Preliminary Research

AN ANALYSIS OF NEW ZEALAND'S BUSINESS DEMOGRAPHY DATABASE[*]

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Abstract

Longitudinal employer information for a linked employer-employee dataset in New Zealand will likely come from the business demography database maintained by Statistics New Zealand. The success of a linked employer-employee dataset in New Zealand will depend on employer and employee data that are well understood, well documented and where false flows and false results are minimised. This paper presents the results of a preliminary analysis of job creation and destruction using the business demography database. We find high rates of job creation and destruction, comparable to international levels.

1. Introduction

The functioning of labour markets is critical for a country's economic and social progress via the transmission of productivity growth to prosperity. Although labour markets are traditionally characterised as having high levels of inertia and being slow to adjust to shocks, the most recognised and least contentious theme that emerges from literature on job creation and destruction is that rates of job creation and destruction are large. Internationally, annual job creation typically accounts for one in ten jobs, and job destruction accounts for a similar number (Davis, Haltiwanger and Schuh, 1996). High levels of creation and destruction been found across all sectors of a wide variety of economies. While this does not imply that adjustment costs associated with employment changes are low, it does suggest considerable potential exists for labour markets to respond dynamically to shocks (OECD, 1994).

The high levels of employment change and reallocation in the economy highlights that behind an aggregate growth rate there is a wide dispersion of firm outcomes. This may reflect both differing circumstances facing establishments at a point in time and also that there is no representative firm in an economy or industry (Grey, 1996). It also highlights that, although aggregate firm and employment outcomes may be relatively stable, the determinants of individual level outcomes are considerably more complex (Hamermesh, 1993).

This paper presents preliminary results of analysis on job creation and destruction in New Zealand over the period 1994-2001. The analysis uses employer-based data from Statistics New Zealand's Business Demography Statistics (BDS) database. The BDS provides a rich source of firm-level data: the BDS includes detailed information on employment, together with data on payroll, sales and purchases (the latter two enabling a measure of firm value-added to be derived), and other firm characteristics such as whether it is an exporter and/or importer.

However, there are also several weaknesses in the BDS database. Currently, information on mergers, acquisitions, and splits are not readily available on the database. Second, employment figures for many multi-unit enterprises are only available for the enterprise as a whole, and not separately by geographic units. Third, there appears to be a number of dormant firms on the BDS. Misleading results may occur if information is not kept up-to-date, new firms are not identified promptly, and mergers, splits and acquisitions are not handled appropriately.

The BDS has previously been used to analyse patterns of job creation and destruction in New Zealand (e.g., Malcolm (1993), Gorringe (1997), and Johnson (1999)). What distinguishes the present study from earlier analyses is that it is the first analysis of the database by non-Statistics New Zealand analysts. In addition, the BDS will be the likely source of employer data used in any New Zealand linked employer-employee database. Thus, although job creation and destruction is interesting in on its own for understanding the labour market, we are further interested in the properties of the BDS because of its relevance for a possible linked employer-employee database. The strengths and weaknesses of the BDS are particularly important for the robustness of a linked employer-employee dataset based on this information.

Broadly speaking our findings are consistent with previous New Zealand and international literature. First, the analysis confirms that New Zealand's firm structure is strongly dominated by small firms. About three-quarters of the Geographic Units (production plants)

in the BDS have at most 5 employees and working proprietors, while only 5% have more than 20. In addition, small firms contribute disproportionately to firm and employment changes. Second, the apparent rates of job creation and destruction that we report are comparable to earlier New Zealand findings.[1] Third, the job creation and destruction rates for New Zealand tend to be higher compared to international studies, however this may be explained partly by the relatively high proportion of small firms in New Zealand, together with their higher turnover rate.

As stated above the research results at this stage are preliminary. From here, there are a number of features of business and labour market data in New Zealand that will naturally lend itself to further investigation. For example, with the availability of detailed net sales information on firms, future research can investigate the dynamic interaction between firms' net sales, their employment, and their productivity performance. Detailed firm and industry information will also allow analysis on the impact of aggregate and allocative shocks on sectoral performance. Finally, in the future with the possible integration of employee information with employer information, firm and individual effects on pay, tenure and labour market performance can be studied.

The remainder of this paper is structured as follows. In section 2, we describe the Business Demographic Statistics (BDS) database used in the analysis. This covers the methodology of updating the BDS, its relationship to the Business Frame (BF) database, and some of the strengths and weaknesses of the data. In section 3 we present some cross-sectional context for the study. Section 4 presents a general description of job creation and destruction in New Zealand between 1994 and 2001 using the BDS. Section 5 provides an examination of longer-term changes in firm growth. Section 6 presents conclusions and further work.

2. New Zealand Business Data and the Business Demographic Statistics database

In order to understand flows in the labour market and economy, a robust data source is required in order to distinguish actual flows from changes that are the result of administrative, statistical or ownership changes. This section gives detailed information on the Business Demographic Statistics database in order to give an indication of where flows may not reflect actual changes.

2.1 Background to the Business Demographic Statistics database

Since the introduction of Goods and Services Tax (GST) in 1986, Statistics New Zealand's (SNZ) primary source of information about business enterprises in New Zealand has been the Inland Revenue Department's (IRD) Client Registration File, which is the universe of GST registered enterprises.[2] The Client Registration File currently includes 530,000 enterprises. For GST-exempt financial services enterprises, SNZ supplements the Client Registration File

[1] Although some differences exist, these probably reflect differences in the period of analysis. For example, we find slightly higher rates of job creation and lower rates of job destruction during the 1994-2001 period than Malcolm's (1993) results for the 1989-93 period. However, this may be due to the change in the sample frame of the BDS that occurred in 1994, together with differences in the general economic conditions over the respective periods: the late 1980s and early 1990s was characterised by substantial economic restructuring and recession, whereas generally stronger economic conditions prevailed during the later period.

[2] GST is a broad-based sales tax, introduced on 1 October 1986 at the rate of 10%, and increased on 1 July 1989 to 12.5%. The few GST-exempt industries include banking and financial services, superannuation and life insurance and residential property leasing and rental. Businesses must register for GST, and therefore be added to the IRD client registration file, if they are conducting a taxable activity and their annual turnover has exceeded, or is expected to exceed, $40,000 (this was increased from $30,000 as of 1 October 2000).

data using various sources, including association lists, financial reports, and a list of superannuation (pension) schemes from the Government Actuary[3].

These sources of business information have been used to create SNZ's Business Frame (BF) database for the period from 1987 onwards.[4] For pragmatic reasons, the Business Frame is restricted to economically significant enterprises. Currently, an enterprise is defined to be *economically significant* if it satisfies at least one of the following criteria (see technical notes to the Business Demographic Statistics database on SNZ's website):[5]

- have greater than $30,000 annual GST expenses or sales;
- have more than two full-time equivalent paid employees;
- be in a GST-exempt industry except residential property leasing and rental;
- be part of a group of enterprises;
- be a new GST registration that is compulsory, special or forced (this means the enterprise is expected to exceed the $40,000 boundary);
- be registered for GST and involved in agriculture or forestry.

This means that the BF can include zero-employee/employment firms that meet one of the other criteria for selection. All GST-registered enterprises recorded on the IRD's client registration file are *continually* monitored to determine if they meet the 'economic significance' criteria for inclusion in the Business Frame. In addition, non-employing firms are monitored using PAYE tax information to see if and when they begin to employ staff. When businesses register for GST they are added (or 'birthed') onto the BF, and are given a new reference number. In practice, the selection criteria tends to be applied liberally, and the business frame continues to monitor a number of firms that fail to satisfy the criteria of economical significance.

Thus, the BF is a comprehensive register of businesses in New Zealand that satisfies the *economically significant* selection criteria and, currently, includes approximately 350,000 enterprises. The BF acts as the population of enterprises for selecting samples for SNZ's business surveys. It also provides the backbone for consistent classification of data from these surveys and other administrative sources, and allows SNZ to control the extent of respondent burden. A business registered for GST must inform the IRD of any material changes, such as a change of name, address, taxable activity or organisation's constitution. Where firms are sold, merged, or liquidated this will result in a firm de-registering for GST. A non-employing enterprise is removed from the BF once it deregisters for GST or files 12 months of consecutive zero GST returns.

Other businesses and information on the BF are monitored using SNZ surveys, including Annual Business Frame Update (ABFU) survey conducted in February each year. The ABFU survey is administered to all businesses except farm type agriculture enterprises, and those

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[3] In addition, in order to ensure appropriate timing of firm births and deaths Statistics New Zealand uses a variety of other sources including its own surveys and media reports to identify businesses for entry onto and exit from the business frame.

[4] Prior to 1997 this was known as the Business Directory.

[5] The *economically significant* criteria has applied to inclusion on the Business Frame for the period 1994 onwards. The annual GST limit was set at $30,000 from 1994. In practice SNZ uses a GST 'buffer zone' of $25,000 – $35,000 in order to limit the extent of movements in- and out-of the BF because of the $30,000 GST criteria: GST sales must fall below $25,000 before a firm is dropped and then must exceed $35,000 before being included again. From 1987-1994, the criteria criterion used was units belonging to a compulsory GST-registration enterprise (i.e. firms with GST sales of at least $30,000). Thus, in 1994 enterprises satisfying both criteria were included, enabling a comparison of the sample frames for this year.

that are not part of a group of enterprises and have no paid employees.[6] The ABFU collects a variety of information, including number of employees, overseas ownership and activities, location, and main activity.

The data used in this paper comes from SNZ's Business Demographic Statistics (BDS) database. The BDS is updated in February each year as an annual snap-shot from the Business Frame at that point in time. In addition to the selection criteria for the BF discussed above, the BDS further selects enterprises on the basis of industry classification, and the economically significant criteria tends to be applied more strictly for the BDS than the BF. The primary exclusion from the BDS is firms in agricultural production industries, although the industry coverage has varied over time.[7] Because of the changes in BF selection criteria in 1994, we restrict attention to the period 1994-2001, and to the sample of firms in the industries covered throughout this 8 year period. In the BDS, firm 'births' and 'deaths' are identified by comparing GST registration reference numbers across years.

2.2 Description of the Business Demographic Statistics data

We now discuss various data related issues for using the BDS, including the ownership level of the unit of observation, the measure of employment, and measures of output of firms.

First, the BDS has information on business activity at both the geographic unit (i.e. 'plant') level and the enterprise level for multi-geographic unit enterprises.[8] An enterprise may be a company, partnership, trust, estate, incorporated society, producer board, local or central government organisation, voluntary organisation or self-employed individual. The analysis in this paper is concentrated primarily at the geographic unit level, which is consistent with the plant level analysis that was undertaken by Davis, Haltiwanger and Schuh (1996). It can be argued that decision-making about changes in employment levels of a firm could occur at either the enterprise or the geographic unit level, and probably varies across firms. One caveat associated with using geographic unit information is that changes in plant level production may be the result of multi-unit enterprises shifting employment from one unit to another as well as the impact of firms winding down production in the unit for competitive reasons.

Second, the BDS includes information on the numbers of full and part-time employees (also by Gender), and also the numbers of 'working proprietors'. In this study we will use a simple

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[6] Prior to 1997 the survey was called the Annual Business Directory Update Survey. The response rate to the ABFU survey is about 90% overall, but higher for larger firms. In the case of non-response, the BF carries forward the last known survey details. There are approximately 100,000 smaller enterprises, which are not covered by the ABFU. In addition, enterprises that indicate to the IRD that they have no paid employees have their data for working proprietors estimated from the data provided to the IRD.

[7] Until 1996 the industry selection criteria were based on the New Zealand Standard Industrial Classification (NZSIC); while from 1997 onwards the Australian and New Zealand SIC (ANZSIC) was used. Between 1994 and 2001, the excluded industries were as follows: Agriculture and livestock production (NZSIC 11111-11199 in 1994-96; ANZSIC 01110-01699 in 1997, 1999-2001); Residential property leasing and rental (NZSIC 83121), Commercial property and leasing (NZSIC 83123), Child care services (NZSIC 93402), Residential and non-residential services (NZSIC 93403), and Business, professional and labour organisations (NZSIC 93500) in 1994-95; and Religious organisations (NZSIC 93910), Social and community groups (NZSIC 93990), and Sporting and recreational services (NZSIC 94402) in 1994-96.

[8] Statistics New Zealand (2001) defines a geographic unit as "a separate operating unit engaged in New Zealand in one, or predominantly one, kind of economic activity from a single physical location or base"; while it defines an enterprise as "a business operating in New Zealand". Thus an enterprise will consist of one or more geographic units.

'total employment' measure of employment that includes both working proprietors and employees, and does not differentiate between full-time and part-time employees. This measure takes no account of firms adjusting the number of hours that their staff work and therefore where a firm moves from one part-time staff member to one full-time staff member this will not be counted as job creation and destruction. Working proprietors are included in the statistics because they are engaged in the production process.

Third, as well as information regarding firm structure from the BDS, Statistics New Zealand provided the study with GST sales, purchases and net sales (sales less purchases). This was added to the information collected from other sources, and provides a measure of value-added output for the firm. However, this value-added measure is not without problems. In most cases, the GST information is only available at the enterprise level and not separately for geographic units. Also, although businesses with turnover more than $40,000 annual turnover are required to file a GST return, under-reporting is known to be a problem. Furthermore, there are conceptual differences between net GST sales and value added because (Statistics New Zealand, 1998):

- GST sales and purchases variables are GST inclusive, while most Statistics New Zealand surveys of businesses record sales and purchases are recorded GST exclusive;
- Sales (and purchases) of businesses themselves and second hand assets are included in the GST figures; and
- Gross output measures sales plus stock change, whereas GST sales are exclusive of stock change.

Despite of these caveats, the GST sales indicator provides potentially useful information about firm output, and its relationship to job creation and destruction.

2.3 Data Caveats

Although the BDS, together with GST data, provides detailed information about firm employment and output overtime, there are several caveats associated with the use of this data for the study of job creation and destruction.

First, there are conceptual and empirical issues associated with how to measure business demographic events (i.e. births, deaths, and job creation and destruction) in relation to firm mergers, splits and acquisitions. A birth occurs when a new firm enters an industry, while a death occurs when an existing firm leaves an industry. However, when two firms merge, for example, does this represent the death of two firms and the birth of one, or the death of one firm and the continuation of the second with, presumably, an increase in employment of that firm?[9] The BDS used in this paper contains no information on changes in ownership, and we are constrained to measuring births and deaths according to entries of new business demographic identifiers and exits of existing identifiers respectively. Given that business demographic identifiers are based on GST indicators, which change with most ownership changes, this implies that many mergers, acquisitions, and splits will likely be classified as births and deaths of all enterprises involved. This suggests that an important avenue for future research on understanding gross employment changes is to investigate the impact that changing ownership has on birth and death rates.

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[9] Eurostat's: "Recommendation Manual – Business Register" notes that "The conclusion is that, in theory, an enterprise is considered to be continued if its production factors are continued. It is discontinued if its production factors are discontinued." The manual then provides three practical criteria for determining whether an enterprise has continued: the controlling legal unit of the enterprise, the economic activities undertaken and the location of the enterprise.

Second, the BDS identifies the timing of firm births and deaths according to the criteria used for inclusion in the database. Specifically, this means that 'births' and 'deaths' relate, conceptually, to transitions into and out-of *economic significance*. In addition to this issue, births and deaths as measured by GST and employment indicators may not coincide with common conceptions of a firm birth or death. For example, a firm may have turnover of over $40,000, hence be 'born', yet not have begun trading. Alternatively, firms with new GST registrations often start business prior to registering for GST, resulting in a delay in the 'birth' registration. Analogous issues arise with the timing of firm 'deaths': e.g. after a firm ceases trading it can continue to have annualised GST sales or purchases of over $30,000 as it winds down its activity and thus continue to be included in the business demography statistics. Thus identifying the true timing of births and deaths of such firms is problematic.

Third, in order to ensure a wide coverage of firms in the business frame, Statistics New Zealand collects information from a variety of sources, other than the monthly GST registrations, to get firm birth information. Although attempts are made using the IRD database to check the existence of enterprises from other sources, duplicating enterprises with a different identification numbers can and do occur due to clerical or other errors. This results in false births and, when the duplication is discovered, removing duplicated records will result in false deaths at that point. Using an earlier sample from the BDS, Malcolm (1993) estimated the degree of false births was between 4 and 14% per year.

Finally, although there is a high response rate to the Annual Business Frame Update survey (approximately 90 percent of enterprises return the survey), the policy of carrying forward the last recorded firm data for non-responding firms will tend to bias downwards the extent of job creation and destruction rates. This will tend to have a greater effect on smaller firms and cause more bias in firm dynamics than in employment changes, as Statistics New Zealand has case managers to ensure that relevant information is collected for larger firms. A related issue with the ABFU survey is that respondents are asked to correct the provided details about their firm rather than enter in new details. This is likely to bias downwards any changes in measured firm characteristics, although may tend to reduce the measurement error in the responses. In addition, the BDS is conducted at a point-in-time in February so the *level* of employment may reflect seasonal, as well as underlying, firm factors, while any intra-year transitory changes will not be measured.

3. A Cross-sectional description of the BDS

Different types of firms and industries experience different kinds of changes and respond in different ways. To provide a context for the aggregate results presented later in the paper, this section, along with table 1, presents a cross-sectional summary of the Business Demographic Statistics database by enterprise structure, employment size and industry. The first column in the table pertains to the distribution of geographic units (plants), while the second column pertains to the distribution of employment. The BDS data shows there are a total of 260,800 geographic units in 2001 that satisfy the BF selection criteria of economic significance and the BDS industry selection coverage for the 1994-2001 period, and there are a total of 1,616,500 employees and working proprietors engaged in these enterprises.

To gauge the completeness of the BDS, we compared the employment numbers with those obtained from the March 2001 Quarter Household Labour Force Survey (HLFS). Because agriculture is excluded from the BDS sample frame, we exclude primary industries from both sources. Under this scenario, total employment is 1,575,300 in the BDS compared with

1,685,800 in the HLFS. At least three factors may contribute to the discrepancy between these numbers: additional industries are also excluded from the 1994--96 BDS coverage (so excluded from the panel sample used in this study); the HLFS is a household survey, and so counts the numbers of people employed, whereas the BDS counts the numbers of jobs;[10] and the HLFS is carried out across the Quarter, while the BDS applies more specifically to week in February.

Panel A of table 1 describes the distribution of the ownership structure of the geographic units. The first column shows that 87% of geographic units are the single unit owned, 6% of units are owned by firms with 2-5 units, and 7% are owned by firms with at least 6 units. The distribution of employment shown in column 2 is less skewed towards single-unit owned firms: 58% of employment is in these units, while 14% of workers are employed by firms with 2-5 units, and 28% are employed by firms with at least 6 units. Thus, although both the ownership structure and employment is concentrated in single-unit enterprises, larger employers are more likely to own multiple geographic units.

In panel B of table 1, we describe the distribution of geographic units and employment by the size of the geographic unit, as measured by the number of workers it employs. This shows the basic fact that New Zealand firms can be characterised as small employers: 8% of units in the BDS have no employees (or working proprietors);[11] nearly one-third (32%) have a single employee (primarily single working proprietor firms); and almost two-in-five (39.2%) employ between 2 and 5 workers. Only 5% of geographic units employ more than 20 workers, and less than 1% employ at least 100.

Naturally, in terms of employment, the importance of larger firms is quite different. Column 2 of panel B shows that the 0.7% of geographic units with at least 100 employees employ one-quarter of all workers in the BDS, while the 4.2% of units employing 21-99 workers, account for a further quarter (27%) of total employment. At the lower end of the size distribution, the 71% of units with 1-5 employees employ only 23% of all workers.

The last panel in table 1 shows the 2001 industry distribution of geographic units and employment in the BDS. Services and the Retail, wholesale and accommodation sectors account for the largest fractions of both geographic units (39% and 26% respectively) and employment (30% and 27% respectively). Although Manufacturing and the Public services sectors are relatively smaller, units in these industries are relatively larger: these sectors account for 8.5% and 8% of geographic units respectively, but 15.3% and 18% of total employment.

In summary, Table 1 shows the predominance and importance of small geographic unit plants in New Zealand. For example, the average number of employees at a geographic unit is approximately 6, while the median is only 2! One way to illustrate how important small units are is to note that if units with less than 20 employees were dropped from the analysis, as is

[10] This will tend to overcount the numbers employed in the BDS relative to the HLFS – e.g. a worker with 2 jobs will be counted twice in the BDS but only once in the HLFS.

[11] We suspect that many of these geographic units are essentially dormant and don't satisfy the criteria of economically significant: for example, a high proportion of these firms also have annualised GST less than $40,000. However, although these firms do affect the analysis measured at the firm level, because they have 0 employment they do not affect job (employment) creation and destruction statistics which is the primary focus of the analysis in this paper.

sometimes done internationally, 95% of units and almost 50% of employment would be eliminated from the BDS.

4. Job Creation and Destruction empirics in the BDS

This section provides simple descriptive statistics of job creation and destruction in New Zealand and compares these results to previous work done in New Zealand and to international evidence. This section examines changes in firm level employment between pairs of years. Job creation and destruction in a country provides an indication of the dynamism of the economy and of the amount of excess re-allocation that goes on in the labour market.

4.1 Job Creation and Destruction Concepts and Measures

Conceptually, a job is *created* when a firm opens a new position for an employee, and a job is *destroyed* when an existing position within a firm is no longer required. For a full description of the employment dynamics within a firm, we would want to observe exactly which jobs (or positions) are created and which jobs are destroyed. However, the data available in the Business Demographic Statistics database only enables us to observe the *net* annual job creation and destruction of firms, and not their *true* (or *gross*) job creation and destruction patterns. That is, all we observe is a firm's net employment change, equal to the difference between the number of new hires and the number of separations (quits and layoffs). International evidence suggests that net employment change within many firms disguises high rates of staff turnover (Hamermesh et al., 1994). This may be especially true during periods of restructuring when the positions within a firm may change substantially, even though the firm's total employment may be relatively stable.

Thus, aggregate job creation and destruction rates based on net employment change within firms will tend to underestimate the full extent of job creation and destruction in the economy. Furthermore, that we also do not observe temporary (intra-year) hires and layoffs, implies further underestimation of the total job *churning* that occurs over a period (Davis, Haltiwanger and Schuh, 1996).

On the other hand, the fact that we cannot isolate the impact of changing vacancies from job creation in the data means we will tend to over-estimate the extent of changes in firms desired employment levels. In addition, measured job creation and destruction may be overstated in the statistics due to false flows (i.e. measurement error) in the labour market statistics. For example, a change in a firm's ownership with no change in its operations may be recorded as the death of one firm, and consequent destruction of all of its jobs, together with the simultaneous birth of another, and consequent recreation of all of its jobs (Revelli, 1996). The net effect of these diverse factors is unclear.

With this discussion and caveats in mind, we now turn to the empirical measures of job flows that we use in the analysis. In line with the literature on job creation and destruction,[12] we begin with the following definition for relative net employment change. Let E_{it} be the level of employment of firm-i in year-t, then the relative employment change from year-(t-1) to year-t is defined as

$$\Delta e_{it} = (E_{it} - E_{it-1}) \Big/ \overline{E}_{it}$$

[12] For example, see Davis, Haltiwanger and Schuh (1996).

where $\overline{E}_{it} = 0.5*(E_{it-1} + E_{it})$ is the average employment level of firm-i in years (t-1) and t. Note that if firm-i does not exist in year-t then E_{it}=0. This definition of relative employment change has two advantages over conventional growth rate definitions: it treats employment growth and loss symmetrically, and handles firm births and deaths. In addition Δe_{it} is monotonically related to the conventional growth rate definition, and is bounded by +/-2.[13]

The aggregate job creation rate (Δe_t^c) measures the total increase in employment across expanding and new firms relative to average total employment in all firms. Similarly, the aggregate job destruction rate (Δe_t^d) measures the total decrease in employment across contracting and dying firms relative to average total employment. The aggregate net employment growth rate (Δe_t^{net}) is then simply the difference between the aggregate job creation and destruction rates. Finally, the excess job reallocation rate (Δe_t^{XS}), which measures the excess job flows over and above that required to achieve the net employment growth, is the sum of the job creation and destruction rates less the net employment rate. Specifically,

$$\Delta e_t^c = \sum_i \left(1(E_{it-1} < E_{it}).(E_{it} - E_{it-1})\right) \Big/ \overline{E}_t ;$$

$$\Delta e_t^d = \sum_i \left(1(E_{it-1} > E_{it}).(E_{it-1} - E_{it})\right) \Big/ \overline{E}_t ;$$

$$\Delta e_t^{net} = \Delta e_t^c - \Delta e_t^d ;$$

and

$$\Delta e_t^{XS} = \Delta e_t^c + \Delta e_t^d - \Delta e_t^{net} ;$$

where $\overline{E}_t = \sum_i \overline{E}_{it}$ is the average total employment in years-(t-1) and t, and 1(.) is an indicator function which is equal to 1 if the enclosed expression is true and equal to 0 otherwise.

4.2 Job Creation and Destruction Results

We begin by describing the distributions of year-on-year employment growth rates of geographic units (? e_{it}). Figure 1 presents the distribution of relative employment change across geographic units for the pooled sample of 7 paired-years from the BDS sample over 1994-2001. This figure shows that the distribution of employment changes is highly concentrated at three points: no change in employment numbers; firm 'births'; and firm 'deaths'. Nearly one-half (47%) of all firms have no year-to-year change in employment numbers (Δe_{it}=0). On the other hand, firm deaths and births (Δe_{it}=-2 and +2, respectively) each account for approximately 15% of all year-to-year firm changes on average. There is some year-to-year variation in these results. For example, excluding dormant firms, the firm birth rate varies from a low of 10% (in 2000-01) to a high of 19% (in 1994-95); while the death rate varies from 10% (in 1994-95) to 14% (in 1998-99). Births, deaths and stable-employment firms combined account for about 80% of all year-to-year matches.

[13] Δe_{it}=-2 corresponds to a firm death – i.e. it loses all of its year-(t-1) employment. Similarly, Δe_{it}=2 corresponds to a firm birth – i.e. it gains all of its year-t employment. For units that have zero employment in each year, we have assigned Δe_{it}=-2 if the unit is removed from the BDS between year-(t-1) and t; Δe_{it}=0 if it exists in both years; andΔe_{it}=2 if it is are 'birthed' between year-(t-1) and t.

Small geographic units tend to dominate the distribution of employment change in figure 1. In particular, units with 1-5 employees dominate the birth, death, and no-change points of the distribution. For example, 85% of units with 1-5 employees are either born, die or remain static, compared to 40% for units with more than 5 employees. This is partly mechanical: small relative employment changes are more difficult to achieve in smaller firms; alternatively, smaller firms are more likely to be able to achieve a proportionate increase in output without increasing employment, than larger firms. In addition, small firms are more likely to be vulnerable to shocks, given their smaller capital base and therefore more likely to exit than a larger firm (Malcolm, 1993).

We next examine the impact of firm employment-growth rates on employment. Analogously to the distribution of firm growth rates shown in figure 1, figure 2 describes the distribution of employment change across geographic units, weighted by the (average) employment level in each unit. This distribution is broadly similar to that in figure 1: in particular, there are spikes in the distribution corresponding to static employment level, and births and deaths. However, these spikes are considerably lower reflecting the fact that larger geographic units are less likely to have either static employment levels, or experience a birth or death from year-to-year. For example, 33% of employment is in units with static employment, 6.0% of employment is in units that die and 7% is in units that are birthed. The distribution is also more bell-shaped around zero-change than that described in figure 1. For example, roughly 10% of employment is in firms that experience up to a 10% change in employment, and more than 5% in firms that experience between 10% and 20% increase in employment; similar fractions of employment are in firms experiencing up to a 10%, and between 10% and 20%, contraction in employment.

We now turn to describing the job creation and destruction rates in the BDS. Table 2 presents a summary of the job creation, destruction, net change, and excess job reallocation rates from this exercise, using all 7 matched pairs of years in the BDS. The first panel in this table describes the aggregate rates across all years. This shows that on average over the 1994-2001 period the annual rate of net job creation in enterprises is 17.5%, while the corresponding rate of net job destruction is 15.3%. Thus, the total job reallocation rate (the creation plus destruction rates) is 32.8%, which means that nearly one-third of all jobs change across locations on a year-to-year basis (are either created in a new location or destroyed from an old location), while the difference between these shows the average net employment growth rate over the period is around 2%. The excess job reallocation rate (i.e. over and above what is required to achieve the net employment growth observed) is 31%.

To examine the temporal patterns of job creation and destruction rates the 1994-2001 period, figure 3 shows the job creation, job destruction, and net employment growth rates for each pair of years. Figure 3 illustrates that net employment growth was strong in the mid-1990s, before slowing in the late 1990s and rebounding in 2000/01. This is consistent with economic growth estimates for the period and HLFS figures. Although the job creation and destruction rates are reasonably flat over the period, there does appear to be some pro-cyclicality in job creation, and some counter-cyclicality in job destruction rates. For example, job creation was stronger early and late in the period, while the job destruction rate tended to rise during the middle of the period, corresponding to the downswing in the business cycle.

Panel B of table 2 describes the patterns of job creation and destruction across different firm sizes in the BDS. The most salient feature from this panel is that the rate of job change

decreases monotonically as the firm-size increases. This is true across each of the columns corresponding to job creation, job destruction, net employment growth, and excess job reallocation. For example, the annual rates of job creation and destruction in small (1-5 employee) firms are 26% and 22%, respectively, compared to 11% and 10% for large (more than 100 employee) firms, and the net employment growth rates of such small and large firms are 3.4% and 1.1% respectively.

In the data appendix there is a stacked bar graph highlighting the composition of job creation and destruction by firm size. It shows that while firms of size 1 to 5 employment make up 25%, they make up over 50% of job creation due to births and approximately 60% of job destruction due to deaths. Given that small firms are unable to adjust employment by small relative amounts, not surprisingly, large firms dominate job creation and destruction from small employment changes.

Panel C in table 2 shows summarises job creation and destruction patterns across industries in the BDS, using the ANZSIC single-digit industry classification. This panel shows further that job creation and destruction is both high and variable across industries. For example, job creation rates range from a low of around 12% in the public sector and Mining and Quarrying industries to a high of 29% in Agriculture, forestry and fishing, while job destruction rates have a similar range and magnitude. Average net annual employment change ranged from about –6% in Electricity, Water and Gas industries to 4% in the Business, Communications, and Financial services industries.

Figure 4 shows how the overall levels of job destruction and job creation are distributed across their respective rate ranges – i.e. from –2 to 0 for job destruction, and from 0 to 2 job creation. (Note, the sum of the histogram bars sum to 100% across each of the job destruction and job creation ranges.) This figure shows that nearly 45% of the job destruction occurs in firms that 'die' out of the BDS, and an almost identical fraction of the job creation that occurs is in firms that are 'birthed' into the BDS between the first and second years. In contrast, only about 5% of jobs destroyed or created occur in firms that contract or expand employment levels by less than 10%. This implies that most job creation and destruction is concentrated in firms that experience relatively large employment changes (even after controlling for the effects of 'birthed' and 'deathed' firms).

Table 3 summarises the contributions deaths and births, and small and large contractions and expansions, to the overall job destruction and job creation rates for all firms, by firm employment size and by industry. This tells the same story as figure 3. That is, most of the job destruction and job creation in the economy occurs in firms that experience relatively large employment changes. This is true across all sized firm and industries.

The results presented here on job creation and destruction are broadly consistent with findings elsewhere, both in New Zealand and internationally. For New Zealand, Malcolm (1993) examined changes in firm size, and found that between 48 and 66 percent of firms record little change in their employment levels over the course of a year.[14] Table 4 presents job creation and destruction rates from OECD (1996) and Malcolm (1993) and compares them to the results from this study. OECD (1996) and Malcolm (1993) found in an earlier period that job destruction rates were higher than those given in this study and job creation rates were lower.

[14] Malcolm characterised firms by *positive growth* (full time equivalent employment growth of greater than 10 percent), *little change* (full-time equivalent employment growth of between –10 percent and +10 percent), and *negative growth* (full-time equivalent employment contraction of greater than 10 percent.

This can be partly explained by the weaker labour market conditions in New Zealand in the late 1980s and early 1990s and it may also be explained by the slightly different coverage of the BDS in this period. Interestingly, in this study the proportion of job creation and destruction due to firm entry and exit are lower in this study compared to the earlier studies.

Second, although most firms have stable employment levels, we find results consistent with those of Davis, Haltiwanger and Schuh (1996), who conclude that most job creation and destruction occurs at a relatively few plants that grow or shrink much more rapidly than the typical plant. Davis and Haltiwanger (1999) suggest that such lumpiness of employment change has some important implications. First, there may be major adjustment costs for firms in changing employment levels. Second, most job destruction leads to involuntary job losses for workers, rather than voluntary quits. Third, the concentration of job creation and destruction suggests that local economic conditions may change rapidly through either a firm opening or closing.

Compared to figures calculated overseas New Zealand's figures on job creation and destruction are relatively high (see table 4) – between 3 and 10 percentage points higher. This may be partly due to the use of different coverage. For example, some international studies have more restricted industry coverage (particularly manufacturing) and/or exclude small firms from the analysis. From the results presented here, showing higher turnover rates in small firms and lower turnover rates in Manufacturing industries, these are likely to explain some of the differences. As well as these sampling issues, that small firms are so prevalent in New Zealand together with the consequent implications for turnover rates, the differences are also likely to reflect such differences in the nature of New Zealand's firms.

5. Longer Term Firm and Employment Dynamics

In the last section, we described the year-to-year patterns of firm birth, death, expansion and contraction, and the implications of these changes for employment growth. This illustrated that while job creation and destruction rates are high across all years, there is variation in the rates by firm size and sectors. In this section we extend the focus of the analysis and examine the longer-term (beyond consecutive year) dynamic patterns of firms and their employment over the period 1994-2001. This provides some preliminary insights into the barriers that firms face in growth and, more generally, their patterns of growth and decline.

The analysis here compares and contrasts the dynamic patterns of three different cohorts of firms from the BDS. The first is a general 'stock cohort' of all firms observed in 1995 and, conceptually, focuses on the issue of how a randomly chosen firm performs in subsequent years.[15] The second is the 'birth cohort' of all firms born in 1995: tracking this subset of firms provides an insight into the growth and survival patterns of new firms. Finally, we examine the firm and employment dynamics of the 'death cohort' of firms that die in 2001 – i.e. those firms observed in the BDS in 2000 but not in 2001. We focus on two related aspects of firm and employment dynamics: the propensity of firms to survive over time, and the propensity for such firms to grow. The analysis of these three cohorts provides a useful comparison of the potentially contrasting differences in the dynamics for firms at differing stages of their life-cycle.

[15] We select the 1995 stock cohort instead of the 1994 cohort to provide greater comparability with the birth cohort analysis which follows.

The 1995 stock cohort of geographic units in the BDS database that we analyse consists of 223,880 units. First, in table 5, we summarise the cross sectional size distributions of these firms in 1995 and 2001, and the transition rates between each of the size categories over this period. The first column of table 5 shows the 1995 size distribution of the cohort. As highlighted by table 1, this column shows that the vast majority of geographic units in New Zealand are small employers: over three-quarters of units have less than 5 employees (including working proprietors), and only 5% have more than 20 employees.

In the final row of table 5 we describe the analogous size distribution of this cohort of firms in 2001, including the fraction of firms that 'died' during the 1995-2001 period. The most salient feature to note from this distribution is that 4 out of 9 geographic units in the 1995 cohort no longer exist in 2001. Comparing the two cross-sectional distributions indicates that, although there are fewer firms of each size in 2001, small firms are disproportionately more likely to die out than larger firms. For example, while over 70% of the units in 1995 employ 1-5 workers, only one-third of this cohort of firms employ 1-5 workers in 2001.

The main body of table 5 presents the firm-size transition rates between 1995-2001, including transiting out of the BDS, which we interpret as a death. For example, the second row presents the transition rates of 1-5 employee firms in 1995. This shows that nearly 2% of these firms are dormant (0 employees) in 2001, 42% remained in the 1-5 employee category, nearly 5% expanded to become 6-10 employee firms, 1% expanded beyond this scale, and 50% no longer exist in 2001. In contrast, of the firms with more than 100 employees in 1995, nearly 4% contracted to less than 20 employees, 5% contracted to 21-50 employees, 15% to 51-100 employees, nearly two-thirds remained with more than 100 employees, and 12% no longer exist in 2001.

The bold figures on the leading diagonal of the transition matrix in table 5 represent the fractions of firms in each size category that remain in the same size category. These numbers indicate that, conditional on existing in 2001, firm are generally more likely to remain in their original size band than to either expand or contract. The only exception to this is for 11-20 employee firms, which are found to be more likely to contract over this period. The greater tendency for small firms to die is clearly shown in the final column of table 5. Specifically, half of firms with fewer than 5 employees in 1995 have died by 2001, compared with nearly 30% of firms with 6-10 employees, about 20% of firms with 11-100 employees, and 12% of firms with more than 100 employees.

Figure 5 shows the year-to-year survival rates of this cohort. About 85% of firms survive to 1996, and then rises to about 90% in later years. One reason for this difference may be a high risk of non-survival for new firms in infancy, particularly the first year (see the subsequent discussion on the birth cohort). However, some of the difference between the year-1 and subsequent year survival rates may also be due to transitory problems that the BDS (and Business Frame, more generally) has in tracking firms: for example, we observed that the fraction of firms that drop-out of the BDS and subsequently reappear (i.e. *rebirths*) is not insignificant.

We now consider the dynamic employment patterns of this 1995 stock cohort of geographic units. Table 6 describes the 1995 employment numbers and the relative growth (or decline) in employment, by geographic unit size of employment.[16] The first column, which shows the

[16] Note that, for the 1995 0-employment firms, table 5 shows the 2001 employment level, and indexes employment growth relative to this level.

1995 employment in the various employment-size groups, again emphasises that although firms are disproportionately small, employment is more evenly distributed across the unit-sizes. Subsequent columns show that employment in all size-groups fell over the period for this cohort of firms (except, of course, for 1995 0-employment firms). The relative drop is larger for the 1995 1-5 employee units than larger firms, but beyond this size firm there appears little systematic variation in the rate of decrease by firm size. For example, the 1-5 employee units had lost about 30% of their 1995 employment levels by 2001, while larger firms had lost on the order of 20%.

These findings are consistent with, and reflect, the previous section's results on job creation and destruction. That is, the high rate of firm-death, and associated loss of jobs, from this cohort of firms reflects the high rate of job destruction, which is largely driven by firm-deaths, measured earlier.

Next we compare these results with those for the subsample of firms birthed in 1995 – i.e. firms in the BDS in 1995 but not in 1994. This birth cohort consisted of 49,550 geographic units, or about 22% of the 1995 stock cohort. Table 7 presents is the analogue to table 4, showing the 1995 and 2001 distributions of units by employment-size, and the matrix of transition rates between the various size-groups, for this cohort. Because of the relative scarcity of births of units exceeding 5 employees, we have combined the 6-10 and 11-20 1995 employee-units, and also the 21+ employee-units.

Similar broad patterns observed for the stock cohort also apply here. Small firms are again substantially less likely to survive 6 years until 2001 than larger firms. However, the death rate over the 1995-2001 period is much higher for the birth cohort than the stock cohort, implying that new-units are less likely to survive than older units. For example, the 6-year survival rate of birthed units is only 35%, compared to 55% for the full stock of units in 1995. Much of this difference can be attributed to the higher fraction of small firms in the birth cohort than the stock cohort (87% versus 71%), together with the higher death rate of such firms (two-thirds versus one-half). However, the apparent death rate is also much larger for new than existing large firms – e.g. over 40% of new 21+ employee units, compared to less than 20% for existing such firms. On the other hand the fraction of the 1995 birth cohort with more than 20 employees actually increased between 1995 and 2001.

Figure 6 shows that, for this birth cohort, the annual survival rate of units increased from 72% in the first year to about 90% in the sixth year. This rising survival rate may reflect selection effects (weaker firms are more likely to exit in the first year), learning or time-dependent effects (whereby firms that survive learn from their previous experience), or factors associated with managing the BDS and BF databases (easily tracked units will appear more stable and tend to survive longer).

Table 8 describes the employment levels and growth patterns by initial geographic unit employment-group for this birth cohort, analogously to table 6. Again the patterns here are similar to those for the stock cohort, after allowing for the greater incidence of small new firms and the lower survival rate of new firms. The 2001 employment of the 1995 birth cohort of firms had fallen 40% since 1995. Although the employment of units that were larger at birth generally contracted less than for smaller units, the relationship is not monotonic with initial firm size, although this may reflect sampling variation in a small sample.

5.4 Death cohort analysis

Forthcoming

5.4 Cohort Analysis Conclusion

This section has shown that small and new firms appear more vulnerable to market exit, while firms that do not exit are most likely to remain near the initial size classification. Given the strong overlap between small and new firms, this analysis doesn't identify the extent to which the higher incidence of firm-death observed among small and young firms is due to each of these factors. For example, is firm size or firm age the crucial factor in firm survival, or is it some combination of the two. However, the simple statistical description presented here is suggestive of both effects being important – for example, new small firms have lower survival rates than existing small firms.

What is also not clear is the extent to which the observed differences in survival rates by firm size and firm age reflects true difficulties that small and/or new firms may face either becoming established and/or surviving, and the extent that such differences reflect tracking and/or measurement issues in maintaining the BF and BDS databases. Furthermore, to the extent that such differences are real, it remains an open-question as to whether higher death-rates of (e.g.) small firms reflect the adverse effects of greater difficulty in surviving, or whether they reflect the positive effects of greater flexibility on the part of these units to respond to shocks via creative destruction.

6. Summary of findings and future work

This paper has provided both a brief background and description of New Zealand's Business Statistics Database and some initial job creation and destruction analysis. The first half of the paper highlighted the data coverage and quality issues especially when considering using the administrative data to build a longitudinal business database. In New Zealand the ability to use the IRD's Client Registration File as a base for the business frame brings with it many advantages over sample survey information. It also brings administrative complications when attempting to use it for anything other than administrative purposes. Within the brief background and description, issues are raised for further work in regard to the:

- treatment of mergers and acquisitions;
- ability to accurately map in time actual firm births and deaths from the data source;
- duplication of firms within the data set arising from the information gathering process; and
- treatment of firms that do not respond to the Annual Business Frame Update Survey.

Our initial job creation and destruction analysis, using the BDS database, highlights the nature and predominance of small firms within the New Zealand business landscape. A high level of dynamism is observed across time, across firm size and across industries. The results are largely consistent with both earlier New Zealand and international literature. Having said this New Zealand's job creation and destruction figures are relatively high compared to most overseas countries. This may be partially as a result of the wide industry coverage of our analysis and also the many small firms within our analysis. Our initial cohort analysis highlights that:

- small and new firms appear most vulnerable to firm exit; and
- for firms that do not exit the majority are most likely to remain near their initial size. classification.

Future work on understanding firm dynamics in New Zealand can be split into short, medium and longer term projects. In the short-term further work needs to be undertaken on understanding the business demography statistics. Most importantly investigating duplications, ownership structures, timings of births and deaths and the impact of non-response on the outputs. The sensitivity of outputs to these different issues need to be considered in greater detail.

In the medium term, more sophisticated modelling of firm dynamics and growth, creative destruction and job creation and destruction could be undertaken. With the availability of net GST sales for a large proportion of firms in New Zealand, there is the ability to examine the impact of firm exit and entry on productivity growth (do firms that enter the market have higher productivity than those firms that exit?) following Haltiwanger (2000). In addition, further work could examine the role of different shocks to see whether they are allocative or aggregate shocks[17] following Davis and Haltiwanger, (1996). Along these lines, one interesting question to answer could be when New Zealand had a rapid rise in its exchange rate over the 1990's, how did this affect different parts of the economy and how this in turn affected the job creation and destruction rates of the economy.

A parallel area of research to be examined in the medium term could be the different factors that impact on firm growth. In particular, what factors are associated with firms shrinking and firm exit and what factors are associated with firm expansion. The relationship between GST sales and employment expansion across firms would provide valuable insights into the way that New Zealand firms adjust employment in response to an output shock. The analysis of firm growth patterns may also be useful to examine whether there are points at which firms face particular barriers to further growth.

In the longer term, it is hoped that the integration of employee information from administrative tax information will be used to create a linked employer-employee database. Abowd and Kramarz (1999) provide an overview of the number of studies that can be done using linked employer-employee data. This data can examine the relative importance of person and firm variables in the determination of compensation, tenure and future earnings. It can improve our understanding of the dynamics of low pay, people transitions into and outside of paid work and the role of firm versus individual effects. It can also help our understanding of the role of firm expansion and contraction on worker flows. Finally linking employer-employee databases with information on unemployment (either administrative or survey information) can provide a rich picture of the flows between unemployment, employment, out of the coverage.

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[17] It is expected that a allocative shocks result in desired employment levels falling in one sector and rising in another sector. This means that in the contracting sector there is lower job creation and higher job destruction (as this sector contracts) and in the expanding sector there would be higher job creation and lower job destruction than otherwise. In an aggregate shock is that an aggregate shock impacts on both sectors in the same way and therefore we would expect to see similar patterns of job creation and destruction across both sectors.

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Table 1: Cross-sectional Description of the Business Demography Statistics – 2001

	Geographic Units	Employment
	A: Ownership structure	
1 Geographic Unit	226700 (86.9)	936800 (58.0)
2-5 Geographic Units	15200 (5.8)	227200 (14.1)
6+ Geographic Units	18800 (7.2)	452600 (28.0)
	B: Employment size	
0	21700 (8.3)	0 (0.0)

1-5	48000 (70.9)	373800 (23.1)
6-20	41500 (15.9)	409200 (25.3)
21-100	10900 (4.2)	429200 (26.6)
101+	1700 (0.7)	404400 (25.0)
	C: Industry	
Primary less agriculture	12300 (4.7)	41200 (2.5)
Manufacturing	22100 (8.5)	246700 (15.3)
Utilities and construction	36400 (14.0)	120300 (7.4)
Retail, wholesale, accommodation	68300 (26.2)	431000 (26.7)
Government, education, health	20500 (7.9)	286700 (17.7)
Other Services	101200 (38.8)	490600 (30.3)
All enterprises	260,800	1,616,500

Notes: Based on the sample of firms in industries covered throughout the 1994-2001 period. Numbers in parentheses are percentages of total number of geographic units or total employment, as appropriate. Employment includes the numbers of fulltime and parttime employees, and also working proprietors. Employment size is based on information available by geographic unit.

Table 2: Summary of Job Creation and Destruction Rates

	Sample[(a)] Size (Jobs)	Rate of Job Creation	Rate of Job Destruction	Rate of Net Employment Change	Rate of Excess Job Reallocation
			A: All Geographic Units		
	1,630,000	17.5	15.3	2.1	30.7
Employment			**B: By Geographic Unit Size**		
0	0	---	---	---	---
1-5	25.6	25.7	22.3	3.4	44.6
6-10	12.6	19.9	17.0	2.9	34.0
11-20	12.6	17.5	15.2	2.3	30.4
21-50	16.0	15.4	13.9	1.5	27.8
51-100	10.1	14.4	12.9	1.6	25.7
101+	23.5	11.1	10.0	1.1	19.9
ANZSIC[(b)]			**C: By Industry**		
0	2.1	29.4	25.7	3.7	51.4
1	0.3	15.4	17.5	-2.1	30.8
2	16.7	12.5	12.8	-0.3	25.0
3	0.6	15.1	21.5	-6.4	30.3
4	13.5	20.3	17.4	3.0	34.7
5	17.2	17.6	15.0	2.5	30.1
6	4.4	18.5	16.4	2.0	32.9
7	16.2	22.7	18.5	4.2	37.1
8	19.4	12.6	11.2	1.3	22.4
9	4.8	20.4	16.8	3.6	33.5
.	4.8	19.4	17.0	2.4	34.1

Notes: Based on the combined 7 matched year-on-year samples from the BDS, 1994-2001.

[(a)] For all units, this is the average sample size across the 7 matched-year samples. For the Unit Size and Industry panels, the entries are the percentages of the sample in each firm-size and industry respectively.

[(b)] The 1-digit ANZSIC is: 0=Agriculture, forestry, fishing; 1=Mining and Quarrying; 2=Manufacturing; 3=Electricity, Gas and Water; 4=Construction and Wholesale trade; 5=Retail trade, Accommodation, Cafes and Restaurants; 6=Transport and storage; 7=Business, Communication, and Financial services; 8=Government administration and Defence, Education, Health and Community services; 9=Cultural, Recreational and Personal services. The last row (labelled ".") is the sample of geographic units whose industries did not match with the ANZSIC.

Table 3: Decomposing Job Creation and Job Destruction Rates

	Job Destruction				Job Creation			
	Firm Deaths	Contractions 10+%	Contractions 0-10%	Total	Expansions 0-10%	Expansions 10+%	Firm births	Total
A: All Geographic Units								
	6.2	8.6	0.6	15.3	0.7	9.9	7.0	17.5
Employment				**B: By Geographic Unit Size**				
0	---	---	---	---	---	---	---	---
1-5	14.4	7.8	0	22.3	0	8.0	17.8	25.7
6-10	6.0	11.0	0	17.0	0	12.9	7.0	19.9
11-20	5.0	9.4	0.8	15.2	0.9	11.5	5.1	17.5
21-50	4.1	9.0	0.8	13.9	0.9	10.9	3.6	15.4
51-100	3.2	8.7	0.9	12.9	1.0	10.6	2.8	14.4
101+	1.7	7.3	0.9	10.0	1.2	8.3	1.6	11.1
ANZSIC				**C: By Industry**				
0	13.9	11.6	0.2	25.7	0.2	13.0	16.2	29.4
1	5.3	11.5	0.7	17.5	0.7	9.7	5.0	15.4
2	4.8	7.3	0.8	12.8	0.8	8.1	3.6	12.5
3	8.1	12.6	0.8	21.5	0.8	9.4	5.0	15.1
4	8.8	8.2	0.4	17.4	0.4	9.9	10.0	20.3
5	6.4	8.2	0.5	15.0	0.5	9.0	8.0	17.6
6	7.5	8.5	0.5	16.4	0.7	10.3	7.5	18.5
7	8.9	9.2	0.5	18.5	0.5	11.6	10.6	22.7
8	2.4	8.1	0.7	11.2	1.0	9.0	2.5	12.6
9	6.6	9.7	0.5	16.8	0.5	10.4	9.4	20.4
.	4.1	12.5	0.5	17.0	0.5	14.2	4.7	19.4

Notes: Based on matched year-on-year samples from the BDS, 1994-2001. See notes to table 2.

Table 4: Comparison of Job Creation and Destruction Rates With Other Studies

	Job Creation Rate	Fraction Due to Firm Entry	Job Destruction Rate	Fraction Due to Firm Exit
1. NZ – 1995-2001	17.5	39.8%	15.3	40.4%
2. NZ – 1989	14.1	52.2%	16.0	48.4%
3. NZ – 1987-92	15.7	47.1%	19.8	42.9%
4. US – 1984-91	13.0	65%	10.4	70%
5. UK – 1985-91	8.7	31%	6.6	59%

Notes: Rows 1—3 use Statistics New Zealand's Business Demography Statistics: row 1 is the present study; row 2 is from Malcolm (1993); and row 3 is from OECD (1996). Rows 4 and 5 are also drawn from OECD (1996): row 4 is based on the Longitudinal Research Database, and covers only the manufacturing sector and establishments with at least five employees; row 5 covers only establishments with at least 25 employees.

Table 5: Firm Size Transition Rates, 1995-2001 – 1995 Stock Cohort

Geographic Unit Size In 1995	1995 Distribution of Units	Transition Rate of Geographic Unit Size from 1995 to 2001 Geographic Unit Size in 2001							
		0	**1-5**	**6-10**	**11-20**	**21-50**	**51-100**	**101+**	**Deaths**
0	5.9	**34.7**	7.7	1.6	1.2	0.7	0.2	0.0	53.9
1-5	71.1	1.7	**42.2**	4.6	0.9	0.2	0.0	0.0	50.4
6-10	10.8	1.2	22.7	**32.7**	12.6	2.2	0.2	0.1	28.4
11-20	7.2	1.1	5.5	34.1	**28.3**	11.2	0.7	0.2	18.9
21-50	3.4	1.6	3.3	4.0	15.2	**45.3**	8.9	1.5	20.3
51-100	1.0	1.1	1.8	2.3	3.9	21.5	**37.9**	12.8	18.7
101+	0.7	1.3	0.8	0.6	1.7	5.3	14.7	**63.5**	12.0
2001 Distribution of Units	100	3.5	33.4	9.5	4.7	3.0	0.9	0.6	44.4

Notes: Based on the 1995 stock cohort of 223,880 geographic units in the BDS.

Table 6: Longitudinal Employment Dynamics – 1995 Stock Cohort

Geographic Unit Size In 1995	1995 Employment Level	Total Employment Relative to 1995 Employment						
		1995	1996	1997	1998	1999	2000	2001
0	13540[(a)]	0	42.3	61.7	68.8	85.0	93.8	100
1-5	344960	100	94.2	88.5	82.1	78.4	73.6	69.7
6-10	180380	100	94.2	92.4	86.9	84.2	83.1	80.2
11-20	182920	100	96.3	93.7	89.8	86.5	83.8	82.1
21-50	232770	100	98.2	96.2	92.9	89.3	85.4	84.1
51-100	152640	100	97.4	94.3	91.6	86.4	80.6	78.6
101+	361000	100	97.5	96.7	94.8	88.6	86.1	83.9
All Firms	1454670	100	96.7	94.1	90.2	86.0	82.6	80.3

Notes: Based on the 1995 stock cohort of 223,880 geographic units in the BDS.

[(a)] 2001 employment for firms with 0 employees in 1995. This acts as the base-period for indexing annual employment levels of this group.

Table 7: Firm Size Transition Rates, 1995-2001 – 1995 Birth Cohort

Geographic Unit Size In 1995	1995 Distribution of Units	Transition Rate of Geographic Unit Size from 1995 to 2001 Geographic Unit Size in 2001				
		0	**1-5**	**6-20**	**21+**	**Deaths**
0	7.4	**27.1**	8.8	3.0	0.9	60.3
1-5	86.8	1.1	**29.0**	3.0	0.2	66.6
6-20	5.1	2.3	15.4	**27.3**	5.5	49.5
21+	0.7	3.5	3.5	9.8	**41.9**	41.3
2001 Distribution of Units	100	3.1	26.6	4.3	0.8	65.1

Notes: Based on the 1995 birth cohort of 49,550 geographic units in the BDS.

Table 8: Longitudinal Employment Dynamics – 1995 Birth Cohort

Geographic Unit Size In 1995	1995 Employment Level	Total Employment Relative to 1995 Employment						
		1995	1996	1997	1998	1999	2000	2001
0	5170[(a)]	0	46.4	61.9	68.5	62.7	67.7	100
1-5	75210	100	85.6	74.9	68.2	62.5	57.7	54.0
6-10	13880	100	87.2	82.1	70.7	67.1	64.3	61.1
11-20	9170	100	85.2	72.7	63.1	66.2	57.5	61.0
21-50	8110	100	86.6	78.2	75.5	63.1	63.3	64.9
51-100	4240	100	72.9	67.9	57.5	46.9	36.5	35.8
101+	5330	100	92.7	77.9	81.8	73.9	79.7	82.9
All Births	121110	100	87.8	78.4	71.9	66.1	62.1	61.3

Notes: Based on the 1995 birth cohort of 49,550 geographic units in the BDS.

[(a)] 2001 employment for firms birthed with 0 employees in 1995. This acts as the base-period for indexing annual employment levels of this group.

Table 9: Firm Size Transition Rates, 1994-2000 – 2001 Death Cohort

Geographic Unit Size In 2000	2000 Distribution of Units	Transition Rate of Geographic Unit Size to 2000 from 1994 Geographic Unit Size in 1994				
		0	1-5	6-20	21+	Unborn
1994 Distribution of Units	100					

Notes: Based on the 2001 Death cohort of XXXXX geographic units in the BDS.

Figure 1: Distribution of Geographic Unit Annual Employment Growth Rates

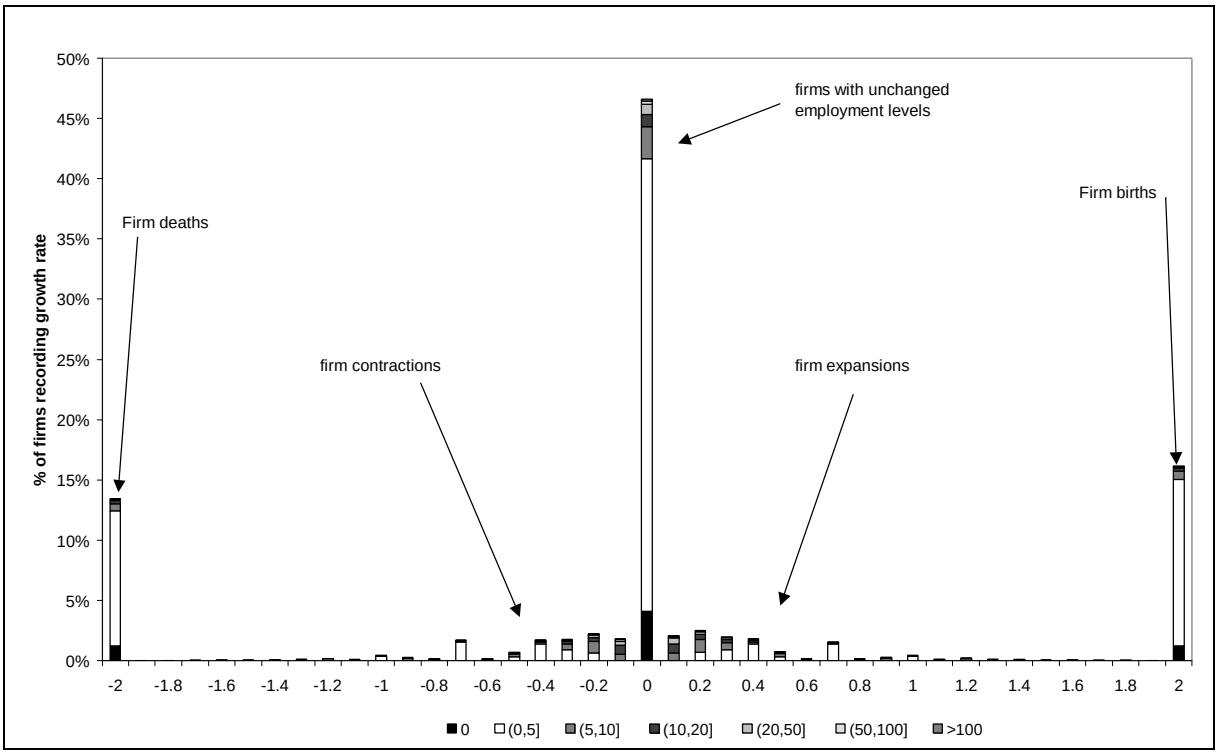


Figure 2: Distribution of Employment by Geographic Unit Annual Employment Growth Rates

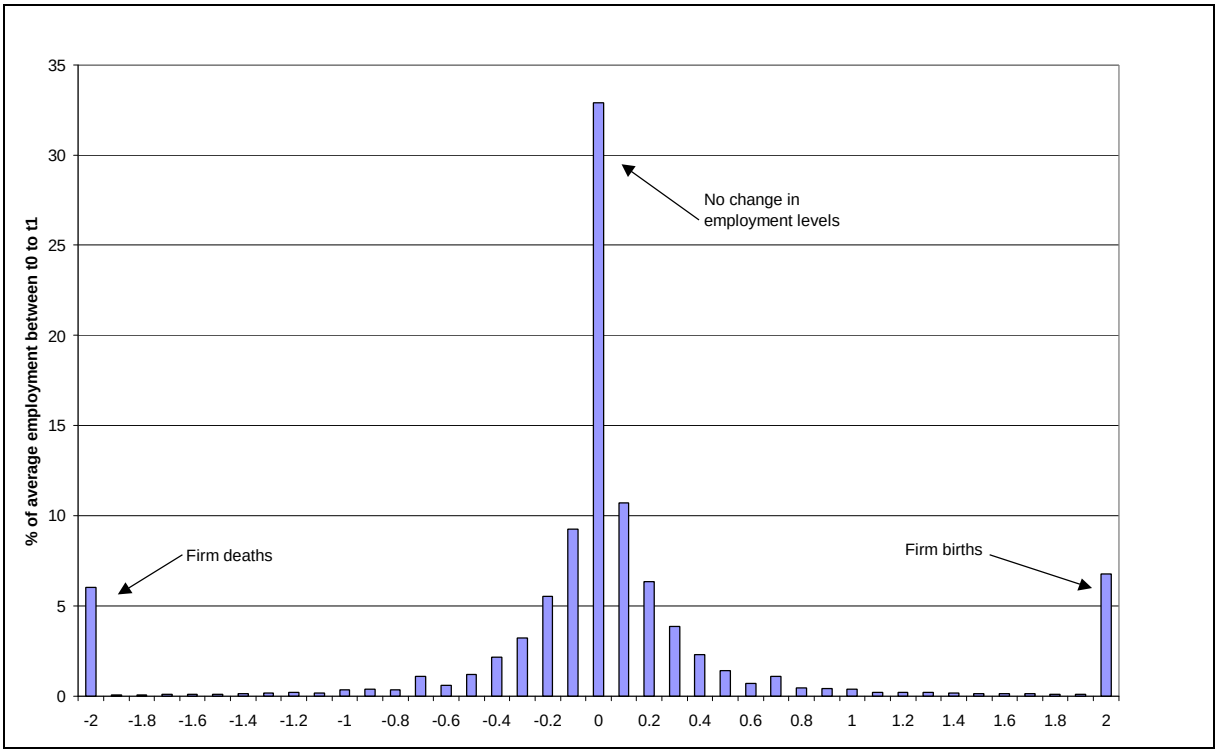
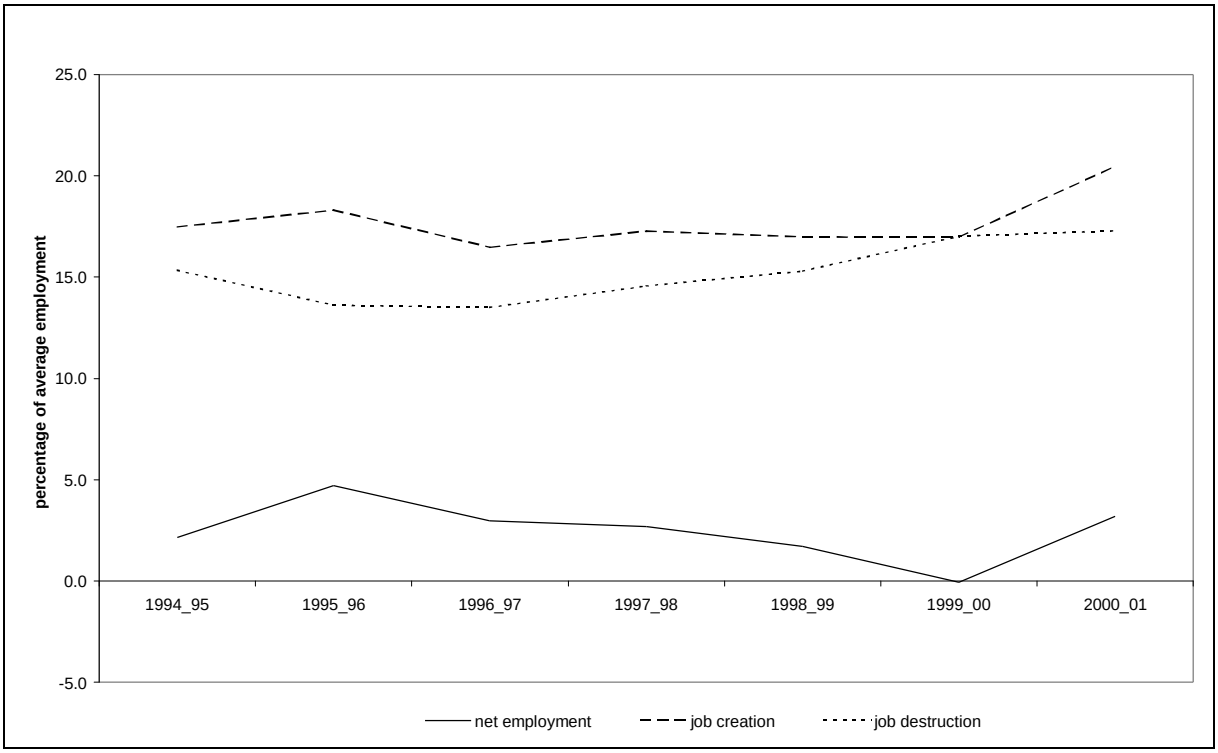


Figure 3: Annual Job Creation and Destruction Rates



Source: Statistics New Zealand Business Demography statistics

Figure 4: Distribution of Job Creation and Destruction

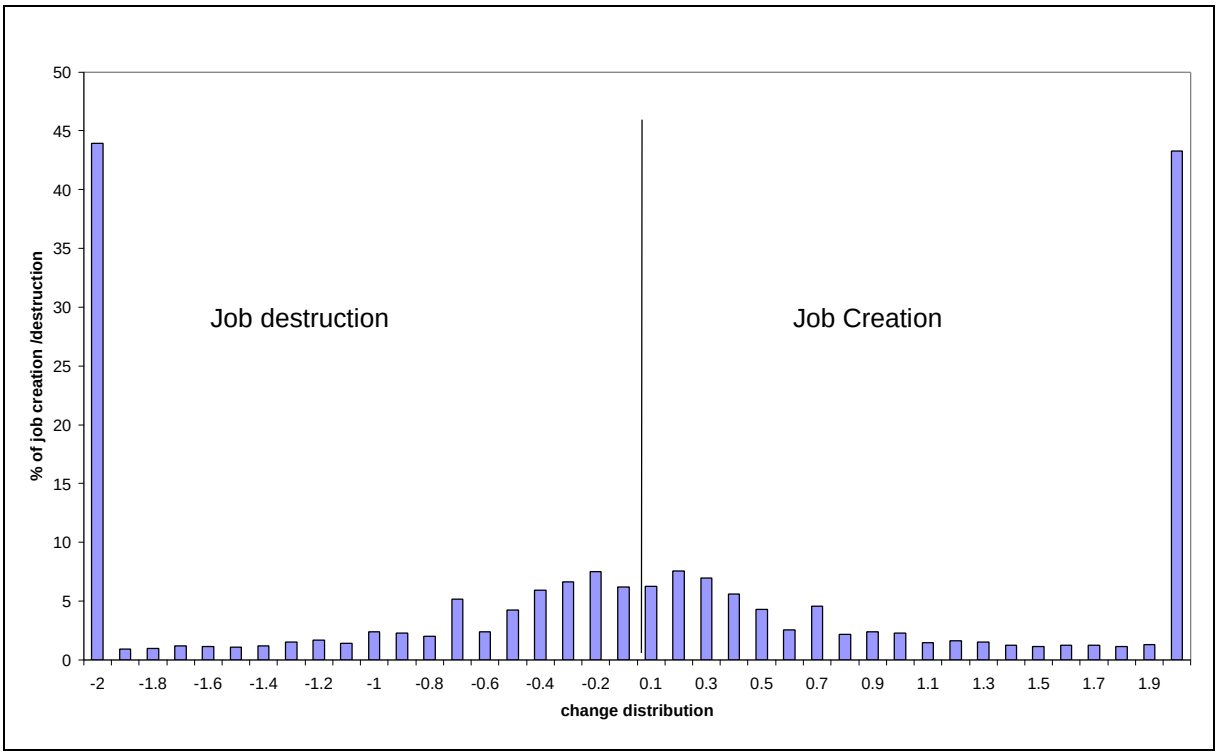


Figure 5: Geographic Units Annual Survival Rates – 1995 Stock Cohort

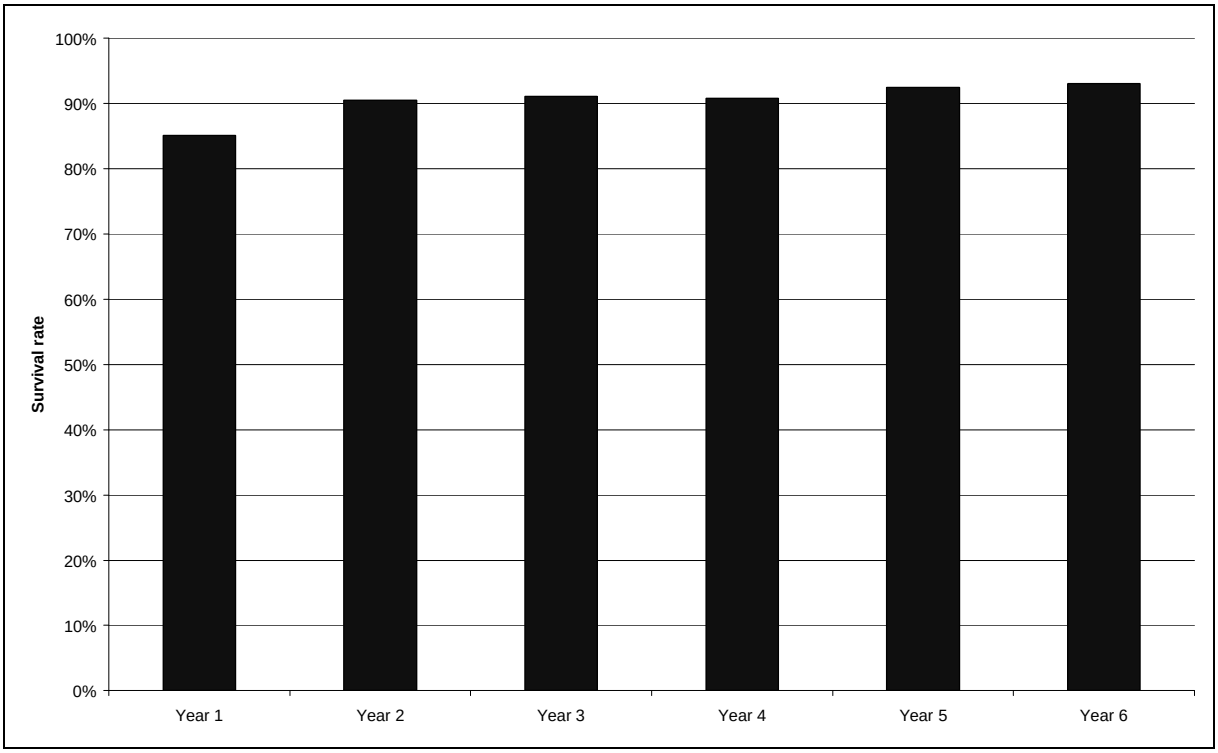
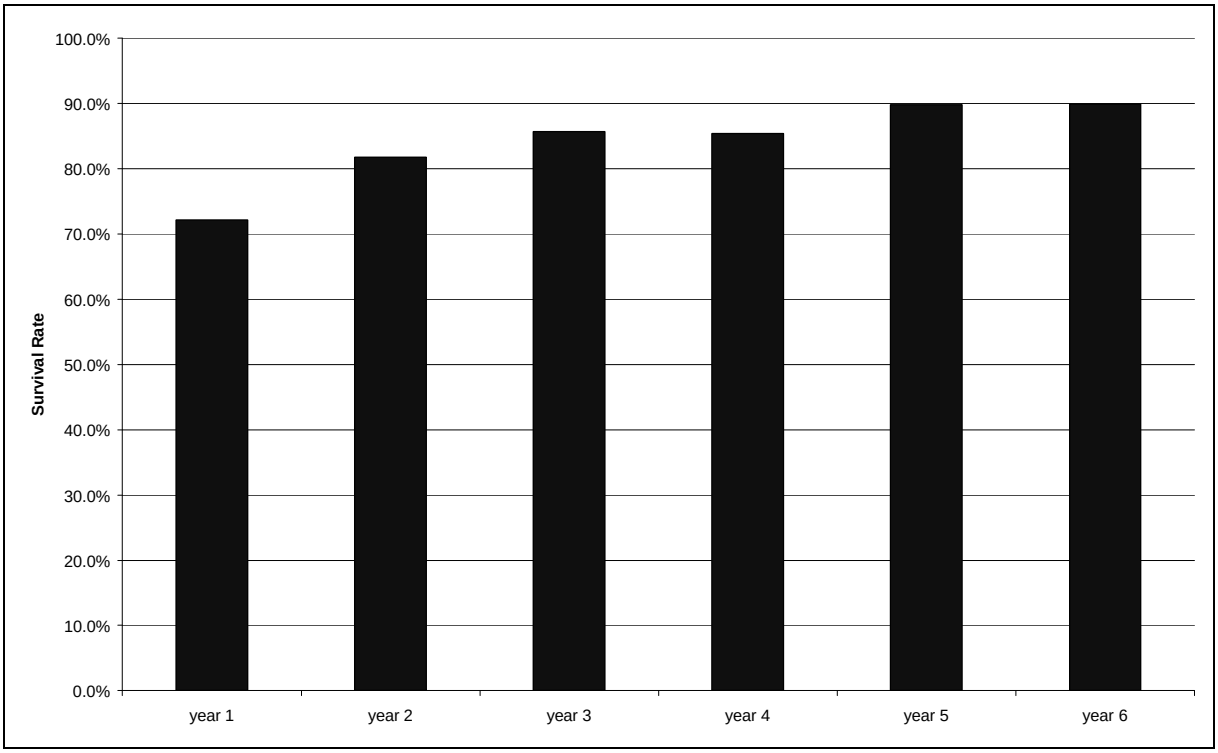


Figure 6: Geographic Units Annual Survival Rates – 1995 Birth Cohort



Data appendix