured.

However, it is generally accepted to define small firms as those with less than 100 employees. Medium sized firms typically employ between 100 and 500 employees. Large firms usually have 500 or more employees.

These criteria can be similarly applied to establishments (or production units) when delineating between small, medium and large. In this study, small employers, whether referring to establishments or firms, are further disaggregated into micro-sized (1-19) and those with 20-49 and 50-99 employees. Medium-sized employers are divided into those with 100-199 employees and those with 200-499 employees. Large employers are those with more than 500 employees.

#### 1.1.4 Net versus Gross Job Change:

The traditional focus has been on measuring net employment change. Whether measured in terms of labor supply or labor demand, this measure masks the significantly larger gross flows of workers in and out of employment, or the gross flows in terms of the creation and destruction of employment opportunities. Therefore, in measuring the gross job flows associated with changes in the demand for labor, we make the distinction between 4 types:

##### 1- Gross job creation by expanding establishments:

The sum of all employment gains for existing establishments between time  $t-1$  and  $t$ .

##### 2- Gross job creation due to establishment births:

The sum of all positions created as a result of establishment openings at time  $t$ .

3- Gross job destruction by contracting establishments:

The sum of all employment losses for existing establishments between time  $t-1$  and  $t$ .

4- Gross job destruction due to establishment deaths:

The sum of all positions eliminated as a result of establishment closings at time  $t$ .

The first two points measure gross job creation (or gains), while gross contraction and exit constitute gross job destruction (or losses). Net job change is the difference between the gross gains and gross losses.

The sum of gross gains and losses are a measure of job turnover. However, since we measure net job changes for individual establishments, actual job turnover will tend to be under-estimated because we do not measure within-plant job changes. Measures of job turnover based on observations at the firm level will further conceal intra-firm job flows between establishments.

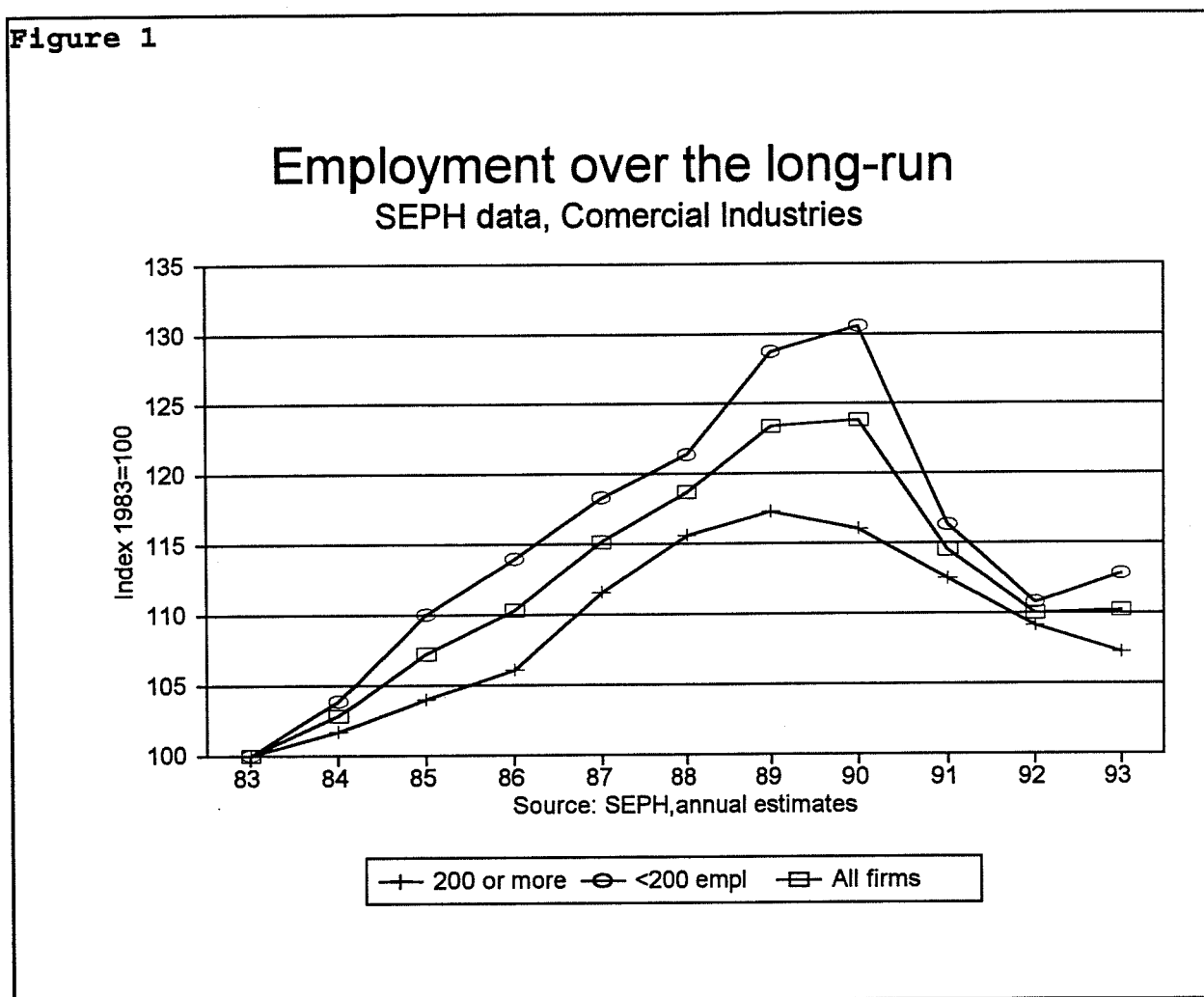
## **1.2 Data Sources and Statistical Biases:**

### **1.2.1 Traditional Measures:**

The use of aggregated data (*i.e.* industrial estimate by employer size) or of changes in the size distribution of employment in order to evaluate the relative job creation performance of small and

large firms may lead to erroneous conclusions. Aggregated data, such as that published through the Survey of Employment, Payrolls, and Hours (SEPH), provide employment estimates by industry for firms with less than 200 employees and for those with 200 or more employees (see Figure 1).

Figure 1



Using this as a data source leads to two main problems. Firstly, only net employment change for two broad size categories can be measured. Secondly, the net job changes in the size categories are

biased because firms can migrate between size classes from period to period. Therefore, during periods of recession and downsizing, employment losses experienced by larger firms would appear as gains for smaller firms. Conversely, during periods of recovery and expansion, gains by smaller firms would appear as losses and tend to inflate job gains in the large size class.

Similarly, studies which use changes in the size distribution of employment in order to evaluate the job creation ability of large and small firms suffer from the same bias. As firms grow or shrink, they can migrate between size classes and thus cause changes in the size distribution of employment.

It is a common practice to observe changes in the size distribution of employment in order to study the evolution of employment. However, it is quite different than to infer that small firms are growing faster than large firms (or vice versa) given a change in the distribution. As a general rule, all that can be deduced from these studies is whether or not net employment shifts have occurred over time between employers of various size.

#### 1.2.2 Longitudinal and cohort data:

Many authors (Davis, Haltiwanger and Schuh (1993), Picot, Baldwin and Dupuy (1994), OECD (1994)) have argued that the job generation process can only be adequately measured using longitudinal data, given the limitations and bias found in aggregate and size

distribution data. In fact, longitudinal census type data<sup>3</sup> is an excellent source for such analysis. However, it is not unique. What is important is that the data used be disaggregated (establishment or firm level) and that the units be comparable over time, available at regular intervals and based on random samples.<sup>4</sup>

The use of cohort or panel data from a sample survey such as the Survey of Employment, Payrolls and Hours (SEPH) is also acceptable. However, there are some shortcomings to using this data source. Firstly, we cannot estimate employment levels, and therefore the total number of jobs created or destroyed, because survey responses are used to assign the size class of the establishments in the cohort. Since actual survey responses are used to define the employer's size category, the contemporaneous size characteristics of the entire population are unknown and estimation is inconvenient. Secondly, inadequate information on actual births and deaths of establishments on the sampling frame means that we cannot

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<sup>3</sup> Longitudinal databases in the U.S. include the Longitudinal Research Database (LRD), and the Dun and Bradstreet file which was developed into a database by the U.S. Small Business Administration (SBA). In Canada, the Longitudinal Employment Analysis Program (LEAP) database is a longitudinal file of companies, not establishments. This database covers the entire population of approximately 760,000 companies in commercial industries operating in Canada. Further, the Dun and Bradstreet file of the U.S. S.B.A. is no longer used due to several inadequacies of the database. However, many studies have been based on this file, namely Birch (1987 and previous studies), Evans (1987), and others. For a discussion of the limitations of this database, see OECD Employment Outlook 1994, pp.108, and Davis, Haltiwanger and Schuh (1993).

<sup>4</sup> These requirements for acceptable data sources are those suggested by the OECD in the Employment Outlook, 1994.

properly identify and estimate jobs created and destroyed by entry and exit<sup>5</sup>.

The analysis of job creation by employer size using cohorts of employers from sample surveys is also subject to sample selection bias. This bias occurs because smaller firms are more likely to fail as opposed to downsizing. The latter being more common in large firms. These firms which exit are those which would have otherwise had negative growth rates. As such, because of exit, and replacement by entry of another firm, the gross creation rate and the gross destruction rate for the smaller firm sector is over-estimated.

### 1.2.3 "Regression-to-the-mean" bias:

The use of longitudinal or panel data does not eliminate all statistical biases associated with measuring employment growth by employer size. "Regression-to-the-mean" bias<sup>6</sup> occurs as a result of

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<sup>5</sup> This points to the need for further research, especially with respect to the data which is presented by this author using monthly survey data. The Central Frame DataBase of Statistics Canada has problems in identifying "real" births and deaths. As such we cannot properly estimate job creation and destruction due to entry and exit. Because of the limitations associated with estimation techniques when population characteristics are unknown, we cannot, at this time, provide monthly estimates for the number of jobs created and destroyed due to entry/exit and expansion/contraction in firms of different sizes.

<sup>6</sup> Davis, Haltiwanger and Schuh (1993) provide a good illustration of the regression fallacy. The example calculates growth rates for individual firms and by size class over a 3 year period to illustrate how apparently valid measurement practices lead to erroneous conclusions regarding the size-growth (continued...)

transitory fluctuations in employer size, or because of measurement error, which leads to fluctuations in observed employer size.

In studies using longitudinal data, employers are usually classified according to the employment level in the base year for which a growth rate is calculated. Each period, the employer is re-classified accordingly. Thus, the classification variable (employer size) is influenced by the variable of interest (growth rate in employment).

The use of longitudinal data eliminates the aggregation bias caused by the migration of employees between size classes (*i.e.* in terms of the impact on the calculated net growth rates by size class). However, the traditional measures used in longitudinal studies imply that the employer may be re-classified from period to period, whether they have experienced a permanent or a temporary change in employment level.

Fluctuations in labor demand at the firm or establishment level are often transitory responses to changes in demand and technology. These changes are temporary and thus likely to be reversed in subsequent periods. Therefore, firms classified as small are more likely to have suffered a recent contraction, and are therefore more likely to expand, as they return to "normal" employment

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<sup>6</sup>(...continued)  
relationship. See also Leonard (1986a) for a discussion of regression to the mean bias.

levels. This is especially true during a period of recovery. On the other hand, firms which are classified as large are more likely to contract, and this especially during a period of economic downturn. Further, smaller firms tend to exhibit higher variance in employment growth than larger firms. Therefore, the criteria used for determining employer size must minimize the impact of these fluctuations and better reflect the "long run" employment level of the firm.

The methods used to remove these statistical biases are different whether the empirical study applies a theoretical models using regression techniques<sup>7</sup>, or whether the study uses longitudinal data.

#### 1.2.4 Measuring employer size:

In order to evaluate the impact of "regression-to-the-mean" bias, different methods suggested by Davis, Haltiwanger and Schuh (1993) are used for determining the size class of the employer. There are three basic methods:

- "Base year" method:

An employer is assigned a size class based on its level of employment in the first year of the period for which a growth rate is calculated.

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<sup>7</sup> Regression techniques to remove heteroscedasticity, "regression-to-the-mean" and sample selection biases are discussed in Hall (1987) and Evans (1987a,b).

- "Current size" method:

An employer is assigned a size class based on the simple average of the current employment level and its employment in the previous year.

- "Average entire period" method:

An employer is assigned a size class based on the average of all observations over the entire period under study.

A variant of the base year method:

- "Prior base year" method (Picot, Baldwin and Dupuy (1994)):

An employer is assigned a size class according to the average of employment in the year prior and the base year of the period for which a growth rate is calculated.

Davis, Haltiwanger and Schuh (1993) suggest that the measure of employer size which fully accounts for "regression-to-the-mean" is the average employer size over the entire period under study. Picot, Baldwin and Dupuy (1994) argue that this long run average creates a bias of its own, depending on whether the plant or firm is expanding or contracting linearly over the period under study. That is, the firm does not experience transitory fluctuations which are corrected in future periods.

Figures 2 and 3 show a hypothetical case of an expanding and a contracting employer. These figures illustrate how the different sizing methods influence the results.

Figure 2

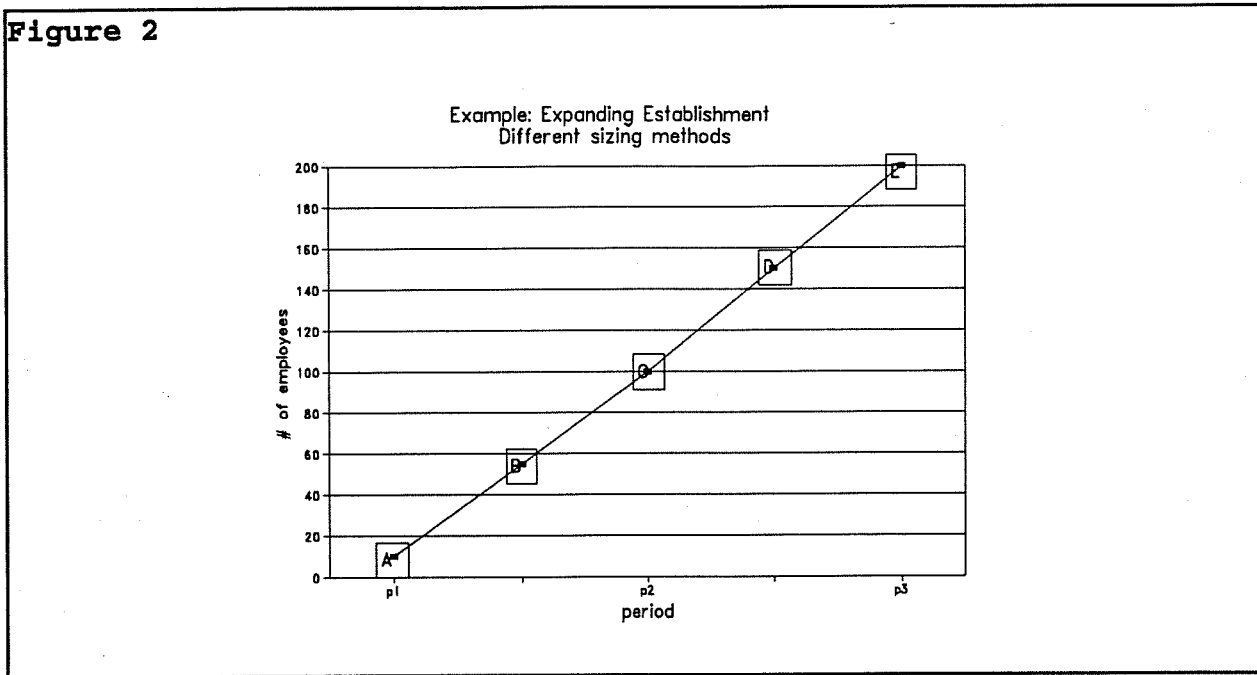
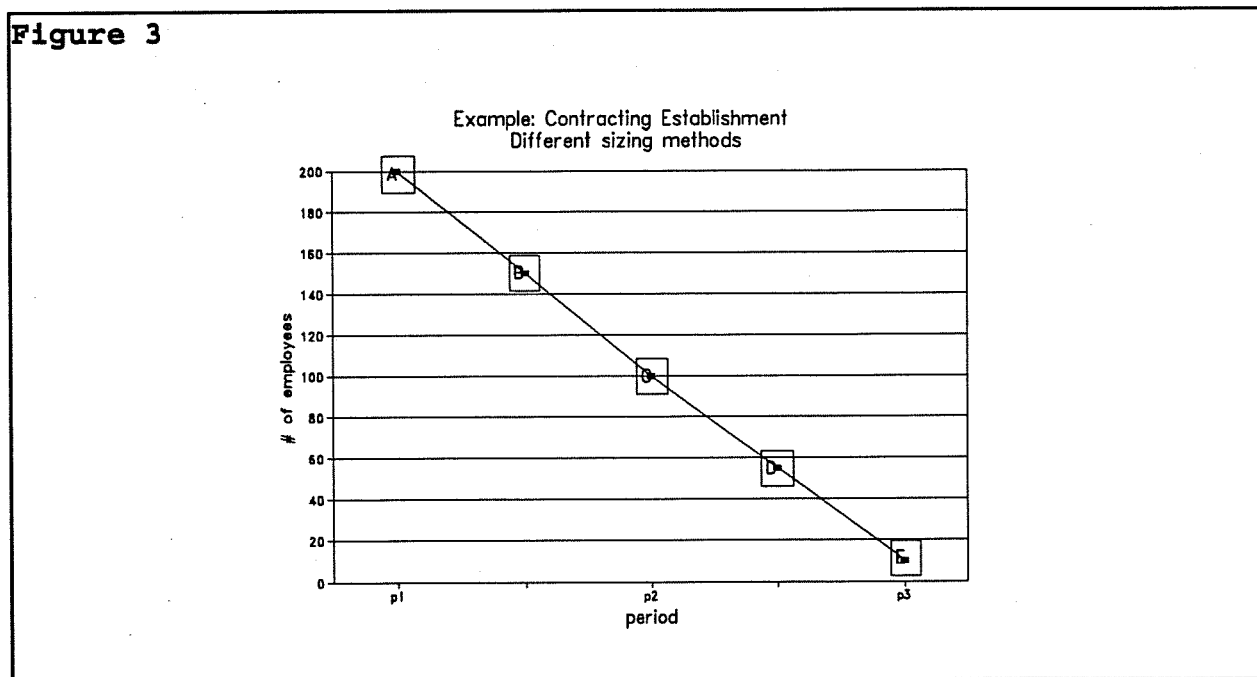


Figure 3



Point A corresponds with the employer size class assigned under the "base year" method for the employment change between period 1 and period 2. Point B is the size class assigned using the "current size" method between period 1 and period 2. Point C refers to both the "average entire period" (for p1 to p2 and p2 to p3) and the "base year" method for the change between period 2 and period 3. Point D corresponds with the "current size" method between period 2 and period 3. We can see in this simplified example that changes in the level of employment can lead to significant differences with respect to which size class an establishment is assigned.

The main problem with using "average entire period" method, compared with the "base year" method, is that small expanding firms are assigned to a larger size class (point C vs point A in Figure 2). Large contracting firms are assigned to a smaller size class (point C vs point A in Figure 3). The result is that the small firm category will only consist of small firms which are stable, as well as larger firms which have downsized considerably. The larger firm size class will consist of smaller firms which have expanded considerably and large firms which have remained stable. The middle size classes will consist of gainers and losers and a stable portion.

It is therefore important to understand that attempting to remove the bias caused by transitory changes in employment leads to another. Picot et al.(1994) argue that the "base year" and the

"average entire period" methods constitute two extremes, and that the appropriate measure lies somewhere in the middle.

Furthermore, we should note that taking the average over the entire period under study to determine the size class becomes more biased as the period under study is lengthened. Firms' product lines and technology change over time. Therefore, scale is not necessarily independent of time, especially beyond a 10 year period. As such, the "average entire period" should be limited, to perhaps 5 to 7 years, in order to establish the long run intended scale.

The "current size" method, which is the simple average of current employment and the employment level in the previous period, is a compromise between the "base year" and the "average entire period" methods. This method also suffers from the "regression-to-the-mean" bias, as it is unlikely that transitory changes are fully corrected over two periods. Depending on the severity of the transitional change in the level of employment, the "current size" method will yield significantly different results than the "base year" method and therefore reduce the bias.

### **1.3 Gross Job Flows:**

#### **1.3.1 The Extent of Gross Job Flows:**

We now turn to a discussion of the measurement of gross job flows. The lack of longitudinal data has until recently prevented the full measurement of gross employment flows due to entry, exit, expansion

and contraction of individual firms or establishments.

Empirical studies in the U.S. and Canada<sup>8</sup> have documented the extent of gross employment flows relative to net changes in employment (in terms of labor demand). The table below shows the average annual gross rates of employment gains and losses and the resulting net employment change for firms in "Commercial industries"<sup>9</sup> in Canada between 1983 and 1991. We can see that even though net employment change is small, it consists of significantly larger gross flows.

Table 1 shows that between 1989 and 1991, gross job creation averaged 13.4% annually. This rate is decomposed between jobs created by expanding firms and those created from firm entry. Of the 13.4% rate, 10 percentage points are due to expanding firms, while the remaining 3.4 percentage points are from new firms. On the other hand, jobs were eliminated at an annual rate of 16.5%, of which 12.8% resulting from firms contracting and 3.7% due to firm exit. Netting this out yields an average 3.1% decline, or a net

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<sup>8</sup> Studies which document the extent of gross job flows relative to net employment change are numerous. These include Birch (1987 and earlier studies), Armington and Odle (1982), Leonard (1986b), Baldwin and Gorecki (1990 and earlier work), Dunne, Roberts and Samuelson (1989a,b), Davis and Haltiwanger (1990, 1991a,b), Evans (1987a,b), Hall (1987) to name a few.

<sup>9</sup> Commercial industries can also be defined as the "Private sector". Industries excluded from this aggregate are Public Administration, Health and Education Services, Agriculture, Fishing and Trapping, the military, Personal Households, and Non-profit & Religious Organizations, and the self employed.

loss, on average, of about 300,000 jobs per year. While these data originate from administrative data and the Longitudinal Employment Analysis Program (LEAP) database, similar results from a monthly survey of establishments (SEPH) show that for commercial industries, employment fell by 580,000 jobs between 1989 and 1991.

**Table I**

	Gross Total Gains	Gross New Firms	Gross Expansion	Gross Total Losses	Gross Exit	Gross Contraction	Net Total	Net entry	Net Expansion	Job Turnover
1983-1991	14.5	3.2	11.2	11.9	3.1	8.8	2.6	0.2	2.4	26.3
1983-1989	14.9	3.2	11.7	10.1	2.8	7.3	4.8	0.3	4.4	25.0
1989-1991	13.4	3.4	10.0	16.5	3.7	12.8	-3.1	-0.3	-2.8	29.9

Source: OECD(1994), LEAP database, Statistics Canada.

The sum of the 4 gross flows described above provide for a measure of job turnover. We see from Table 1 that turnover averaged 25.0% between 1983-89 and increased to 29.9% between 1989-91. This suggests a relationship between job turnover and cyclical fluctuations.

Further, this information shows that the net change in employment in mainly influenced by employment fluctuations in existing firms, through expansion and contraction. This finding is typically observed using different sources and for most countries. The OECD (1994, table 3.1) finds that the main source of the increase in employment in OECD countries was the expansion of existing firms

and that overall, fluctuations in the rate of openings had little effect on net employment change during the 1980s.

In fact, entry and exit is mainly a small employer phenomenon. Opening establishments have an average of 2.2 employees, and 98% of new establishments are in the 1-19 employee size class. Meanwhile, deaths are more likely to occur in smaller establishments because of various factors including poor management practices, limited access to resources, financing and market information. They also tend to rely on local and domestic markets and are thus more sensitive to demand fluctuations. Empirical evidence also suggests that industries with high entry also have high failure rates, which suggest some industry structure in failure rates. As a global measure, only 3 in 5 firms survive past their third birthday, and only 1 in 5 make it past five years.

### 1.3.2 The Nature of Gross Job Flows:

The large fluctuations in labor demand, as seen in the data presented above, suggest that job turnover is intimately related to worker turnover. In fact, a significant proportion of worker turnover is due to temporary and permanent layoffs. What proportion of worker turnover can be attributed to job turnover, or in other terms, to the creation and destruction of jobs at the establishment or firm level?

Empirical studies have recently attempted to measure this

relationship. Davis and Haltiwanger (1990,1991), and Leonard (1987), calculate that between 35-50%<sup>10</sup> of worker turnover is due to changes in establishment level opportunities for manufacturing industries in the U.S. These measures will vary between industries and across countries. However, they suggest that a significant proportion of worker flows in and out of employment, as well as in and out of the labor force, are caused by shifts in the demand for labor.

The study of the magnitude of gross job flows has shown that these are affected by structural change and cyclical fluctuations in aggregate demand. Empirical studies have shown that job turnover, or the sum of gross job flows, is a continuous process. Gross job creation and destruction rates are consistently high through time, as employment opportunities shift between firms and across industries.

However, we know that the rate of job turnover is sensitive to the business cycle. Firm entry and expansion is pro cyclical, while firm exit and contraction is counter cyclical. During economic expansions, job creation due to firm entry and expansion increases while job destruction due to exit and contraction decreases. During

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<sup>10</sup> Davis and Haltiwanger acknowledge that their measure does not include the chain effect created by the movement of previously employed individuals into newly created jobs, thus forming a chain of quits and hires. Furthermore, worker turnover is also created as older workers retire and younger workers enter the labor force. This latter effect is calculated at approximately 12% of total worker turnover.

economic downturns, the reverse happens, job creation decreases, while job destruction increases. As such, the relationship between job turnover and the business cycle is ambiguous, and depends on whether or not the increases (decreases) in gross job creation cancel out the decreases (increases) in gross job destruction.

Let us assume that structural change can be adequately quantified by measuring shifts in employment between industries in decline and industries in expansion. Then we would expect that the net change in employment in declining industries would be predominantly made up of job losses in most firms and, relatively few new jobs within the industry. Conversely, for expanding industries, we would expect that the net growth in employment would consist of mostly job gains with only a few job losses. The same should be observed if we refer to the movement of jobs between regions.

What does the empirical data suggest? Studies by Dunne, Roberts and Samuelson (1989) and Davis and Haltiwanger (1991) find that inter-industry shifts (two-digit SIC level) account for less than 20% of gross employment flows. Dunne, Roberts and Samuelson (1989) accept that this measure is sensitive to the level of aggregation. As such, they calculate the gross job flows at the four digit SIC level. They find that for every job created in an expanding industry, .6 jobs were eliminated, and for every job lost in a declining industry, .6 jobs were created.

Further, several studies have shown that the importance of structural change is somewhat intensified during economic downturns. Some have suggested that periods of recession may force inefficient producers out (due to older technology). Also, intensified competition may lead to more failures. What can we conclude from these findings? Structural change and cyclical fluctuations, however important, do not explain the consistent turnover in employment within industries. What are the factors explaining this phenomenon if it is not structural change? Do these gross flows exhibit a structure, are they concentrated in large or small firms, or in new or old firms? To answer this, we must turn to dynamic models of firm growth to explain this heterogeneity in firm behavior.

#### **1.4 Models of firm growth:**

The previous section has demonstrated the significance of the gross job flows underlying changes in net employment. Further, we have seen that these flows are not fully explained by structural change and cyclical fluctuations. This section presents various growth models and will attempt to provide a basis for the interpretation of empirical results on the size-growth relationship.

##### **1.4.1 Firm Growth is Independent of Size:**

Early empirical studies of firm growth by Hart and Prais (1956), Simon and Bonini (1958), and Pashigian and Hymer (1962) found that

there was no relationship between firm growth and size. These studies restricted their analysis to continuing firms and thus treated growth as being independent of firm exit. These studies, along with later theories by Lucas (1967,1971,1978) and others assumed that firm growth was independent of firm size.

#### 1.4.2 Jovanovic's passive learning model:

In response to empirical findings of an inverse relationship between growth and size, one which conflicted with proportional growth law, Jovanovic (1982) develops a model of "noisy" selection and learning with heterogeneous firms.

While the model is quite extensive, it basically stipulates that firm size is determined by the level of efficiency attained. In this model, the level of efficiency attained is determined by the firm's age. Firms are learning as they age. They can either learn the right way by obtaining the information which allows them to minimize costs, and therefore prosper and expand, or they can only obtain "unfavorable" information relative to efficiency, in which case they will choose to exit.

The model finds and proves, that younger (and also by definition smaller) firms have higher and more variable growth rates, than older (and by definition larger) firms. The model also finds that younger firms have higher growth rates than older firms, holding firm size constant. However, within this model, a firm's size is

endogenously determined by its age. Small firms are homogeneous within their size class, and the heterogeneous behavior of firms is based on age and influenced by learning.

#### 1.4.3 Leonard's "regression-to-the-mean" model:

Leonard (1986a) develops a stochastic regression model where small firm employment growth is disproportionately higher than for larger firms. However, this can be entirely attributable to "regression-to-the-mean" bias. This bias is caused by transitory deviations in employment level from long-term optimal scale.

The model assumes that economies of scale depend on technology and market size and determine optimal plant or firm size. The model consists of a time invariant distribution, a transitory error term, and partial adjustment toward the mean. Given these components, the model predicts that firms classified as large are expected to contract, and firms classified as small are expected to expand.

While this suggests that firm size has an impact on growth, in theory, the expected sign of the adjustment parameter implies that job growth in small firms could be the result of "regression-to-the-mean".

The main result of Leonard's model is that he finds that the greater the deviation of firm size from its mean, the greater the likelihood that future movements will be corrected. Empirical

results have shown that growth rates for smaller firms have higher variance than larger firms. The employment level for smaller firm will tend to fluctuate around the growth path towards optimal size. Larger firms, having reached optimal size, tend to exhibit fewer and less pronounced fluctuations in their employment level.

Leonard (1986b) finds that while the gross job creation rate is higher for smaller firms, the growth is not compounded. That is, each year a new set of establishments account for much of the growth. As such, transitory changes are more common, while continual linear growth is the exception. The impact of "regression-to-the-mean" on the results are more likely to over-estimate both gross expansion and contraction for smaller firms.

#### 1.4.4 Baldwin and Picot's intuitive growth model:

Baldwin and Picot (1994) provide an intuitive explanation of the dynamic growth paths of small firms. The learning model assumes that a change in technology or a shift in demand will result in the entry of new small plants. As such, employment growth increases for small plants. The impact on net growth by size class is ambiguous and depends on the substitution effect with other plants and on the growth path of the new small plants. If the growth of new small plants is not at the expense of other small plants, then the small plant sector will show positive net growth in the short-run. If it is, there is no effect on net employment growth for either small or large plant sectors (*i.e.* the new small plant supply only that part

of new demand following the demand shift). However, if new small plants grow and capture market share previously held by large plants, then net employment growth in small plants will increase while that for larger plants will fall.

The model argues that in the long run, small plants eventually learn to produce in larger quantities and employment growth leads to a movement up to a larger size class. Assuming no substitution effect and no new entrants, this leads to higher gross and net employment growth in middle and larger size classes. In this context, what happens to the smallest size class is entirely dependent on entry.

Furthermore, although structural change is slow, it is mostly found in smaller plants. As such a 'wave' of new small plants does not guarantee a permanent shift in the distribution of employment towards smaller firms, since firms will learn to produce at larger scale. However, if new technologies warrant a reduction in scale through higher levels of automation and employment of more productive workers, then the share of employment in smaller firms will increase.

Although this model does suggest that the distribution of employment can shift toward smaller firms, it does not explain why smaller firms grow faster than larger firms. The relationship, in theory, is between age and growth and not necessarily size and

growth, although the two may be highly correlated.

#### 1.4.5 Interpretation of growth models:

The interpretation of empirical results must be made in light of these models.

The models of firm growth presented here do not suggest a direct causal relationship between size and growth. The relationship, in theory, is rather between age and growth, even though there is a correlation between size and growth. Newer, and only by definition smaller firms grow faster than older, and by definition larger firms. As a result, we should note that while we expect that some small firms will experience higher growth relative to larger firms, we can not generalize this to the entire population of small firms.

In fact, the majority of small firms in existence at any one time, are not new. Many of these small firms never reach a scale which renders them large. This is mainly because their optimal scale is small and is determined by the industry in which they are found. The largest share of small firms are found in retailing, construction, other services<sup>11</sup> and business services. Therefore, we cannot expect that all small firms will grow to become large, given

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<sup>11</sup> Other services include recreational services such as movies theaters, golf courses, gambling establishments, amusement parks, personal and household services like beauty shops, laundry and cleaning services, and other services such as auto leasing dealers, window cleaners, janitorial services, travel agencies and parking lots and garages.

differences in industrial structure.

We also expect that newer and smaller firms are more likely to exit or fail. In terms of Jovanovic's model, new (small) firms which do not learn how to minimize costs will exit (*i.e.* small firms cannot possibly survive in this model). This creates a chain of entry, partial growth to optimal scale, and exit of newer firms.

Given high failure rates (80% probability of failure within the first 5 years), only 20% of firms grow and reach optimal scale. The remainder do not obtain the favorable information which minimizes costs, and they choose to exit.

Technological change is another cause of consistent job creation and destruction, as older plants are replaced with newer plants which use superior technology. As such, technological change may result in a shift in employment towards smaller (in terms of employment) and more efficient firms.

In this situation, smaller firms are better at adapting and also developing new technologies, and thus we would expect them to remain relatively smaller. This would explain the shift in the distribution of employment towards smaller firms. However, the relationship between technological change and growth rate is not so clear. Considering a situation where new technology is applied at

a faster rate in larger firms than in smaller firms<sup>12</sup>, then we would expect very low employment growth for larger firms while employment growth in smaller firms continues to increase.

Therefore, the disproportionate growth observed in the small firm sector using traditional measures can be attributable to many factors. Some of the growth is explained by passive learning (perhaps 15% as suggested by Davis and Haltiwanger (1991)), some by technological and structural change, some by the consistent entry and exit of small firms, and some by the "regression-to-the-mean" bias.

## **2. Recent empirical evidence:**

In this section, we examine the results from studies in the United States and in Canada which show quite clearly how the results are sensitive to different measures of the size-growth relationship. The study by Picot, Baldwin and Dupuy (1994) is based on data for firms in commercial industries in Canada between 1978 and 1992. The results of the study by Davis, Haltiwanger and Schuh (1993) are for establishments in manufacturing industries in the U.S. for the period 1973 to 1988. These differences are not important since we

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<sup>12</sup> Large firms tend to do more R&D, and have relatively better access to capital and financing required to adapt to new technology, or to develop new technology. Conversely, one could argue that smaller firms are more flexible and able to quickly respond to emerging markets and the application of new technology.

are interested in the results for the various sizing methods and the impact of "regression-to-the-mean" bias, within each study<sup>13</sup>.

### 2.1 Picot, Baldwin and Dupuy (1994):

Table 2 and table 3 show the results of the study by Picot et al. (1994). The data used for this analysis originate from administrative records compiled into the LEAP<sup>14</sup> database of Statistics Canada. This longitudinal database is at the legal entity or firm level. The results combine employment gains and losses due to entry and exit and employment changes for existing or continuing firms. The job gain and loss rates are averages for the period 1978 to 1992.

Furthermore, the authors present the results using 4 different methods for sizing firms, and for various period averages. The data presented here is only part of the results contained in their paper. However, their main conclusions are summarized below.

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<sup>13</sup> For a comparison of U.S. and Canadian Manufacturing industries, see Baldwin, Dunne and Haltiwanger (1994), Baldwin and Picot (1994) as well as Picot, Baldwin and Dupuy (1994) which presents results similar to those in Table 2 and 3 found in this paper (for Manufacturing industries).

<sup>14</sup> The Longitudinal Employment Analysis Program (LEAP) database is a longitudinal file of companies (firms), not establishments. This database covers the entire population of approximately 760,000 companies in commercial industries. The measure of employment is estimated for each company based on the payroll reported to Revenue Canada for the company. The payroll is converted to employment (called "average labor units") using conversion factors derived from the Survey of Employment Payrolls and Hours (SEPH). For more on the LEAP database, refer to Picot, Baldwin and Dupuy (1994), and other Statistics Canada papers quoted therein.

TABLE 2 (Picot, Baldwin and Dupuy (1994))  
 Job Gain and Loss Rates between consecutive years, avg 1978-1992  
 Canada, Total Commercial Industries

Firm Size	Job Gain Rate	Job Loss Rate	Net Job Change Rate	Employment Distribution Rate (% of ALU's in Size class)
BASE YEAR				
0-19	26.7	-18.6	8.1	24.0
20-49	14.9	-14.6	0.3	11.9
50-99	13.0	-13.8	-0.7	8.3
100-499	11.1	-11.9	-0.8	16.0
500+	5.9	-7.1	-1.2	39.7
TOTAL	13.4	-12.1	1.3	100.0
CURRENT SIZE				
0-19	23.4	-20.2	3.3	24.2
20-49	15.9	-14.2	1.7	11.9
50-99	14.4	-13.0	1.4	8.3
100-499	12.2	-11.2	1.0	16.0
500+	6.8	-6.6	0.1	39.6
TOTAL	13.4	-12.1	1.3	100.0
PRIOR AVERAGE SIZE				
0-19	26.5	-18.4	8.0	24.3
20-49	14.9	-14.7	0.2	11.9
50-99	13.0	-13.8	-0.8	8.2
100-499	11.1	-11.9	-0.8	15.9
500+	5.9	-7.1	-1.2	39.5
TOTAL	13.4	-12.1	1.3	100.0

Source: reproduced from Picot, Baldwin and Dupuy (1994), Table 1

TABLE 3 (Picot, Baldwin and Dupuy (1994))  
 Job Gain and Loss Rates between consecutive years, avg 1978-1989  
 Canada, Total Commercial Industries

Firm Size	Job Gain Rate	Job Loss Rate	Net Job Change Rate
AVERAGE ENTIRE PERIOD			
0-19	23.5	-18.4	5.1
20-49	17.0	-12.6	4.5
50-99	15.1	-11.2	3.8
100-499	12.2	-9.9	2.3
500+	6.1	-5.4	0.6
TOTAL	13.1	-10.5	2.6
CURRENT SIZE			
0-19	24.6	-19.1	5.6
20-49	16.3	-12.3	3.9
50-99	14.5	-11.2	3.2
100-499	12.3	-9.8	2.5
500+	6.1	-5.4	0.7
TOTAL	13.1	-10.5	2.6

Source: reproduced from Picot, Baldwin and Dupuy (1994), Table 2

Table 2 shows the results using the "base year", "current size", and "prior base year" methods, averaged over the period 1978 to 1992. The "base year" and "prior base year" methods yield similar results, with smaller firms apparently responsible for all net employment gains throughout the period. Under the "base year" method, the average annual job gain rate is 26.7% for micro sized firms (1-19 employees), the rate for firms with 20-49 employees falls to 14.9% and continues to decline with increasing firm size until the gross job gain rate for firms with more than 500 employees reaches 5.9%. The disproportionate gap between micro sized firms and firms with 500 or more employees is 20.8%.

Conversely, the gross job loss rate is -18.6% for micro sized firms, this rate falls to -14.6% for firms with 20-49 employees and continues to decline until it averages -7.1% for large firms. The difference between the loss rate for micro-sized and large firms is 11.1%. The resulting net rates suggest that only micro sized firms (+8.1%) and firms with 20-49 employees (+0.3%) were net contributors of jobs, on average, over the period.

The average "current size" method greatly reduces the contribution of small firms to net employment growth. While the gross job gain rate for micro sized firms decreases by only 3.3% to 23.4%, the rate for large firms increases to 6.8%. The gap between micro sized firms and large firms is reduced to 16.6% compared with a difference of 20.8% under the "base year" method. On the other

hand, the job loss rate for micro sized firms increases to 20.2%, while the loss rate for large firms decreases to 6.6%. As a result, the net rates now suggest that firms of all sizes contributed to net job gain, on average, over the period. Nevertheless, micro sized firms register higher net gain rates than larger firms, and the net rates decrease with increasing firm size.

The "regression-to-the-mean" bias significantly over-estimates the contribution of small firms to net employment growth. The "current size" method, although sensitive to transitory changes in employment levels, is less biased but continues to over-estimate growth in smaller firms.

The results using the "average entire period" method are presented in Table 3. The period covered is 1978 to 1989, primarily because there is a break in the LEAP database in 1989 as a result of changes to the Business Register and the development of the new Central Frame Data Base. Nevertheless, the results for the 1978-89 period show that the contribution of small firms is further reduced when compared with the "current size" method.

The results show that smaller firms contributed more to net job growth than larger firms. Picot et al. find that this is mainly due to higher turnover for smaller firms. For continuing firms, they find that employment in small and large firms tended to expand at

approximately the same rate<sup>15</sup>.

They also conclude that the differential growth rates observed can be attributable to faster growth in industries where small firms account for a large percentage of employment. As such, changes in the distribution of employment between industries is estimated to account for as much as 25% of the differences in growth rates between large and small firms for the commercial industries aggregate.

## **2.2 Davis, Haltiwanger and Schuh (1993):**

Table 4 presents the results of a study by Davis et al. (1993) for the U.S. manufacturing industries between 1973 and 1988. The data originated from the LRD<sup>16</sup> which is establishment based. The gross creation and destruction rates, and the resulting net rates, cover employment changes by existing establishments as well as gains and losses due to new entrants and exiting establishments. The authors

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<sup>15</sup> On page 5 of their paper, they conclude that "When turning to a cohort of firms that exist at any given time, the results suggest that employment in existing small firms is likely to expand at roughly the same rate as that in existing large firms. ... it is the fact that most "newly identified firms" are concentrated in the small firm sector that results in its higher overall rate of gross job gain and net employment gain". This conclusion seems to conflict with the OECD's findings that fluctuations in the rate of entry and exit (*i.e.* net entry) had little effect on net employment change during the 1980s.

<sup>16</sup> The Longitudinal Research Database (LRD) is a longitudinal database covering manufacturing industries in the U.S. Data is obtained from the Annual Survey of Manufacturing and the quinquennial Census of Manufacturing. The data is verified using administrative data. For a discussion of the LRD see Davis et al. (1993) and the publications quoted therein.

use three different methods for sizing employers.

The main finding, as was the case for the Picot study, is that gross rates decline with increasing employer size.

Section III of Table 4 shows the results obtained by using the "base year" method. Gross job creation is disproportionately concentrated in smaller establishments. The gross creation rate for micro sized establishments is 25.7% and decreases monotonically with increasing employer size. However, there is a 19% difference in the gross creation rates obtained for the micro plants and plants with 500 to 999 employees.

Conversely, gross job destruction rates do not exhibit the same degree of contrast between employer size classes. Micro-sized establishments have a gross destruction rate of 15% while establishments with 500 to 999 employees averaged a 9% gross destruction rate over the period of 1973 to 1988.

The resulting net job creation rates suggest that establishments with less than 50 employees were the only net creators of jobs during the period.

Section II shows the results using the "current plant size" measure. Here we see a mirror image of the results obtained using the "base year" method. Gross job destruction is unevenly

TABLE 4 (Davis, Haltiwanger and Schuh (1993))  
 Rates of Job Creation and Destruction by Employer Size, 1973-1988  
 United States, Manufacturing Industries

Size Class # of employees	Gross Job Creation	Gross Job Destruction	Net Job Creation	Employment Share
I. Average Plant Size Measure				
0-19	15.9	17.2	-1.3	4.4
20-49	12.6	13.8	-1.1	8.2
50-99	11.7	12.6	-0.9	10.1
100-249	10.0	11.5	-1.4	18.5
250-499	8.5	9.8	-1.3	16.6
500-999	7.5	8.5	-1.0	13.8
1000-2499	6.6	8.2	-1.6	12.5
2500-4999	6.5	8.2	-1.7	7.2
5000+	5.9	6.5	-0.6	8.8
II. Current Plant Size Measure				
0-19	18.7	23.3	-4.5	5.2
20-49	13.2	15.3	-2.1	8.6
50-99	12.2	13.5	-1.3	10.5
100-249	9.6	10.7	-1.1	18.5
250-499	7.7	8.7	-1.0	16.0
500-999	7.0	7.6	-0.6	13.5
1000-2499	6.3	7.3	-1.0	12.3
2500-4999	6.1	7.5	-1.3	7.0
5000+	5.4	5.6	-0.2	8.4
III. Base-Year Measure of Plant Size				
0-19	25.7	15.4	10.3	5.2
20-49	13.6	13.1	0.6	8.5
50-99	11.4	12.0	-0.7	10.4
100-249	9.5	11.1	-1.7	18.6
250-499	7.4	9.9	-2.5	16.0
500-999	6.3	9.0	-2.7	13.5
1000-2499	5.7	8.4	-2.6	12.3
2500-4999	5.4	7.9	-2.5	7.0
5000+	4.7	7.1	-2.4	8.5
IV. Firm Size (# of mfg workers in preceding Census of Manufacture				
0-19	16.5	18.8	-2.3	5.2
20-49	12.3	13.3	-1.0	7.0
50-99	11.5	11.9	-0.4	6.8
100-249	11.1	11.2	-0.1	9.1
250-499	9.8	9.9	-0.1	6.8
500-999	9.3	9.8	-0.4	6.2
1000-2499	8.8	9.5	-0.7	8.2
2500-4999	8.0	9.4	-1.4	7.1
5000-9999	7.8	9.1	-1.3	8.5
10000-24999	7.1	8.6	-1.5	13.6
25000-49999	6.5	8.1	-1.6	9.2
50000+	6.3	8.0	-1.6	12.4

Source: reproduced from Davis, Haltiwanger and Schuh (1993), Table 1 and 2.

concentrated in smaller establishments under this method of sizing. The gross destruction rate for micro sized plants averages over 23% while that for plants with 500 to 999 employees averaged 7.6%.

Meanwhile, gross job creation rates are lower for smaller establishments than those obtained using the "base year" method. However, they remain highest in smaller establishments and decrease with increasing employer size.

The resulting net rates suggest that there is no relationship between employer size and net job creation. In fact, a net rate of -4.5% for micro sized establishments suggest that these account for the largest share of job losses over the period.

The results differ significantly when sizing is based on the average plant size over the entire period. In section I of Table 4 we see that the gross creation and destruction rates remain highest for smaller establishments. However, the difference in the rates for the micro sized establishments and for establishments with 500 to 999 employees is reduced to 8.4% and 8.7% for the gross creation and destruction rates respectively.

The resulting net rates suggest that there is no relationship between employer size and net job creation. The possible exception is establishments with 5000 or more employees which register relatively lower net job losses over the period.

As we can see from the results of the two studies presented above, changes in the criteria used for assigning a size class greatly influences the results.

Davis, Haltiwanger and Schuh (1993) argue that these differences are attributable to the "regression-to-the-mean" bias and the results obtained from the "base year" method should not be used. Their conclusion is also supported by the OECD (1994), as they state that "the methodological problems in accurately accounting for the dynamics of job and firm creation (and destruction) can no longer be ignored" (OECD (1994), p.128.)

### **2.3 International Comparison:**

Table 8 (see appendix) is a cross country comparison of net job gains and losses by establishment (or firm) size. These results are based on the traditional "base year" method, and therefore, tend to overestimate the share of small establishments (or firms) in net job change.

Nevertheless, the results presented show that large establishments or firms (500 or more employees) have negative net job change rates during the late 1980s and early 1990s. The exception is in the UK, which shows an average annual net job change rate of 0.4% on total net change of 2.7%. Firms or establishments with less than 100 employees show positive net employment change, with the exception of New Zealand which records a -1.5% net change rate. The OECD

finds that small establishments contribute a large share of both gross job gains and gross job losses. They reiterate how the contribution of small establishment to net job change are overstated due to the statistical biases discussed in this paper.

In their final analysis, they conclude that no more than one third of net job creation is attributable to small firms. This contribution of new small establishments is exactly what is expected by learning models. Thus they find that establishment size is not "critical for job creation". Further, these net rates hide the fact that jobs are created by both large and small firms, likewise, jobs are destroyed by both large and small firms.

### **3. An Alternate Data Source; Results for Cohorts of Continuing Establishments:**

This section presents the results obtained for an original empirical analysis of cohorts of continuing establishments in Canadian commercial industries. The study does not measure job creation and destruction due to entry and exit. Rather it is limited to measuring the relative performance of existing establishments, through the calculation of gross expansion and contraction rates by establishment size class.

#### **3.1 Data Source:**

The data source used is the monthly Survey of Employment, Payrolls

and Hours (SEPH). In order to use the results from this survey, a transformation of the data was made. This transformation involved the linkage of survey questionnaire or collection entity level data to the standard statistical unit sampled from the business register (CFDB). Although most questionnaires are sent to a specific establishment, many data collection agreements (especially with larger firms) cover several establishments. Therefore, the number of employees and other variables found on the questionnaire needed to be allocated to the proper establishment.

A redesign of the business register (CFDB) and the SEPH in 1990 limited the analysis to three years. Furthermore, a subsequent redesign of SEPH in March 1994 involved the use of administrative records known as Payroll Deduction (PD) accounts for small firms. As a result, further linkages to the business register must be made before we can fully exploit this data source beyond the period presently available.

### **3.2 Panel Selection:**

Cohorts or panels of continuing establishments were selected from those surveyed by SEPH between January 1991 and December 1993. An establishment was said to belong to a monthly cohort if it had existed for more than 12 months<sup>17</sup>. The cohorts were redefined each

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<sup>17</sup> In order to minimize the impact of seasonality, data for 1994 was not included, since averages of monthly observations for part of 1994 would not be comparable with other yearly averages. However, we include establishments which are seasonal by comparing  
(continued...)

month based on this criteria, and employment changes were calculated as the year over year difference for each month. The newly sampled (but existing) establishments were just as likely to be "representative" of the population of existing establishments as those which exited the sample. As such, the entry and exit of establishments in the survey sample, and thus in the cohorts, should not bias the results.

Therefore, 24 cohorts were defined, for each major industrial grouping. Industrial aggregates, such as the total for commercial industries, and the goods producing and services total, were weighted using the size distribution in the base year (industry employment by size class). These were applied to all the methods used for defining the size categories.

### **3.3 Cohort size:**

The panels for the micro sized establishments (1-19 employees) were about 1/3 of the original sample for each month, the panels for other size classes increased with size, and covered over 90% of the survey sample for large establishments. On average, there are 20,000 establishments out of a possibility of less than 50,000 establishments for commercial industries in each panel. These establishments account for over 40% of total employment in commercial industries.

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<sup>17</sup>(...continued)  
year over year changes in employment levels irrespective of whether or not an establishment has employees throughout the year.

### 3.4 Recent employment trends, 1991-1993:

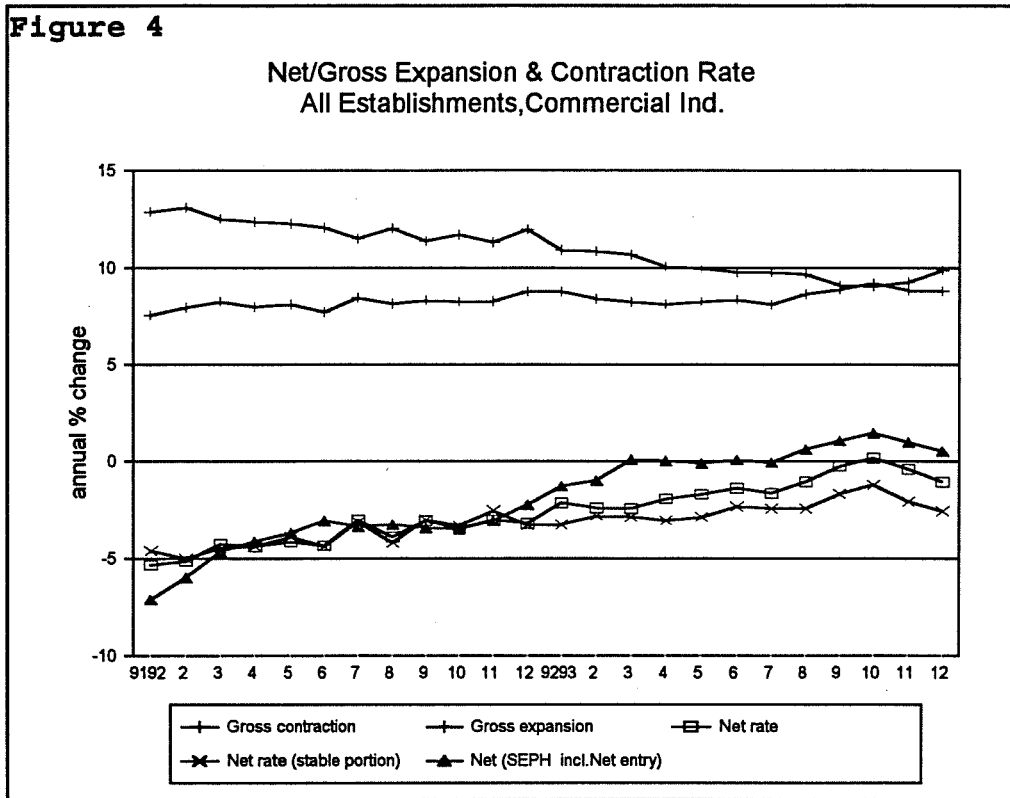
The period covered by the cohort analysis is from the beginning of 1991 to the end of 1993, for commercial industries only. As we can see in Figure 1 (p.7), net employment in these industries fell during the period, at an average annual rate of 1.9%. Although most of the employment losses were suffered between 1990 and 1991, employment was still shrinking during 1991, levelled off in 1992, and rose slightly in 1993.

The share of employment in firms with less than 200 employees remained relatively stable, averaging about 55% of employment during the 1983 to 1993 period. This share increased slightly and peaked in 1990 at about 58%, and then declined to return to its long run average of about 55%. Although firms can move between size classes from period to period, this trend suggests that "smaller" firms tended to increase in size during the expansion, and may have suffered heavier losses during the recession. However, we cannot conclude this given the biases present in this form of aggregate data.

3.5 Results of cohort analysis:

3.5.1 Gross Expansion and Contraction:

Figure 4 shows the results of the cohort data in terms of annual



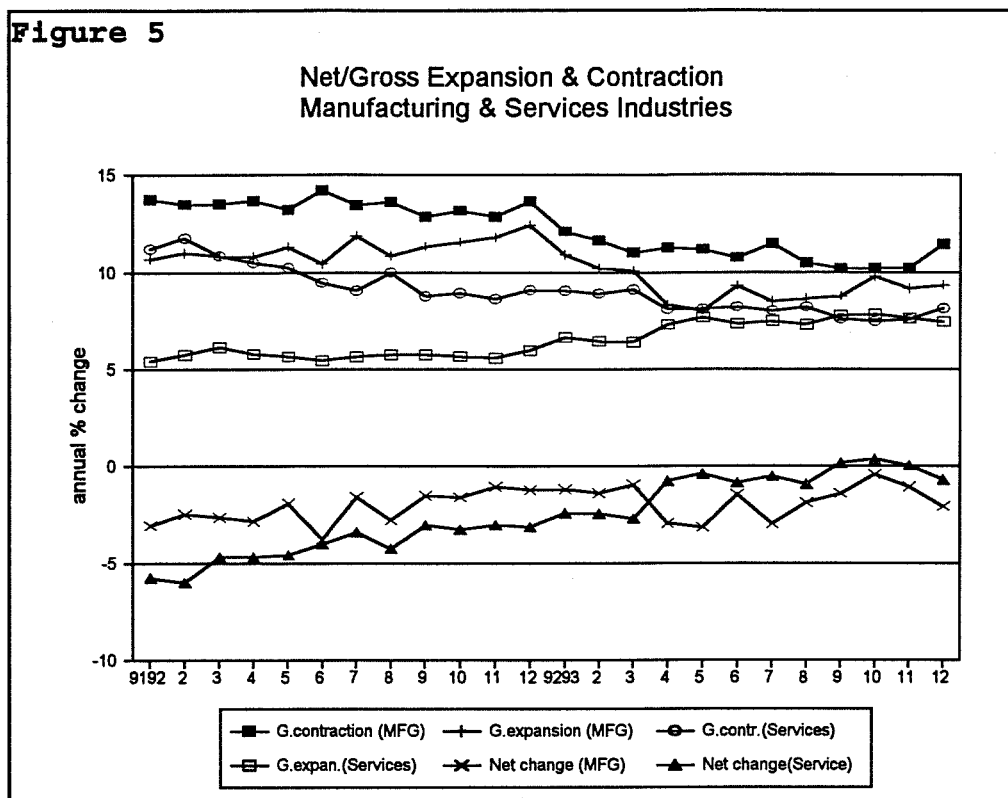
percentage changes, by month, over the period. The net and gross expansion and contraction rates depicted in Figure 4 are for the total of all establishments without distinction to size class. Recall that the cohort data covers only existing establishments and thus excludes births and deaths. Comparing the net expansion rates from the cohorts with the net rates as measured by SEPH (i.e. including entry and exit), we see that these follow a similar trend.

We should note that although the rates are size weighted, the under-representation of small establishments, especially for micro sized establishments, partly accounts for the difference between the net change in the aggregate and the net change for continuing establishments. Nevertheless, during the first quarter of 1992, the annual percentage change in the net expansion rate was smaller than the net rate from SEPH, suggesting that employment losses due to exit overwhelmed employment gains due to entry. During the remainder of 1992, the two series coincide, which implies that net entry was tending towards zero. However, during 1993, the SEPH net rate was smaller than the net expansion rate, suggesting net entry.

Figure 4 also shows how the gross contraction rate fell during the period, dropping from a high of about 13% to 10%. Meanwhile, gross expansion remained stable over the period, rising only slightly from about 8% to 9%. As such, the increase in the net rate is mainly attributable to the reduction in the gross contraction rate.

Somewhat different results are obtained when we observe these rates for manufacturing and services separately. As seen in Figure 5, the net rate for manufacturing remains negative throughout the period, while the net rate for services shows a gradual increase. The gross rates for manufacturing, both relatively higher than their counterparts for services, follow similar trends and decline over the period. The gross rates for services show a different pattern, the gap between gross contraction and gross expansion is widest in

the beginning of the period and is reduced through time. The decline in the contraction rate is matched with increases in expansion to yield increases in the net rate.



### 3.5.2 Gross Expansion and Contraction by Establishment Size:

Table 5 (p.47) contains the net and gross job expansion and contraction rates by establishment size class, using different sizing methods. The rates are averages of the annual growth rates<sup>18</sup>

<sup>18</sup> The general formula for the growth rates is:  

$$\frac{(t_2 - t_1)}{\text{avg}(t_1, t_2)} * 100$$

The calculation for the gross expansion rate is:

$$\frac{[\text{sum}(XE_{it2}) - \text{sum}(XE_{it1})]}{[\text{avg}\{\text{sum}(TE_{it2}), \text{sum}(TE_{it1})\}]} * 100$$

where,  $XE_{it2}$  and  $XE_{it1}$  are the sum of all jobs found in establishments which expanded between  $t_1$  and  $t_2$  in industry  $i$ ,  $TE_{it2}$  and  $TE_{it1}$  correspond to the total employment in expanding, contracting and stable establishments in both periods. For the calculation of the gross contraction rate, the numerator becomes  $(CE_{it2} - CE_{it1})$ , and the net rate is the difference between the gross  
 (continued...)

calculated for each monthly cohort. The table shows the averages obtained using three different methods for assigning a size class to the establishments in the sample.

The first portion of the table refers to the "base year" method. Establishments have been classified according to the average number of employees in the first year of the respective cohort. This differs slightly from the traditional method of sizing in the base year as described earlier.

Other studies have always used annual data, which eliminates the problem of seasonal fluctuations in employment levels. In order to avoid excessive reclassification across size classes for a given establishment, its size is determined by its annual average. However, the employment change is calculated as a year to year change for each monthly cohort.

Therefore, under this method, an establishment is assigned to a size class twice, during 1991 (to calculate the '91 to '92 change) and in 1992. In effect, this method is a cross between the "base year" method and the "current period" method explained above, and therefore reduces the impact of transitory fluctuations on the

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<sup>18</sup>(...continued)  
expansion and contraction rates. This method is identical to that used by Davis, Haltiwanger and Schuh (1993) but differs from Picot, Baldwin and Dupuy (1994) who opt for the traditional method of  $(t_2 - t_1)/t_1 * 100$ .

**TABLE 5**  
**Job Expansion and Contraction Rates, continuing establishments**  
**Commercial Industries**  
**average period 91-93 (monthly observations)**

Establishment Size	Gross expansion	Gross contraction	Net Change	n obs	n gainers	n losers	Ratio of gainers/losers
<b>AVERAGE BASE YEAR</b>							
1-19	24.3	-11.6	12.9	6090	2022	2055	98.4
20-49	16.5	-11.7	4.7	4412	1759	2204	79.8
1-49	18.7	-11.6	7.1	10502	3782	4259	88.8
50-99	10.6	-11.8	-1.2	3785	1629	1958	83.2
100-199	9.8	-12.4	-2.6	2925	1241	1590	78.0
200-499	8.9	-11.4	-2.4	2158	859	1244	69.0
500+	5.2	-9.9	-4.7	937	335	578	57.9
Total	8.2	-10.9	-2.7	20307	7845	9629	81.5
<b>HIGHEST BASE YEAR</b>							
1-19	26.2	-10.1	16.0	5283	1674	1701	98.4
20-49	16.9	-10.7	6.2	4149	1664	2007	82.9
1-49	19.4	-10.5	8.9	9432	3338	3708	90.0
50-99	10.2	-11.0	-0.8	3938	1669	2034	82.1
100-199	9.4	-11.1	-1.6	3178	1359	1705	79.7
200-499	8.6	-11.0	-2.3	2539	1027	1442	71.2
500+	5.7	-10.0	-4.3	1219	451	741	60.9
Total	8.2	-10.9	-2.7	20307	7845	9629	81.5
<b>AVERAGE ENTIRE PERIOD</b>							
1-19	11.8	-15.3	-3.5	6076	1833	2226	82.3
20-49	9.9	-15.7	-5.8	4494	1749	2285	76.6
1-49	10.4	-15.6	-5.2	10570	3582	4511	79.4
50-99	9.7	-14.8	-5.0	3834	1690	1953	86.6
100-199	9.3	-13.1	-3.8	2883	1297	1498	86.6
200-499	9.1	-11.1	-2.0	2090	896	1141	78.5
500+	7.1	-8.9	-1.9	930	379	526	72.0
Total	8.2	-10.9	-2.7	20307	7845	9629	81.5
<b>STABLE PORTION (size classes are identical for base and entire period methods)</b>							
1-19	12.8	-12.6	0.2	5764	1788	1992	89.8
20-49	8.7	-11.7	-3.0	3790	1481	1905	77.7
1-49	9.9	-12.0	-2.1	9553	3268	3897	83.9
50-99	7.5	-10.1	-2.6	3140	1380	1594	86.6
100-199	7.2	-10.0	-2.8	2391	1060	1254	84.5
200-499	6.9	-9.6	-2.7	1851	768	1034	74.3
500+	5.4	-9.1	-3.7	849	319	509	62.7
Total	6.4	-9.6	-3.2	17785	6795	8287	82.0

Source: Survey of Employment, Payrolls and Hours (SEPH), via the Statistical Information System (SIS), Large Enterprise Statistics Project, Statistics Canada

assignment of a size class.

The second segment is a variant on the "base year" method. Using this method, establishments are classified according to the highest level of employment in a given year. This method was used primarily because the information on the sampling frame used for stratification (for SEPH) is based on this principle.

The third section is the "average entire period" method. Each establishment is assigned a size class according to its average employment level over all periods. In this method, a given establishment is assigned to a size class once and remains there throughout the period.

The average "base year" and the "highest base year" methods suggest that establishments with less than 50 employees (+18.7%) have significantly higher gross expansion rates than large establishments (+5.2%). Meanwhile, gross contraction rates are not significantly higher for smaller establishments. The resulting net rates suggest that establishments with 1-49 employees (+7.1%) and especially micro sized establishments (+12.9%) are disproportionately responsible for employment gains during the period under study.

However, the results are quite different under the "average entire period" method of sizing. Gross expansion rates for smaller

establishments are not significantly higher than those for larger establishments. The average rate for establishments with less than 50 employees is 10.4%, while the rate for large establishments is 7.1%. However, gross contraction rates tend to be highest in small establishments (-15.3% for establishments with 1-49 employees) and decrease monotonically as establishment size is increased. The average gross contraction rate for large establishments is -8.9%.

The resulting net expansion rates contradict those obtained using the "base year" methods. Small establishments contributed more to the net job loss over the period than their larger counterparts. Establishments with less than 50 employees had a net loss rate of -5.2%, while the rate for large establishments was only -1.9%.

Accordingly, using this method, we can no longer conclude that smaller employers are disproportionately responsible for net job creation.

These results are surprising given that the period under study is only 3 years. All three methods used suffer from the "regression-to-the-mean" bias to the extent that the period under study is short. The "average entire period" method is the least biased, however given that the period under study coincides with a recession and the beginning of an expansion, we can expect significant transitory changes in employment, which should inflate both expansion and contraction in smaller establishments.

Nevertheless, in order to explain what causes the observed differences between the average "base year" and the "average entire period" method, we isolate the establishments which do not change size classes under either method. The results are shown in the last segment of Table 5. The "stable portion" shows that both gross expansion and contraction rates decrease monotonically with increasing employer size. The resulting net rate shows that only the micro establishments experienced a net increase in employment. Furthermore, there is some evidence that larger establishments (more than 500 employees) were responsible for a relatively greater share of employment losses over the period.

The results of the stable portion show that the majority of establishments are unaffected by different methods of sizing. However, it is important to note that by definition, the stable portion is void of all "big movers". Small establishments which grew rapidly over the period and large establishments which reduced employment significantly are excluded.

The number of establishments excluded averaged about 2,500 or 12% of the population in the cohorts. This 12% is made up of 5% from establishments that grew significantly, such that they are classified differently in the "base year" method than in the "Average entire period" method, and 7% from establishment that downsized.

The "stable portion" shows that small establishments are net producers of jobs, and that larger establishments have net job losses over the period (a period of general downturn). However, the difference between the rates for small and larger establishments is greatly reduced and is no longer "disproportionate".

Now if we were to assume that "regression-to-the-mean" was insignificant for one moment, and further that the "base year" method is the appropriate measure to be used. The difference in the number of establishments classified as micro sized in the "base year" method and the "stable portion" method tells us that only a small percentage are responsible for the disproportionate share of net job change due to higher job creation.

Only 3.8% of the total population classified as small, or 11.6% of establishments which expanded account for the 11.5% difference between the creation rate for the "base year" (24.3%) and the stable portion (12.8%). Only 1% of micro sized establishments are responsible for the 1% "under-estimation" of gross contraction (*i.e.* 11.6% base year method vs 12.6% for the stable portion).

The results for manufacturing industries and for services industries are shown in Tables 6 and 7 in the appendix. The results are similar to those found for the commercial industries aggregate.

Figures 6 to 8 (see appendix) show the evolution of gross expansion

rates by establishment size for the "base year" method, the "average entire period" method and the "stable portion" for total commercial industries. Similarly, figures 9 through 11, show the evolution of gross contraction rates by establishment size and finally figures 12 through 14 correspond to the resulting net rates. The scale of the graphs is identical for both methods of sizing, in order to be able to compare the results from the various methods. The data presented in Table 5 are averages of the rates shown in these charts.

With respect to gross expansion rates (Figures 6 to 8), we see a marked difference between the two sizing methods, especially for small establishments. The expansion rates of large establishments remain stable throughout the period. Meanwhile, those for medium sized establishments tend to increase slightly. The rates for establishments with less than 50 employees behave quite differently depending on the method of sizing. This may suggest, to a certain extent, that large establishments do not respond as quickly to the recovery as smaller establishments which increased their rate (although slightly) of job creation.

The graphs for the gross contraction rates (Figures 9 to 11) show similar behavior under the two methods of sizing, and this for all size classes. The rates are in decline throughout the period, suggesting that the "recovery" tended to reduce job losses in continuing establishments, irrespective of size.

Figures 12 through 14 show the resulting net rates of change by establishment size. Net rates show markedly different evolutions by establishment size for the two methods of sizing. Using the average "base year" method, the net growth rates are highest for smaller establishment and decrease with size. Using the "average entire period" method, the net rates for smaller establishment are lower in the beginning of the period and increase at a faster rate than those for larger establishments which tend to rise gradually. The only common factor is that under both sizing methods, net rates increase in time, and this for all size classes.

**Conclusion:**

The aim of this analysis was not to suggest that small firms are not creators of new jobs, or to a certain extent better creators of jobs than large firms. The main impetus has been to provide evidence of some of the statistical problems associated with measuring employment growth for employers of different size.

The main conclusion is that smaller firms tend to have higher rates of job creation as well as higher rates of job destruction. However, the impact on the resulting net rates is ambiguous. Using one method of sizing employers, we find that the "small" firm or establishment sector is the only provider of net new jobs. Conversely, using another method, we find that there is no relationship between employer size and growth rate.

What should be stressed is that statements such as "Of the cumulative net job gain from 1978 to 1992, almost all was in firms employing fewer than 50 [employees]"<sup>19</sup> and "70% of all the new jobs created in Canada during the 1980s stemmed from the growth of just 30,000 small businesses"<sup>20</sup> should be viewed with skepticism.

With respect to the first statement, we have to ask the question: What is cumulative net job gain, and how can this gain be attributed almost entirely to firms with less than 50 employees, and this over a 15 year period? We have to refute this statement, given the discussion on the extent and nature of gross job flows, and the empirical evidence on the incidence of job creation, which suggests that the gross creation of jobs in small and large firms is not cumulative.

With respect to the second statement, does it refer to 70% of the net job change or 70% of gross job creation? Evidently, the reference is to 70% of net employment change since gross job creation is about 15% of total employment per year. However, this statement means nothing, a similar statement would be to say that

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<sup>19</sup> Quoted from Agenda: Jobs and Growth - A New Framework for Economic Policy, Department of Finance, Ottawa, Supply and Services, 1994.

<sup>20</sup> Quoted from Little Giants: How Small Business Drives the Canadian Economy, Royal Bank Business Report, Fall 1994. p.6. The Report indicates that Statistics Canada is the source for some of the information provided in this report.

General Motors Canada, with exports of \$500 million for example, is responsible for 50% of net exports (assuming a trade balance of \$1 billion for a given period of time). Economists don't make such statements with respect to international trade, and likewise should not make these statements with respect to changes in employment. Similar statements have also been made in the U.S. and have been used by Presidents and Representatives (see. Davis, Haltiwanger and Schuh 1993).

Further, the jobs created by smaller firms tend to be short-lived, as is demonstrated by their high birth and death rates. Also, Picot and Pyper (1993) find that employees in smaller firms are twice as likely to be permanently laid off than employees in larger firms. Therefore, what kind of jobs are small firms creating?

The empirical results have also shown that the contribution of existing establishment to total job turnover is significantly larger than the contribution from entry and exit. For cohorts of existing firms, employment growth is independent of size. Further, the high turnover associated with entry and exit, increases the differential in gross growth rates between small and large employers, yet has a negligible impact on net rates.

Nevertheless, we have seen that part of the observed differences in growth rate between small and large employers is explained by the restructuring of the Canadian economy. The gradual shift in

employment from goods producing to services industries has shifted the distribution of employment towards smaller firms. This change in the composition of employment has been highly concentrated in a few industries and firms (mainly in the consumer and business services industries). Perhaps as much as 25% of the change in the distribution of employment can be explained by structural change (in the traditional sense).

Further, the empirical results presented in this paper suggest that less than 5% of small firms are responsible for the disproportionate growth rate in job creation obtained using the traditional "base year" method for determining the size class.

The liberalization of trade and increased international competition may also be responsible for the downsizing and outsourcing phenomenon observed in large firms, notwithstanding the recent recession. Smaller firms which tend to have a lower propensity to export and trade may not have been affected to the same extent as larger firms. However, this also remains to be tested.

Further, without more information on the age distribution of firms we cannot conclude whether or not the observed differences are caused by size and not by age characteristics. A new survey of firm entry and exit at Statistics Canada has just begun to provide some information on the age distribution of firms. This survey will be used in conjunction with the Statistical Information System and

SEPH data in further research on this issue.

What we can conclude, with certainty, is that the statistical biases associated with the measurement of employment flows by employer size are important and significantly influence the results. "Regression-to-the-mean" bias may in fact account for much of the difference in both job creation and destruction due to expansion and contraction. Further, these biases can no longer be ignored and in fact should be the focus of further study. The existence of these biases suggests, in the least, that claims of the job creation prowess of small firms be toned down a bit.

Throughout this paper we have not discussed the quality aspects of the jobs created and destroyed. However, we have noted studies which have shown that larger firms tend to pay higher wages than smaller firms even after adjusting for differences in employee characteristics. Further, we have not differentiated between part time or full time employment, and this, in light of the increase in part time employment, as reported by the Labor Force Survey, suggests another avenue for further research<sup>21</sup>. Another aspect which requires further study is the duration of employee-employer matches. We have seen that 80% of newer firms tend to fail within 5 years. Are the workers in these small firms consistently being

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<sup>21</sup> Morissette, Myles and Picot (1993) find that while the increase in part-time work may have contributed to a rise in earnings inequality, it was not the dominating factor. Conversely, the percentage of full-time workers working longer hours was more important.

employed by firms with a similar probability of failure?

Government policies aimed at small business, for the purpose of reducing unemployment, will likely have a negligible impact in the short run. Such policies are more likely to lead to further unemployment in the long run. Intensified job creation in small firms will not necessarily result in the creation of permanent jobs and thus a reduction in unemployment. The evidence suggests that intensified employment in "smaller" firms will result in higher job turnover which will increase frictional unemployment and the long-term rate of unemployment. Since growth in small firms is not cumulative, such a policy may simply be creating a chain of hires and layoffs as firms enter, expand slightly and fail.

It is unclear if government policy should be targeted to emerging industries or industries in decline, given the high rate of job creation and destruction across all industries. Increasing job creation in growing industries and reducing job destruction in sunset industries both have an impact of reducing unemployment.

With respect to industries in decline, incentives for the application of more efficient production processes (and the usual downsizing in employment which follows) should be encouraged in order to maintain employment in the long run, at the expense of reduced employment in the short run. As such, sunset industries should not be left to disintegrate. These industries continue to

create jobs every year. They only appear to be stagnant or are recording net declines because of relatively higher destruction rates. Proper investments in upgrading these plants in order to improve international competitiveness should be undertaken. Further improvements in the access to international markets will benefit both large and small business.

Whatever the target, governments should also focus on providing information and encouraging corporate networking between large and small businesses and technology centers. Small firms are not "independent" engines of the economy or for job creation. They interact and rely to a great extent on large firms which buy and sell their products.

**Selected References:**

Armington, C. and M. Odle (1982), "Small Business - How Many Jobs", The Brookings Review, Winter, pp.14-17.

Baldwin, J. and P. Gorecki (1990), Structural Change and the Adjustment Process: Perspectives on Firm Growth and Worker Turnover, Economic Council of Canada and Statistics Canada, Ottawa, Supply and Services Canada.

Baldwin, J., T. Dunne and J. Haltiwanger (1994), "A Comparison of Job Creation and Job Destruction in Canada and the United States", NBER Working Paper Series, No.4726.

Baldwin, J. and G. Picot (1994), "Employment Generation by Small Producers in the Canadian Manufacturing Sector", Analytical Studies Branch Research Paper Series, No. 70, Statistics Canada.

Birch, David (1987), Job Creation in America: How Our Smallest Companies Put the Most People to Work, New York, The Free Press.

Brown, C., J. Hamilton and J. Medoff (1990), Employers Large and Small, Cambridge, Massachusetts, Harvard University Press.

Brown, C. and J. Medoff (1989), "The Employer Size Wage Effect", NBER Working Paper Series, No.2870.

Davis, S., J. Haltiwanger and S. Schuh (1993), "Small Business and Job Creation: Dissecting the Myth and Reassessing the Facts", NBER Working Paper Series, No.4492.

Davis, S. and J.Haltiwanger (1991a), "Gross Job Creation, Gross Job Destruction and Employment Reallocation", NBER Working Paper Series, No.3728.

Davis, S. and J. Haltiwanger (1991b), "Wage Dispersion Between and Within U.S. Manufacturing Plants, 1963-1986", NBER Working Paper Series, No.3722.

Davis, S. and J. Haltiwanger (1990), "Gross Job Creation and Destruction: Microeconomic Evidence and Macroeconomic Implications", National Bureau of Economic Research Macroeconomics Annual.

Department of Finance (1994), Agenda: Jobs and Growth - A New Framework for Economic Policy, Ottawa, Supply and Services.

Dunne, T., M. Roberts and L. Samuelson (1989a), "Plant Turnover and Gross Employment Flows in the U.S. Manufacturing Sector", Journal of Labor Economics, vol.7, no.1, pp.48-71.

Dunne, T., M. Roberts and L. Samuelson (1989b), "The Growth and Failure of U.S. Manufacturing Plants", Quarterly Journal of Economics, vol.104, no.4, pp.671-698.

Economic Council of Canada (1990), Good Jobs, Bad Jobs: Employment in the Service Economy, Ottawa, Supply and Services Canada.

- Evans, D.S. (1987a), "Tests of Alternative Theories of Firm Growth", Journal of Political Economy, vol. 95, no.4, pp.657-74.
- Evans, D.S. (1987b), "The Relationship between Firm Growth, Size, and Age: Estimates for 100 Manufacturing Industries", Journal of Industrial Economics, vol.XXXV, no.4, pp.567-81.
- Gera, S. and G. Grenier (1991), "Interindustry Wage Differentials in Canada: Evidence and Implications, in Canadian Unemployment: Lessons from the 80s and Challenges for the 90s, Economic Council of Canada, pp.129-38.
- Hall, B.H. (1987), "The Relationship between Firm Size and Firm Growth in the US Manufacturing Sector", Journal of Industrial Economics, vol.XXXV, no.4, pp.583-608.
- Hansen, J.A. (1992), "Innovation, Firm Size and Firm Age", Small Business Economics, no.1, pp.37-44.
- Hart, P.E. and S.J. Prais (1956), "The Analysis of Business Concentration: A Statistical Approach", Journal of the Royal Statistical Society, 119, pt.2, pp.150-191.
- Jovanovic, B. (1982), "Selection and the Evolution of Industry", Econometrica, vol. 50, no.3, pp.649-70.
- Lang, K. and W.T. Dickens (1992a), "Labor Market Segmentation Theory: Reconsidering the Evidence", NBER Working Paper Series, No.4087.
- Lang, K. and W.T. Dickens (1992b), "Labor Market Segmentation, Wage Dispersion and Unemployment", NBER Working Paper Series, No.4073.
- Leonard, J.S. (1986a), "On the Size Distribution of Employment and Establishments" NBER Working Paper Series, No.1951.
- Leonard, J.S. (1986b), "In the Wrong Place at the Wrong Time: The Extent of Frictional and Structural Unemployment", NBER Working Paper Series, No.1979.
- Lucas, R.E. (1967), "Adjustment Costs and the Theory of Supply", Journal of Political Economy, vol.75, no.4, pp.321-34.
- Lucas, R.E. (1978), "On the Size Distribution of Business Firms", Bell Journal of Economics, 9, Autumn, pp.508-23.
- Lucas, R.E. and E.C. Prescott (1971), "Investment under Uncertainty", Econometrica, vol. 39, September, pp.659-81.
- Morissette, R., J. Myles and G. Picot (1993), "What is Happening to Earnings Inequality in Canada", Statistics Canada, Analytical Studies Branch Research Paper Series, no.60.

Morissette, R. (1991a), "Big is Beautiful Too - Wages and Worker Characteristics in Large and Small Firms", Canadian Economic Observer, Statistics Canada, July 1991.

Morissette, R. (1991b), "Canadian Jobs and Firm Size: Do Smaller Firms Pay Less", Statistics Canada, Analytical Studies Branch Research Paper Series, no.35.

Organization for Economic Cooperation and Development (1994), "Job Gains and Job Losses in Firms", Employment Outlook, Paris, OECD. pp.103-35.

Pashigian, P. and S. Hymer (1962), "Firm Size and Rate of Growth", Journal of Political Economy, vol.52, pp.556-569.

Picot, G., J. Baldwin and R. Dupuy (1994), "Have Small Firms Created a Disproportionate Share of New Jobs in Canada? A Reassessment of the Facts", Statistics Canada, Analytical Studies Branch Research Paper Series, no. 71.

Picot, G. and W. Pyper (1993), "Permanent Layoffs and Displaced Workers: Cyclical Sensitivity, Concentration, and Experience Following the Layoff", Statistics Canada, Analytical Studies Branch Research Paper Series, no.55.

Picot, G., J. Myles and T. Wannell (1990), "Good Jobs/Bad Jobs and the Declining Middle: 1967-1986", Statistics Canada, Analytical Studies Branch Research Paper Series, no.28.

Royal Bank Business Report (1994), Little Giants: How Small Business Drives the Canadian Economy, Fall.

Simon, J.M., and C.P. Bonini (1958), "The Size Distribution of Business Firms", American Economic Review, 48, pp.607-617.

Wannell, T. (1992), "Trends in the Distribution of Employment by Employer Size: Recent Canadian Evidence", Statistics Canada, Analytical Studies Branch Research Paper Series, no.39.

Gross job expansion rates by establishment size for various methods of sizing:

Figure 6

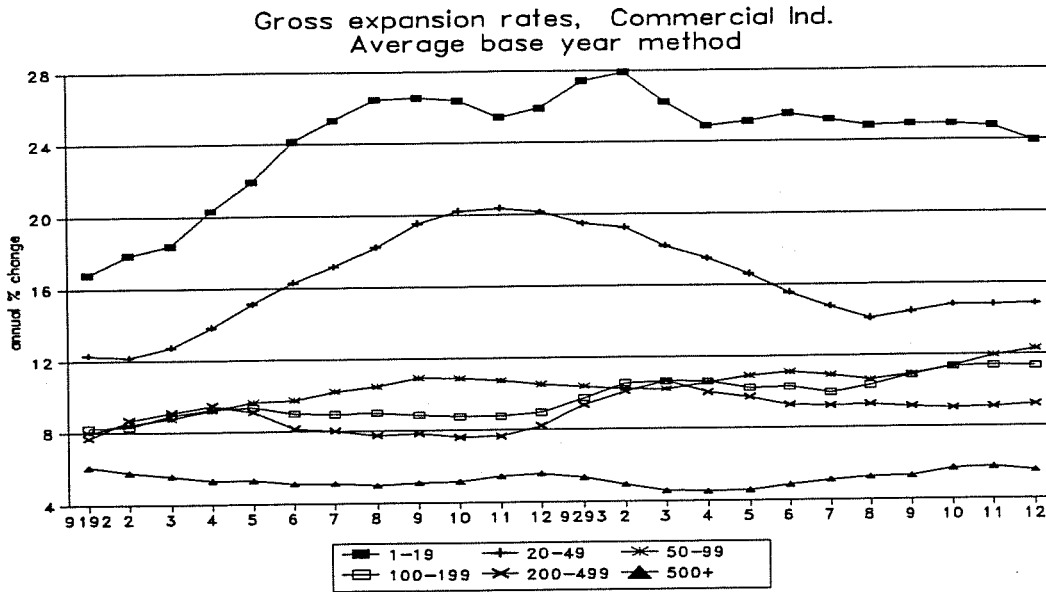


Figure 7

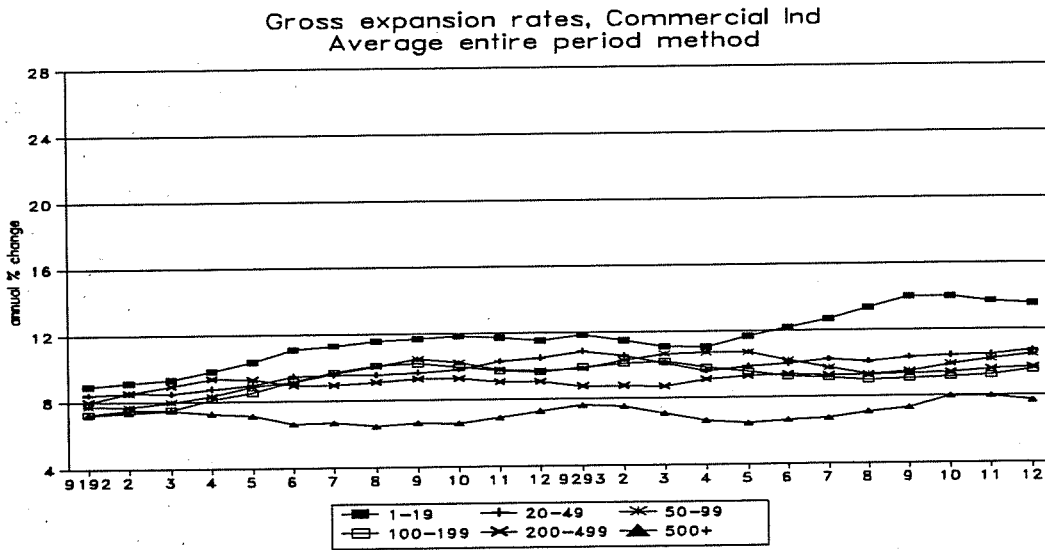
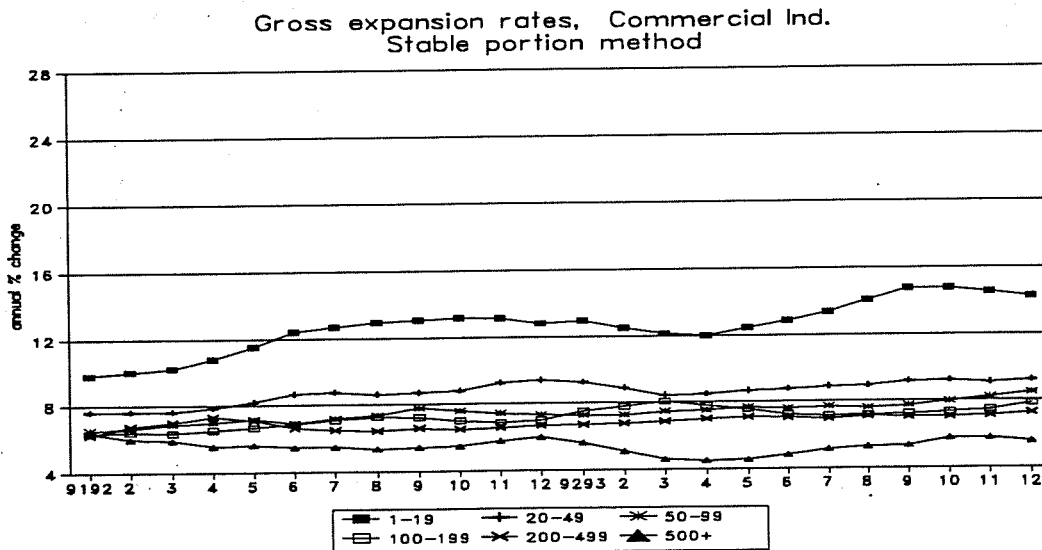


Figure 8



Gross job contraction rates by establishment size for various methods of sizing:

Figure 9

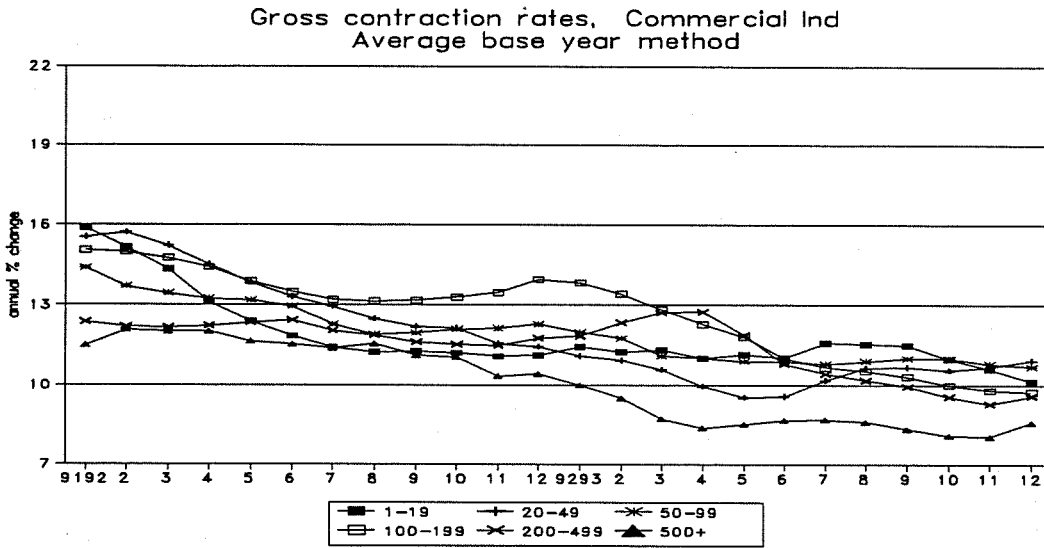


Figure 10

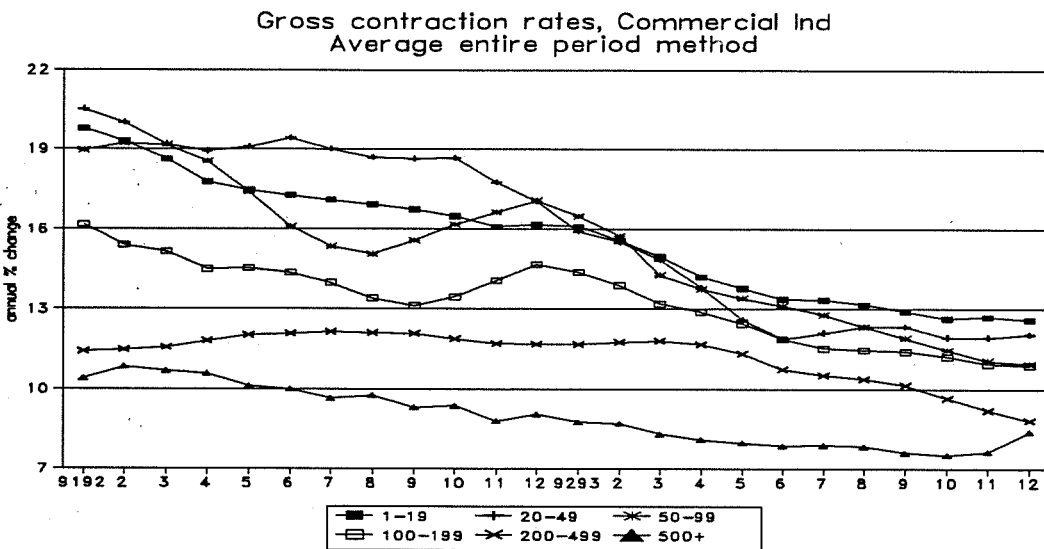
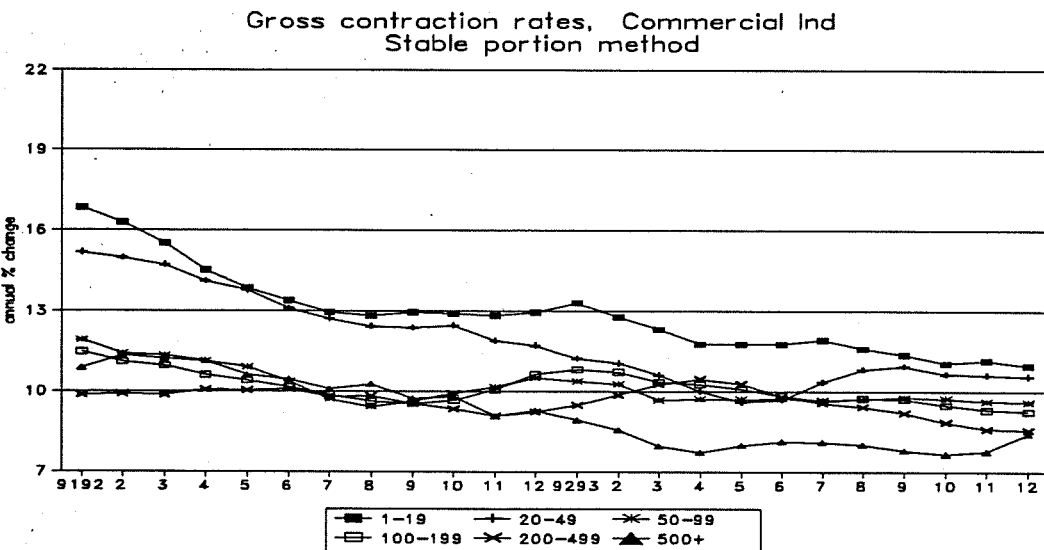


Figure 11



Net job expansion/contraction rates by establishment size for various methods of sizing:

Figure 12

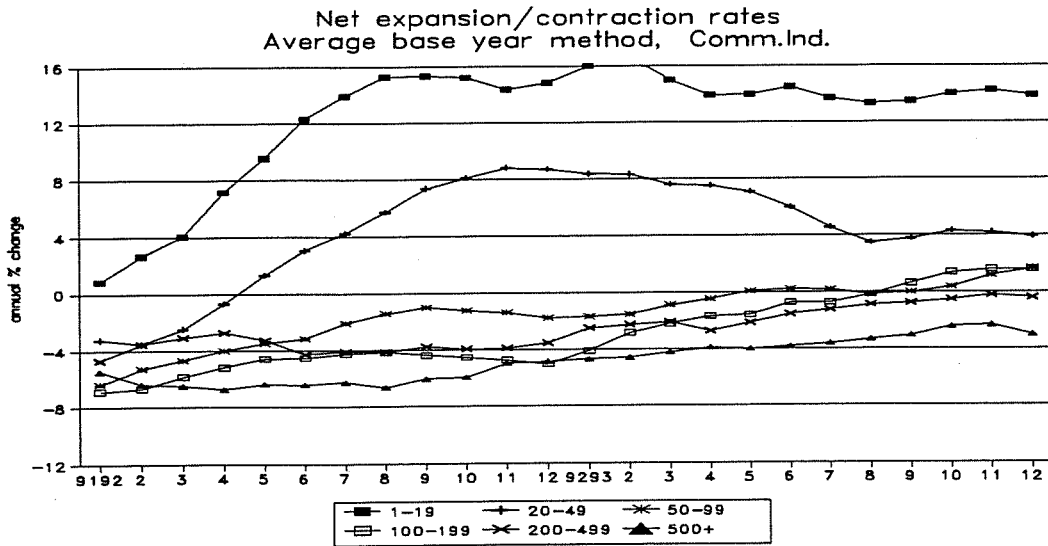


Figure 13

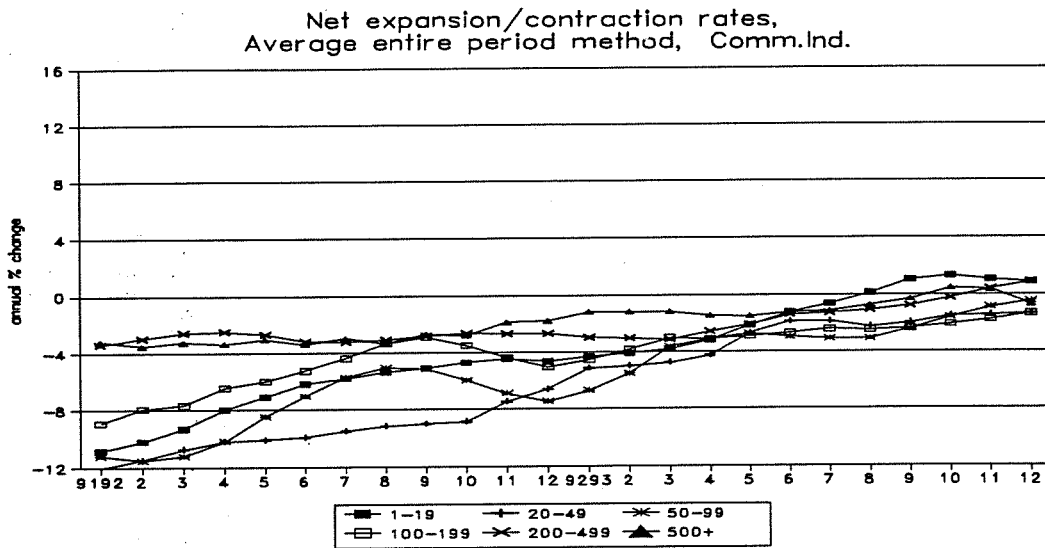


Figure 14

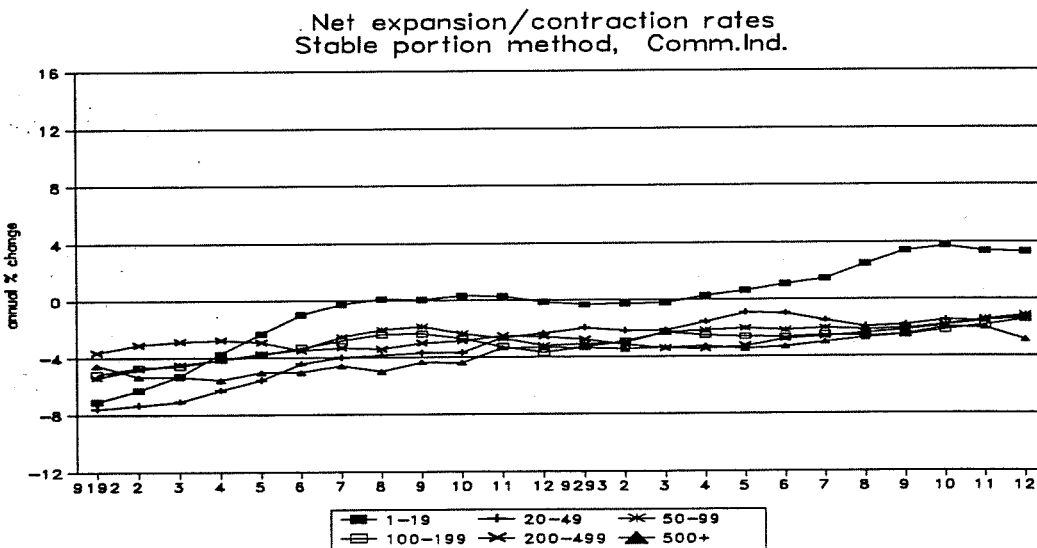


TABLE 6

Job Expansion and Contraction Rates, continuing establishments  
Service industries, total  
average period 91-93 (monthly observations)

Establishment Size	Gross expansion	Gross contraction	Net Change	n total	n gainers	n losers	Ratio of gainers/losers
AVERAGE BASE YEAR							
1-19	23.9	-9.7	14.2	4632	1485	1507	98.5
20-49	15.7	-10.3	5.4	2601	993	1313	75.7
1-49	18.5	-10.1	8.4	7233	2478	2820	87.9
50-99	9.4	-10.4	-1.0	1702	679	918	74.0
100-199	9.0	-12.5	-3.5	1459	578	829	69.7
200-499	8.0	-10.6	-2.5	1266	475	754	63.0
500+	3.6	-7.5	-3.9	613	230	367	62.6
total	6.5	-9.0	-2.5	12273	4440	5689	78.1
HIGHEST BASE YEAR							
1-19	25.8	-8.8	17.0	4161	1287	1302	98.9
20-49	16.3	-9.6	6.7	2590	1003	1261	79.5
1-49	19.4	-9.4	10.0	6751	2290	2563	89.3
50-99	8.9	-9.9	-1.0	1789	701	964	72.7
100-199	9.0	-10.8	-1.7	1489	588	843	69.8
200-499	7.6	-10.3	-2.7	1469	567	857	66.1
500+	4.1	-7.7	-3.6	775	294	461	63.8
total	6.5	-9.0	-2.5	12273	4440	5689	78.1
AVERAGE ENTIRE PERIOD							
1-19	10.7	-12.9	-2.3	4611	1363	1609	84.7
20-49	9.1	-14.2	-5.1	2644	1010	1328	76.0
1-49	9.6	-13.8	-4.2	7255	2372	2937	80.8
50-99	9.0	-13.9	-4.9	1772	737	934	78.8
100-199	8.4	-13.1	-4.7	1414	583	785	74.2
200-499	8.0	-10.0	-2.0	1224	495	694	71.2
500+	5.0	-6.8	-1.7	607	254	338	75.1
total	6.5	-9.0	-2.5	12273	4440	5689	78.1
STABLE PORTION (size classes are identical for base and entire period methods)							
1-19	11.5	-10.9	0.6	4428	1338	1471	91.0
20-49	7.7	-10.2	-2.5	2272	861	1143	75.3
1-49	9.0	-10.5	-1.4	6700	2199	2614	84.1
50-99	6.6	-8.9	-2.3	1424	584	754	77.5
100-199	6.6	-10.0	-3.4	1180	485	656	74.0
200-499	5.9	-8.9	-3.0	1097	428	635	67.5
500+	3.6	-6.9	-3.3	563	220	327	67.2
total	4.9	-7.9	-3.1	10963	3917	4985	78.6

Source: Survey of Employment, Payrolls and Hours (SEPH), via the Statistical Information System (SIS), Large Enterprise Statistics Project, Statistics Canada

TABLE 7

Job Expansion and Contraction Rates, continuing establishments  
Manufacturing Industries  
average period 91-93 (monthly observations)

Establishment Size	Gross expansion	Gross contraction	Net Change	n total	n gainers	n losers	Ratio of gainers/losers
AVERAGE BASE YEAR							
1-19	32.5	-12.7	19.8	966	350	354	98.8
20-49	15.8	-11.4	4.4	1427	621	688	90.2
1-49	19.0	-11.7	7.3	2393	970	1042	93.2
50-99	12.5	-10.9	1.7	1854	859	913	94.1
100-199	9.1	-9.4	-0.3	1304	608	660	92.1
200-499	10.0	-11.2	-1.2	743	333	396	84.1
500+	8.0	-15.4	-7.4	265	92	166	55.5
total	10.2	-12.2	-2.0	6558	2862	3177	90.1
HIGHEST BASE YEAR							
1-19	32.8	-12.1	20.7	785	266	279	95.4
20-49	16.5	-10.5	5.9	1171	509	551	92.4
1-49	19.7	-10.9	8.8	1956	775	830	93.4
50-99	12.0	-10.3	1.7	1866	857	914	93.7
100-199	9.7	-9.5	0.2	1515	708	760	93.2
200-499	9.5	-10.6	-1.2	863	388	459	84.6
500+	9.0	-15.5	-6.5	358	135	216	62.6
total	10.2	-12.2	-2.0	6558	2862	3177	90.1
AVERAGE ENTIRE PERIOD							
1-19	10.9	-16.9	-6.0	955	294	397	73.9
20-49	10.0	-15.4	-5.4	1463	589	755	78.0
1-49	10.1	-15.6	-5.5	2418	883	1152	76.6
50-99	9.6	-11.5	-1.9	1833	862	889	97.0
100-199	10.0	-10.0	-0.0	1319	657	626	104.9
200-499	10.4	-11.2	-0.8	724	352	361	97.6
500+	10.5	-13.8	-3.3	264	109	149	72.8
total	10.2	-12.2	-2.0	6558	2862	3177	90.1
STABLE PORTION (size classes are identical for base and entire period metho							
1-19	12.0	-13.0	-1.0	876	282	338	83.5
20-49	9.2	-11.9	-2.7	1206	498	602	82.7
1-49	9.7	-12.1	-2.4	2081	780	940	83.0
50-99	8.5	-9.4	-0.9	1545	724	748	96.8
100-199	7.5	-7.8	-0.2	1096	532	532	100.0
200-499	7.6	-9.3	-1.7	628	295	322	91.6
500+	8.4	-14.0	-5.6	236	87	143	60.6
total	8.1	-10.9	-2.8	5586	2418	2686	90.0

Source: Survey of Employment, Payrolls and Hours (SEPH), via the Statistical Information System  
Large Enterprise Statistics Project, Statistics Canada

**TABLE 8****Net employment change by establishment size class**

	Canada(1) 1983-91	Denmark 1983-89	Finland 1986-91	France(2) 1987-92	Italy(1,3) 1984-92	U.K.(1) 1987-91	Sweden 1985-91	New Zealand 1987-92
1-19	2.2	2.3	0.9	0.4	1.5	1.6	2.6	0.4
20-99	0.6	0.3	-0.7	0.4	-0.2	0.4	-0.2	-1.9
1-99	2.8	2.6	0.2	0.8	1.3	2.0	2.4	-1.5
100-499	0.1	-0.4(4)	-1.1	0.3	-0.2	0.3	-0.5	-1.5
500+	-0.3	—	-0.7	-0.2	-0.5	0.4	-0.6	-1.1
TOTAL	2.6	2.2	-1.6	0.9	1.3	2.7	1.3	-4.1

(1) Data refers to firms

(2) Data by establishment size class are not available for the period 1984-1987.

(3) Sum of size categories does not equal total as firms temporarily operating with 0 employees are not classified according to size for the period 1986-1992.

(4) 100 and more.

Sources: OECD Employment Outlook, 1994, reproduction of Table 3.12, pp.125