Firm Entry and Exit in New Zealand Industries

Tinh Doan, Hilary Devine, Peter Nunns and Philip Stevens

Ministry of Economic Development

June 2012

Ministry of Economic Development
Manatū Ōhanga

Ministry of Economic Development

Date: June 2012

Author: Tinh Doan, Hilary Devine, Peter Nunns and Philip Stevens

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Abstract

The creation of new firms and the death of existing firms is a fundamental part of the functioning of capitalist economies. In any given year, around one-fifth of firms have either been born or died. In this paper, we investigate patterns of firm entry and exit in New Zealand. We examine how firm birth and death varies across industries. We also examine the impact of entry and exit on employment and output growth. Finally, we study entering firms' chances of survival rates and the evolution of their performance relative to incumbent firms and the experience of exiting firms before their demise.

JEL Classification: L10

Keywords: Entry, Exit, firm dynamics, survival

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Firm Entry and Exit in New Zealand Industries

1. Introduction

The creation of new firms and the death of existing firms is a fundamental part of the functioning of capitalist economies. In any given year, around one-fifth of firms have either been born or died. Firm entry and exit is also an important part of the competition story. The entry of new firms increases competition and competition causes the least efficient firms to fail. This process, which Joseph Schumpeter described as 'creative destruction', is fundamental to economic growth.

This paper is one of the outputs from the *Competition in New Zealand* project undertaken by the Ministry of Economic Development, the Treasury, the Commerce Commission and the Ministry of Foreign Affairs and Trade with funding from the Cross Departmental Research Pool. The project investigates the nature of competition in New Zealand industries. In this paper, we investigate patterns of firm entry and exit in New Zealand. We examine how firm birth and death varies over time and across industries. We also examine entering firms' chances of survival and their performance relative to incumbent firms.

The rest of this paper is as follows: Section 2 reviews the literature on firm entry and exit in order to provide some background for the following analysis and present some key evidence for New Zealand. Section 3 describes our data and discusses how we define firm entry and exit. Section 4 presents our main finding, and section 5 concludes.

2. Background

Firm entry and exit are important to the functioning of economies. New entrants will compete with incumbents, often bringing with them new products or processes that change the nature of the industry they are entering. Competition from entrants, or even the mere threat of potential entry, creates pressure on incumbent firms to increase efficiency, to invest in productivity improvements and new product development. At the same time, the competitive process has losers as well as winners: unprofitable firms are forced to exit the market. The death of inefficient firms releases resources for more productive use and creates space for more productive firms.

Schumpeter described this process as 'creative destruction' and considered it to be the key driver of economic growth. Through the process of entrepreneurs looking for, creating and taking advantage of opportunities to serve consumers in new and more profitable ways, the economy grows through an unceasing process of innovation, firm birth and death.

2.1. Creative destruction, competition and economic growth

Whilst firm entry and exit has been an important part of the branch of economics that examines the behaviour of markets – industrial organisation (IO) – it was curiously absent from mainstream theories of economic growth for most of the last century. However, modern Schumpeterian models suggest a relationship between growth and the entry of new innovators and exit of former innovators (Aghion and Durlauf, 2007).

Competition, firm entry and exit

Competition and firm entry and exit are interrelated phenomena. Not only is firm entry an instrument of competition (with more firm entry contributing to greater competition), but competition in the market may also affect the incentives to enter. In the classic industrial organisation models of price competition and product differentiation (e.g. Hotelling, 1929; Salop, 1977; and Dixit and Stiglitz, 1977) competition reduces rents when firms enter the market. Competition in the market, therefore, discourages potential entrants (Aghion and Griffith, 2005, p. 8). This leads to the situation where the threat of competition post-entry actually lowers the degree of effective competition in the market – new firms have less incentive to enter markets where

their profits might be whittled away by a competitive response from the incumbents. In this sense, we say that *ex post* competition drives out *ex ante* competition (Dasgupta and Stiglitz, 1980; Aghion and Griffith, 2005).

This effect is called 'Schumpeterian' by Aghion and Griffith (2005) because Joseph Schumpeter emphasised post entry, or post innovation, rents as being the incentive for entrepreneurs to undertake a risky and/or expensive activity, like creating a firm or conducting R&D activity. This has been the dominant model of competition underlying early 'endogenous growth' models of economic growth (e.g. Aghion and Howitt, 1992).

These results seem counter-intuitive to many who feel that competition might be a spur to innovation, or at the very least to efficiency. However, not all models of competition and entry predict a negative influence of post-entry competition on the incentives for entry. For example, as Aghion and Schankerman (2003) have shown, heterogeneity in costs in an industry can create the conditions whereby higher levels of (*ex post*) competition in the market can actually create a positive incentive for productive firms to enter. If there is a high degree of heterogeneity (what Aghion and Schankerman call 'cost asymmetry'), this encourages entry by more productive (low-cost) firms[1]. This is because competition in the market leads to lower-cost firms increasing their market share at the expense of their less productive peers. Aghion and Schankerman call this shift the 'market selection effect'.

Are these models that are based on firm heterogeneity more realistic, and hence useful, than models based on homogenous firms? As the studies summarised in Syverson (2011) and Bartelsman and Doms (2000) clearly show, heterogeneity in productivity is pervasive in developed economies. Significant variation in productivity exists even in fairly narrowly defined industries. In Doan *et al.* (2011) we see that New Zealand is not immune to this phenomenon. Indeed, it appears to be characterised by even greater dispersion in productivity than other developed economies.

The nature of entering and exiting firms

In simple models of firm entry, the potential entrant knows a great deal about both their own likely performance as well as that of the incumbents. However, the real

[1] Note that Aghion and Schankerman (2003) incorporate quadratic costs into their model.

world is one of considerable uncertainty. Firms do not know how well they will perform in an industry before they enter. In the passive learning model of Jovanovic (1982), a new firm enters a market without knowing its given "type" (i.e. its potential profitability) *ex ante*. Once the firm has entered and competes with incumbents and learns about its own profitability potential (although this is based on noisy information from realised profits). By continually updating such learning, the firm decides to expand, contract, or to exit. This model provides an explanation of why most entrants end up exiting soon after entering the market. It also predicts that smaller and younger firms will have higher and more variable growth rates.

Small (and possibly young, therefore) firms are also more likely to exit in models of random firm growth. If all firms are subject to random demand or productivity shocks, it is the smallest and the least productive that are least able to survive a negative shock (see Caves, 1998, for example).

In the active learning model (Ericson and Pakes, 1995), a firm explores its economic environment actively and invests to enhance its capability to earn profits under competitive pressure form both within and outside the industry. Its potential and actual profitability changes over time in response to the stochastic outcomes of the firm's own investment, and those of other actors in the same market. The firm grows if successful, shrinks or exits if unsuccessful.

Pakes and Ericson (1998) tried to compare these two learning models to see which of them is more appropriate by considering the evolution of the size distribution of the surviving firms from the year 1979 cohort of Wisconsin firms in manufacturing and retailing over eight years. They had mixed results, concluding that manufacturing firms were consistent with the active learning model while retailing firms were consistent with the passive learning model.

2.2. International evidence on firm entry and exit

In the past two decades, there has been an explosion in the availability of large-scale, firm-level datasets. These have proved fertile ground for empirical economists seeking to understand just how economies function. In the words of Caves (1998), 'This research has borne as its fruit a great outpouring of stylized facts where no more than impressions had existed before' (p. 1947). Birth and death rates tend to

be highly correlated (Geroski, 1991; Baldwin and Gorecki, 1991). As we see below, however, this is not always the case.

Bartelsman, Scarpetta and Schivardi (2003) describe entry and exit from the 1980s to the early 1990s for around 40 industries in ten OECD countries (United States, Germany, France, Italy, United Kingdom, Canada, Denmark, Finland, the Netherlands and Portugal). They confirm the earlier work summarised in Caves (1998) that firm turnover is a significant phenomenon. About twenty percent of firms enter and exit most markets every year. Entering and exiting firms tend to be smaller on average. Between twenty percent (UK) and forty percent (US) of entering firms fail within the first two years, although this failure rate declines with time. It is smaller entrants that are more likely to fail, but the remaining larger firms also tend to grow rapidly. Entry and exit rates are highly correlated across industries. These results were largely confirmed by Bartelsman, Haltiwanger and Scarpetta (2004), who combined the OECD data with data on 14 countries from a World Bank study[2]. In transition economies, firm entry largely out-paced firm exit. Note, however, that Bartelsman, *et al.* found that the within-country correlation between entry and exit rates across industries in the 1990s, whilst positively and significantly correlated, was actually negatively correlated in France (although this result was only statistically significant using the unweighted data, once data was weighted using employment the result lost its significance).

Kocsis, Lukach, Minne, Shestalova, Zubanov and van der Wiel (2009) in their survey of the international evidence on firm entry and exit describe four stylised facts:

1. Many firms enter and exit the market each year, at every stage of the business cycle. Figures for total churn (entry plus exit) suggest that around 20% of firms in most economies will either be born or fail in any given year.
2. In general, entering and exiting firms are smaller and have lower productivity than the average, and a large fraction of new entries do not survive the first few years.
3. However, entering firms that do survive the first couple of years gain in size and in productivity faster than industry average.

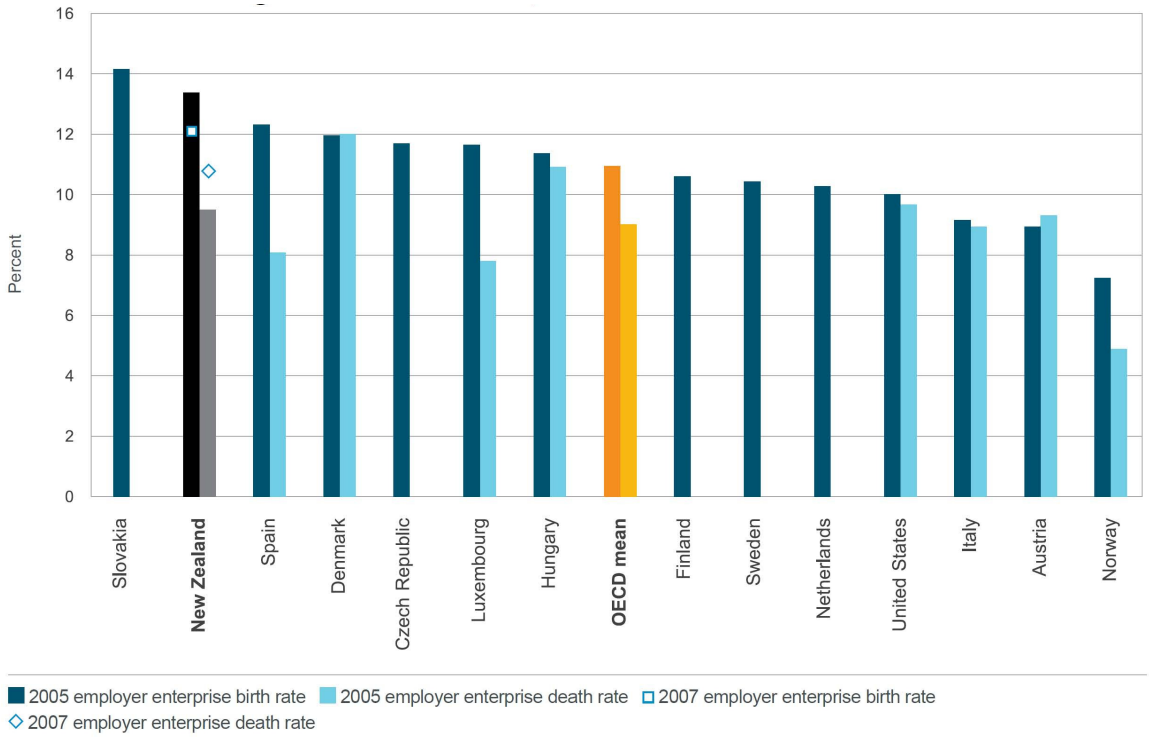
[2] Argentina, Brazil, Chile, Columbia, Estonia, Hungary, Indonesia, Korea, Latvia, Mexico, Romania, Slovenia, Taiwan, and Venezuela

4. Market entrants face a rigorous selection process: more than fifty per cent of all entrants have left the market after five years and between 15% and 20% of firms enter and exit the market each year.

How does New Zealand compare to other countries? According to OECD statistics, New Zealand has one of the highest rates of employer enterprise birth (Table 1). New Zealand's enterprise birth rate in 2007 was second only to Slovakia in the sample of countries presented. Entry and exit rates in OECD economies average around ten percent. They are highly correlated, although New Zealand shares with Spain and Luxembourg an enterprise death rate that is four percentage points lower than its birth rates (although its birth and death rates were more aligned in 2007). In the year for which there are comparable data (2005), the enterprise death rate in New Zealand appears to be lower than many OECD countries. It is interesting to note that the United States, which is generally considered to be one of the more dynamic economies in the developed world, has a relatively low rate of enterprise births and deaths.

Figure 1 Firm births and deaths as a percentage of active firms

Manufacturing and services sectors, 2005 and 2007



- *Source: OECD database, Industry and Services, SDBS business demography indicators, Published in Economic Development Indicators 2011*[3]
- *Active enterprises with at least one employee*
- *The data for Sweden and the United States are for 2006*

3. Data

3.1. Longitudinal Business Database

The source of data for this paper is the prototype Longitudinal Business Database (LBD). The LBD is part of Statistics New Zealand's Integrated Data Infrastructure (IDI) and contains data collected by Statistics New Zealand for the national accounts (the Annual Enterprise Survey, or AES), and Goods and Services Tax (GST) returns, Financial Accounts (IR10) and aggregated Pay-As-You-Earn (PAYE) returns all provided by the Inland Revenue Department (IRD). The full prototype LBD is

[3] The population of employer enterprise births consists of 'new' enterprise births (i.e. new enterprises reporting at least one employee in the birth year); and enterprises that existed before the year under consideration but were below the threshold of one employee (and reported one or more employees in the current [i.e. birth] year). Symmetrically, an employer enterprise death occurs either as the death of an enterprise or by moving below the threshold of one employee. 'Employer' indicators were found to be more relevant for international comparisons than indicators covering all enterprises, as the latter were sensitive to the coverage of business registers.

described in more detail in Fabling, Grimes, Sanderson and Stevens (2008) and Fabling (2009).

The spine of the LBD is the Longitudinal Business Frame (LBF)[4]. The LBF is a product of Statistics New Zealand's Business Frame (BF) and payroll tax records (Inland Revenue's *Employer Monthly Schedule*).

The main unit of analysis in the LBD is the enterprise, which approximates to the economic concept of the firm. The enterprise represents a legal business entity, for example a limited company, a partnership, a trust, an incorporated society. Where there is a group of limited companies linked by share ownership, each individual limited company is recorded in the statistics as a separate enterprise[5]. Enterprises are made up of geographic units (GEOs), which approximate to the plant or establishment. Statistics New Zealand carried out work to improve the longitudinal quality of GEOs, creating Permanent Business Numbers (PBN) for the GEOs/plants/ establishments within an enterprise. Consequently, these units are known as 'PBNs'. Further work has been undertaken to improve the longitudinal quality of enterprise identifiers (Fabling, 2011).

3.2. Identifying entry and exit

Defining firm entry and exit in any study of this nature is complicated by three potential problems. The first is misidentification of firm birth or death due to incomplete or incorrect data. The second is the fact that firms can appear to drop out of the dataset for some years and then re-enter (this may be for data-related reasons, or because they are truly in stasis). Finally, because some of our analysis is conducted at the industry level, firm entry and exit may be clouded by the fact that firms can change industries. Firms are classified into a predominant industry according to the employment shares of their constituent plants. In cases where firms have multiple establishments in different ANZSIC industries, they are assigned to the industry of the unit with the largest employment. Consequently, firms may appear to move between industries for several reasons. A shift may be caused by the firm actively choosing to leave or enter a market, or it may result from data issues. For example, if a firm's employment is split evenly between two plants in different

[4] Seyb (2005)
[5] Enterprises may come together as groups, with a group top enterprise (GTE) sitting at the top.

industries, small changes in employment at either plant could incorrectly indicate that the firm has changed industries.

A further complication arises from the fact that LBD data on enterprises relates to legal entities. Whilst this is fine for undertaking cross-sectional analysis, it makes it more difficult to conduct longitudinal research. This is because an enterprise on the Business Frame may change its identifier, creating a false death and birth. Fabling (2011) provides the following example: 'a sole proprietor may decide to incorporate their business, while continuing to employ the same staff in the same location, producing the same goods and services. This business may be represented in the LBD as two firms – one exiting, one entering – where an economist would say there is one on-going firm' (p. 1). Consequently, we utilise the method developed by Fabling (2011) using repaired plant identifiers to repair broken firm links across years.

To be or not to be

In order to examine the entry and exit of firms to a population, we must first define the population. We define a firm as an economic entity that transforms inputs (labour and intermediate inputs, and possibly capital) into outputs. The practical outcome of this is that for an enterprise to be part of the population of firms they are required to that have reported some kind of labour input (either employment or working proprietor(s)), intermediate consumption or purchases, and have some kind of sales revenue. We have multiple sources for these variables. Output and intermediate consumption come from either the Annual Enterprise Survey, the Business Activity Indicator database (GST returns) or the IR10 Financial Accounts form. Labour input comes from the LEED. Our focus is on private for-profit businesses[6] and we exclude enterprises in ANZSIC industries: M (Government Administration and Defence); Q97 (Private Households Employing Staff); R (Not Elsewhere Included).

We define a firm as entering the population (or being born) in the first year we observe either output or an input (i.e. one of gross output/sales/expenditure,

[6] Defined according to: (a) *Business Type New Zealand Standard Classification 1996* (http://www.stats.govt.nz/surveys_and_methods/methods/classifications-and-standards/classification-related-stats-standards/business-type.aspx) as business types 1-6: individual proprietorship; partnership; limited liability company; co-operative company; joint venture & consortia; and branches of companies incorporated overseas; and (b) *New Zealand Standard Institutional Sector Classification 1996* (http://www.stats.govt.nz/surveys_and_methods/methods/classifications-and-standards/classification-related-stats-standards/institutional-sector.aspx) as sectors that are not 5 (Households) and 6 (Rest of World).

intermediate consumption/purchases, or labour input). Similarly, we define a firm as exiting (or dying) in the final year we observe outputs or inputs. It is possible to make a distinction between firms that are 'alive' and 'temporarily inactive'. However, it is difficult to distinguish between true inactivity and data issues, particularly for small firms that may drop below reporting thresholds. Instead of making some arbitrary choice for 'length of inactivity' before reactivation, we consider firms to be born the first time they are observed undertaking economic activity and to die when we no longer observe economic activity for simplicity and to prevent double-counting.

Thus we define firms that enter, exit and are present in a given year t as follows:

N_t = entering firms are present in year t but not in $t-1$ or any earlier year

C_t = continuing firms are present in both year t and t - 1

X_t = exiting firms are present in year t but not in t+1 or any subsequent year.

The total number of firms in year t is $C_t + N_t$. The entry (n_t) and exit (x_t) rates between year t and t-1 are as follows:

(1) $$n_t = N_t/(C_t + N_t) \text{ and } x_t = X_t/(C_t + N_t);$$

The churn rate ($churn_t$) is the sum of the entry and exit rate. That is, $churn_t = n_t + x_t$, this is also known as the *turnover* rate.

Movin' on up

We need to consider one further data issue before we continue. The above works fine for calculating total numbers and rates of firm births and deaths. However, things become a little more complex when we wish to examine firm births and deaths by industry. This is because firms can enter or exit an industry for other reasons than being formed or ceasing. There are essentially three reasons why a firm may shift industry. The first, and simplest, reason is that the firm decides to change its focus from producing in one area to another, e.g. from the production of machine tools and parts to the manufacture of lifting and material handling equipment.

The second, related, reason for an enterprise to change its predominant industry is for a new one of the sub-industries in which it works to predominate. In the previous example, the firm might initially employ 50 people in its plant producing machine tools and parts (ANZSIC industry C2864) and 40 people in its plant producing lifting and

material handling equipment (ANZSIC industry C2865). If, however, due to changes in demand or its business strategy, it employs 20 more people in the lifting and material handling equipment plant, its predominant industry changes from C2864 to C2865. Again, this might reflect a fundamental change in strategy (a shift from domestic production to manufacturing abroad and housing its head office functions domestically) or a fairly random change in employment due to an extra order in one of the PBNs within the enterprise.

The final reason an enterprise might shift predominant industry is because of some data issue. For example, the data for one PBN may be missing because of some kind of coding error, a form not being submitted, being submitted incorrectly, or an establishment falling under a reporting threshold. Since information on employees (as opposed to working proprietors) is based on tax forms and so a legal requirement to be submitted, and the effective thresholds for reporting for PAYE tax are extremely low, we suspect that these are relatively unlikely reasons for missing data.

In our analysis, we allocate information on firm birth and death to the industry into which an enterprise enters or from which it exits. Because of this, it is entirely possible that aggregate numbers may not 'add up', particularly if there are any trends in the data (e.g. firms shifting from being predominantly manufacturing to predominantly service or wholesaling). Recall that the stimulus for our work is an examination of competition in New Zealand. Because we cannot distinguish firms shifting industries in response to competitive pressures in that industry from those doing so for other reasons, we focus on the actual birth and death of firms. This makes the analysis itself cleaner and the interpretation of the results clearer. In a companion piece to this paper (Doan *et al.*, 2011a), we explicitly consider firms that shift industry, as well as those that appear to drop in and out of economic activity spasmodically.

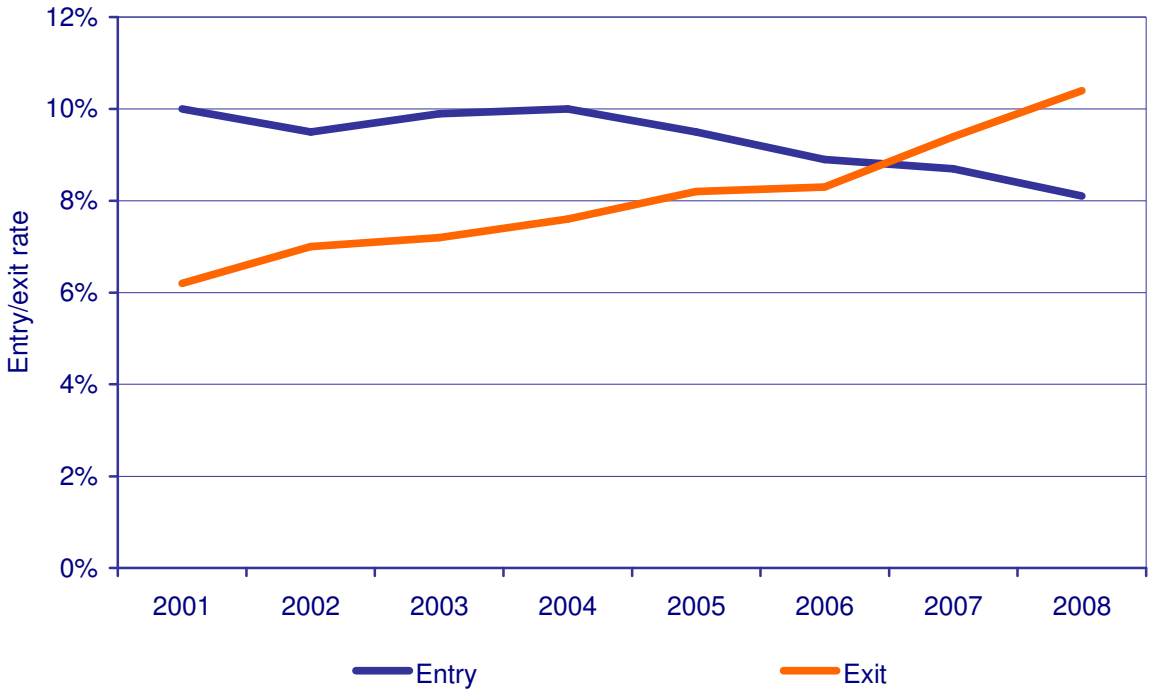
4. Results

We divide our results into four sections. First we look at rates of entry and exit for the whole economy. Next we disaggregate our results by industry. In section 4.3 we examine the experience of new entering and exiting firms and their impact on the industries they enter. Finally we consider the relationship of entry and exit to the competitiveness of the industry as measured by the profit elasticity of that industry.

4.1. Aggregate rates of entry and exit

Entry and exit rates appear quite stable but both exhibit countervailing trends over the study period (Figure 2). The rate of churn stays fairly constant at around 17 or 18 percent. Entry rates were fairly flat until 2004 when they started to trend downward. They were consistently higher than exit rates until 2007. Exit rates have trended upward fairly consistently over the period. The impact of the global financial crisis (GFC) can be seen in the upturn in exits in 2007 and 2008. However, it is interesting to note that whilst this change is noticeable, it is not much more than a doubling of the trend increase in the exit rate. The net entry rate had been trending downward from 2005.

Figure 2 Rates of entry and exit, 2001-2008



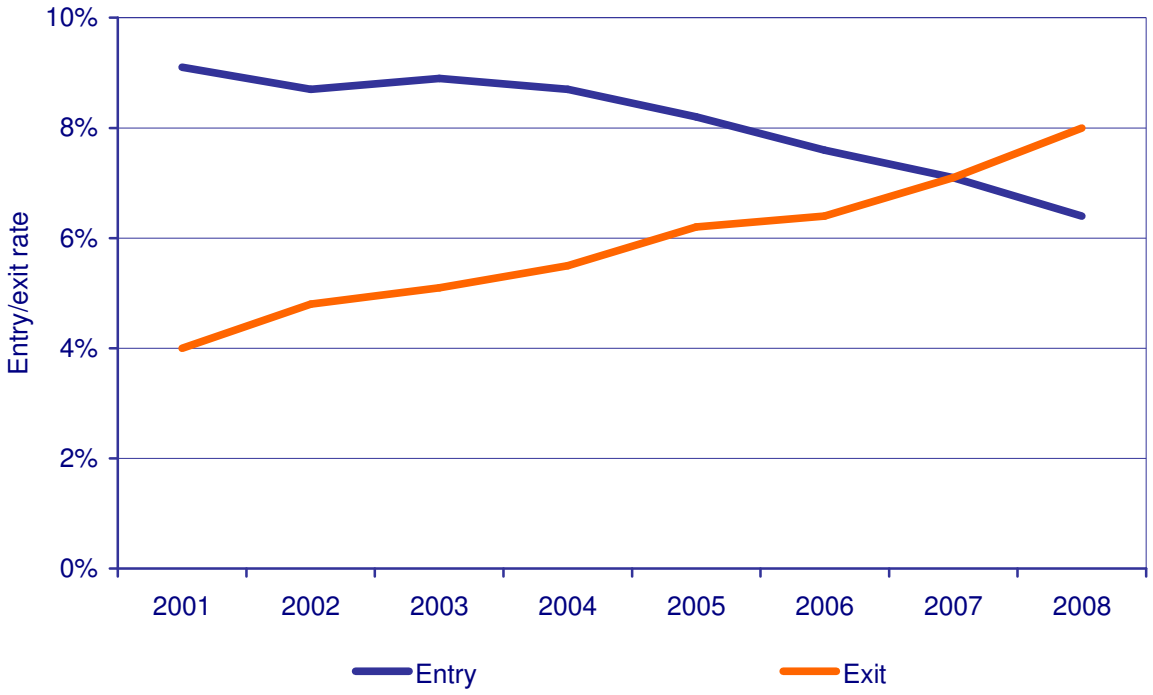
- *Source: Authors' calculations based on Longitudinal Business Database*
- *For more on calculations and data see Section 3 and the Data Appendix.*
- *Figures exclude firms that do not produce value added or employ labour input (either employees or working proprietors) during the sample period*

Recall that our measure of labour input is a combination of employees and working proprietors. A large proportion of the firms that exist in New Zealand working proprietor only firms. They also make up a disproportionate amount of entering and exiting firms. Excluding these firms reduces our measures of entry and exit rates

(Figure 3). The impact on entry rates is rather small, but that on exit rates is rather larger. Entry and exit disproportionally affect orkping proprietor only firms.

Figure 3 Rates of entry and exit, 2001-2008

Excluding working-proprietor only firms



- *Source: Authors' calculations based on Longitudinal Business Database*
- *For more on calculations and data see Section 3 and the Data Appendix.*
- *Figures exclude firms that do not produce value added or employ labour input (either employees or working proprietors) in the sample period*

4.2. Entry, exit and switching rates by industry

In this section, we examine patterns of movement by industry. Entry and exit rates are calculated both at the 4-digit level to examine overall patterns, and at the 1-digit ANZSIC division to aid discussion. The rates of entry, exit and their sum (churn) at the –digit level are set out in Table 1. Our results confirm work in other countries that find a high degree of correlation between the rates of entry and exit in industries (the correlation at the 4-digit level is 0.402, the Spearman rank correlation 0.432). We find that services industries tend to have higher rates of entry and exit. The highest rate of firm churn is in the 'Post and communications services sector', followed by

'Cafés, restaurant and accommodation'. This is in line with the pattern observed in most OECD countries (OECD, 2003). It is argued that this may be due to lower levels of start up costs and/or capital intensity in these than in sectors such as agriculture or manufacturing. This might be expected to lead to higher levels of competition in these industries. Something we return to at the end of this paper.

Table 1 Overall rates of exit, entry, and churn by industry, 2001-2008

Industry	Entry	Exit	Churn
Farm, agricultural services & hunting	5.2%	6.4%	11.6%
Fishing, forestry	6.3%	7.7%	14.0%
Quarrying & mining	6.1%	6.3%	12.4%
Manufacturing	7.5%	6.7%	14.2%
Construction	10.8%	8.3%	19.1%
Whole sales	8.2%	7.6%	15.7%
Retail	9.9%	9.2%	19.1%
Cafe, rest, accommodation	14.2%	11.1%	25.3%
Transport & storage	10.2%	8.8%	19.0%
Post and communications	14.8%	14.3%	29.2%
Finance and insurance	10.8%	7.7%	18.5%
Property & business services	10.9%	8.7%	19.5%
Education	11.7%	7.7%	19.4%
Health & community services	9.2%	6.7%	15.9%
Cultural & recreational services	10.7%	7.4%	18.1%
Personal & other services	11.3%	8.9%	20.2%
Overall	*9.3%*	*8.0%*	*17.4%*

- *Industry classified according to ANZSIC 1996 classification system.*

There is considerable variation across industries (the distribution of the entry and exit rates of 4-digit industries are set out in Figure 4 and Figure 5). Despite the correlation between the two there is rather more variation in rates of entry in 4-digit industries than in exit rates. Exit rates are tightly bunched around their average with very few industries displaying exit rates over 10%. Entry rates are rather more dispersed, with many more industries displaying rates over 10% and 20%.

Figure 4 Histogram of 4-digit Entry Rates, average 2001-2008

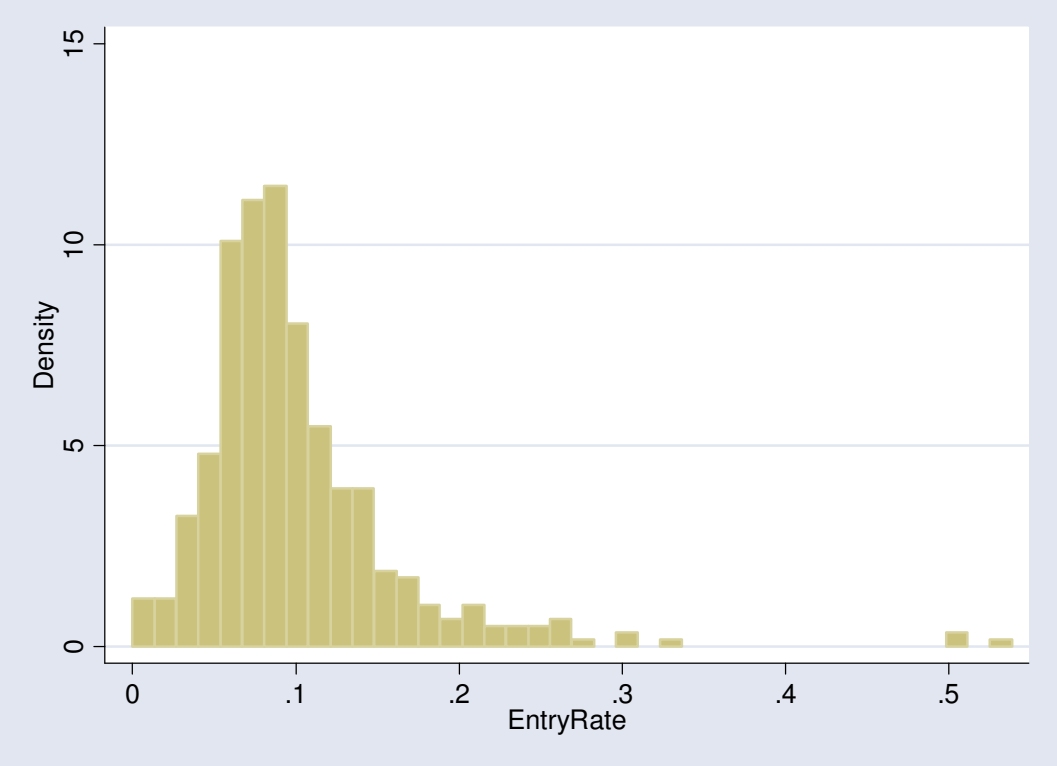
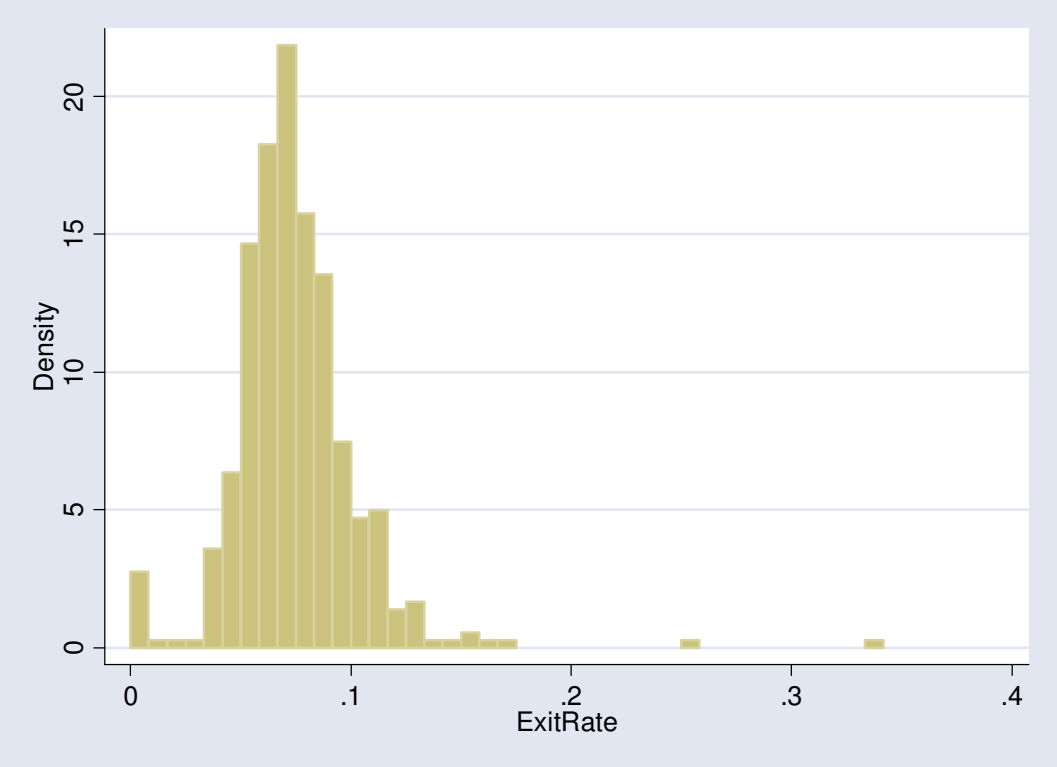


Figure 5 Histogram of 4-digit Exit Rates, average 2001-2008



4.2.1. Flick of the switch – industry movements

As we can see from Table 2, switching is a not uncomment occurrence. Over the entire period of our analysis, we observed over 100,000 industry switching events at the 4-digit level. This corresponds to 3.68% of firm-year observations. Firms tend to switch to industries that are fairly close to each other in the industry classification. However, nearly half of the industry switching events we observe are between 1-digit industry divisions, e.g. from agriculture to manufacturing.

Table 2 Firms shifting between industries, 2001-2008

Firms that shifted industry	No of firms		Switching rate (Annualised)
	Switching in	Switching out	
Between 4-digit industries	110,811	108,501	3.68%
Between 3-digit industries	87,636	85,731	2.91%
Between 2-digit industries	60,780	58,857	2.00%
Between 1-digit industries	49,740	48,114	1.64%

- *Table shows the number of firms changing industries, when industry is defined at the 4-, 3-, 2-, and 1-digit level.*
- *Switching rate is estimated as an average of numbers of switching-in and switching-out divided by the sum of continuing and entering firms in corresponding industries.*
- *Note that because firms switch-out in one year and switch-in in the following year, the numbers in any given year (or set of years) will not be equal.*

Whilst switching rates into and out of 1-digit industries are generally similar, they are quite different in some industries (Table 3). More firms are switching out of 'Farm, agricultural services and hunting' and the 'Quarrying and mining' industries and are switching in. The converse is true for the 'Finance and insurance' and 'Property and business services' industries.

Table 3 Switching by industry, 2001-2008

Industry	In	Out	Total
Farm, agricultural services & hunting	1.1%	2.1%	3.3%
Fishing, forestry	4.2%	4.4%	8.6%
Quarrying & mining	2.6%	3.8%	6.4%
Manufacturing	1.6%	1.9%	3.4%
Construction	1.1%	0.8%	2.0%
Whole sales	2.3%	2.5%	4.8%
Retail	1.4%	1.7%	3.1%
Cafe, rest, accommodation	2.0%	2.2%	4.2%
Transport & storage	1.4%	1.4%	2.8%
Post and communication services	1.7%	2.0%	3.6%
Finance and insurance	3.5%	2.0%	5.5%
Property & business services	2.3%	1.2%	3.5%
Education	1.8%	1.8%	3.6%
Health & community services	0.6%	0.6%	1.2%
Cultural & recreational services	1.8%	1.8%	3.5%
Personal & other services	1.7%	1.6%	3.2%
Total	*1.7%*	*1.6%*	*3.3%*

- *Note: The figures for switching industry are calculated at the 1-digit level.*
- *Industry classified according to ANZSIC 1996 classification system.*

4.2.2. Tales of creation: The impact of firm entry and exit on employment

We can measure the impact of firm entry and exit though their impact on total employment. Before we continue, one data issue needs to be emphasised. It is caused by the fact that we cannot identify precisely at what date during the financial year a firm exits or enters the population. Recall that our labour input is made up of two elements – employment and working proprietors – one of which is calculated on an annual basis. Employment is measured using an average of the headcount of employees in each month and so reflects the fact that a firm may cease during the year. If a firm of ten employees in only in existence for the first half of the financial year, its total labour input will be measured as five. Working proprietors, however, are calculated as a headcount over the year and so are likely to overstate their labour input. For our analysis, we assume that firms are born and die evenly across the year and so our mean expectation of labour input from working proprietors in the firms in their first and last year is one half.

There has been a steady increase in total labour input over our period of analysis (Table 4). This has been a period of expansion in the New Zealand economy, driven

largely by an increase in labour input[7]. The majority of this growth has come from the entry of new firms, rather than the growth of existing firms. The net impact of firm entry and exit on overall employment is almost four times that of changes in employment in growing and shrinking incumbent firms.

There was a small decline in the employment of continuing firms in 2007 (following a very small increase the previous year), but this rebounded in 2008. The increase in employment from entry declined in the two years following its peak in 2006. This corresponded with increased employment loss from exiting firms. In 2008, the increase employment due to entering firms and the decrease due to exiting firms were at their highest over the period of analysis, but incumbent firms enjoyed their second largest net increase in employment.

It is important to note that the figures in Table 4 do not reflect a whole economic cycle. Recent official statistics on employment show a slow decline in employment in the period subsequent to this table. It will be interesting to see how this pattern changes over the second half of the cycle.

Table 4 Decomposition of employment growth from exit, entry and existing firms, 2001-2008

Year	Entering firms	Exiting firms	Net impact of entry and exit	Change in incumbents	Net change in total labour input	Total labour input
2001	45,000	-17,400	27,600	n/a	n/a	1,492,500
2002	44,400	-15,300	29,100	-5,400	23,700	1,516,200
2003	39,400	-15,500	23,900	11,800	35,700	1,551,900
2004	43,500	-14,200	29,300	14,900	44,200	1,596,100
2005	43,200	-16,000	27,200	12,400	39,600	1,635,700
2006	47,500	-15,000	32,500	1,900	34,400	1,670,100
2007	41,100	-17,900	23,200	-1,400	21,800	1,691,900
2008	37,200	-20,500	16,700	13,800	30,500	1,722,400
Overall	296,300	-114,400	181,900	48,000	229,900	

- *Our measure of employment is a combination of rolling mean employment and a count of working proprietors*
- *To avoid overstating working proprietor counts for entry and existing firms, we use a half of working proprietor counts for the entering year and last year firms.*
- *Numbers are randomly rounded to base 100.*

7 http://www.stats.govt.nz/browse_for_stats/economic_indicators/productivity/ProductivityStatistics_MR7811.aspx

These changes in employment are not evenly spread across sectors. Employment grew over the period over the period in all sectors except 'Farm, agricultural services and hunting' and 'Fishing and forestry'. The decline in these sectors was driven by declines in incumbent firms, The employment growth (in terms of numbers) was largest in the 'Construction' and 'Property and business services' sectors.

Table 5 Decomposition of employment growth by industry, 2001-2008

Industry	Entering	Exiting	Change by incumbents	Net changes in total labour	Total labour in 2008
Farm, agricultural services & hunting	28,000	-12,600	-34,700	-19,300	159,300
Fishing and forestry	2,700	-1,600	-6,000	-4,900	13,200
Quarrying and mining	330	-70	440	700	3,400
Manufacturing	34,400	-17,000	-8,800	8,600	264,800
Construction	31,100	-10,600	30,100	50,600	168,500
Whole sales	12,300	-6,600	8,700	14,400	118,800
Retail trade	44,400	-13,900	-1,700	28,800	259,500
Cafe, restaurants and accommodation	31,400	-10,500	-4,300	16,600	101,200
Transport and storage	9,900	-4,000	4,000	9,900	82,000
Communication services	3,100	-1,200	-1,200	700	28,700
Finance and insurance	4,700	-2,300	7,800	10,200	56,900
Property and business services	56,300	-21,000	12,800	48,100	284,700
Education	2,900	-1,100	5,200	7,000	18,900
Health and community services	19,100	-5,100	8,200	22,200	91,800
Cultural and recreational services	6,200	-2,900	3,000	6,300	34,200
Personal and other services	9,600	-3,600	0	6,000	36,300

- *Industry classified according to ANZSIC 1996 classification system.*
- *Numbers are randomly rounded to base 100 in accordance with SNZ confidentiality protocol.*

4.3. Experience and impact of new entrant and exiting firms

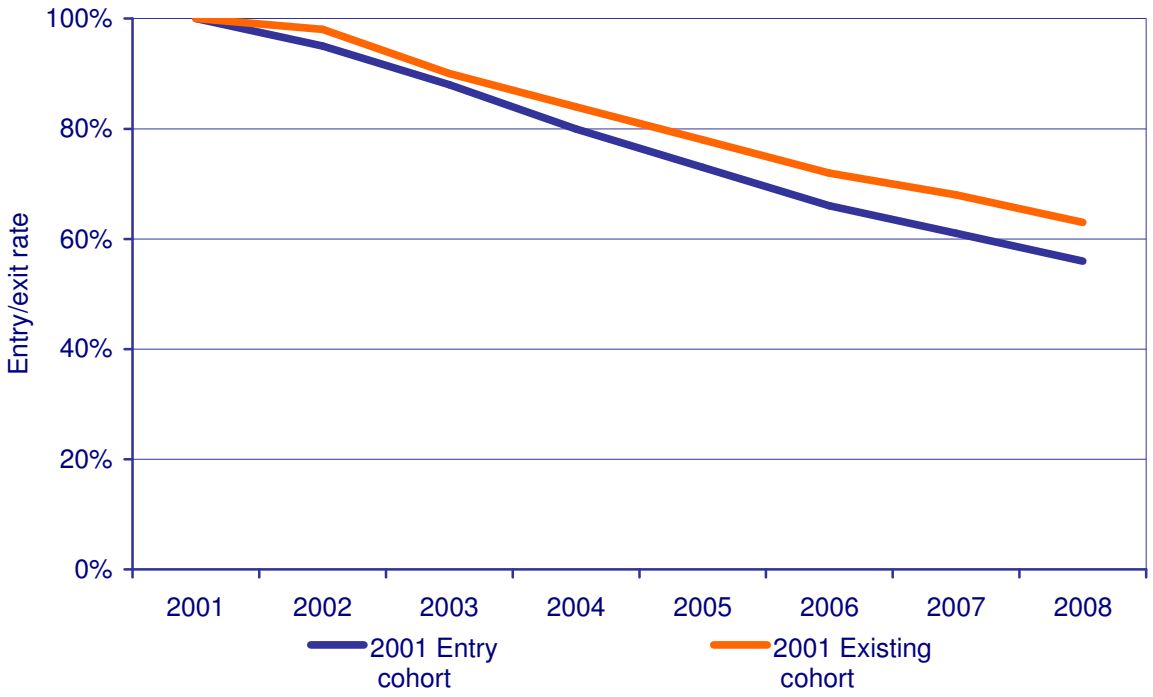
In this section we look at the experience of new entrant firms and their impact on the industry

4.3.1. Firm survival

We can get a good idea of how entering firms fare by looking at their survival rate. Figure 6 shows the survival rates of the cohort of entrants in 2001 and compares it with the experience of the cohort of firms that were already in existence in that year. The survival of function of entering firms is below that of the pre-existing cohort,

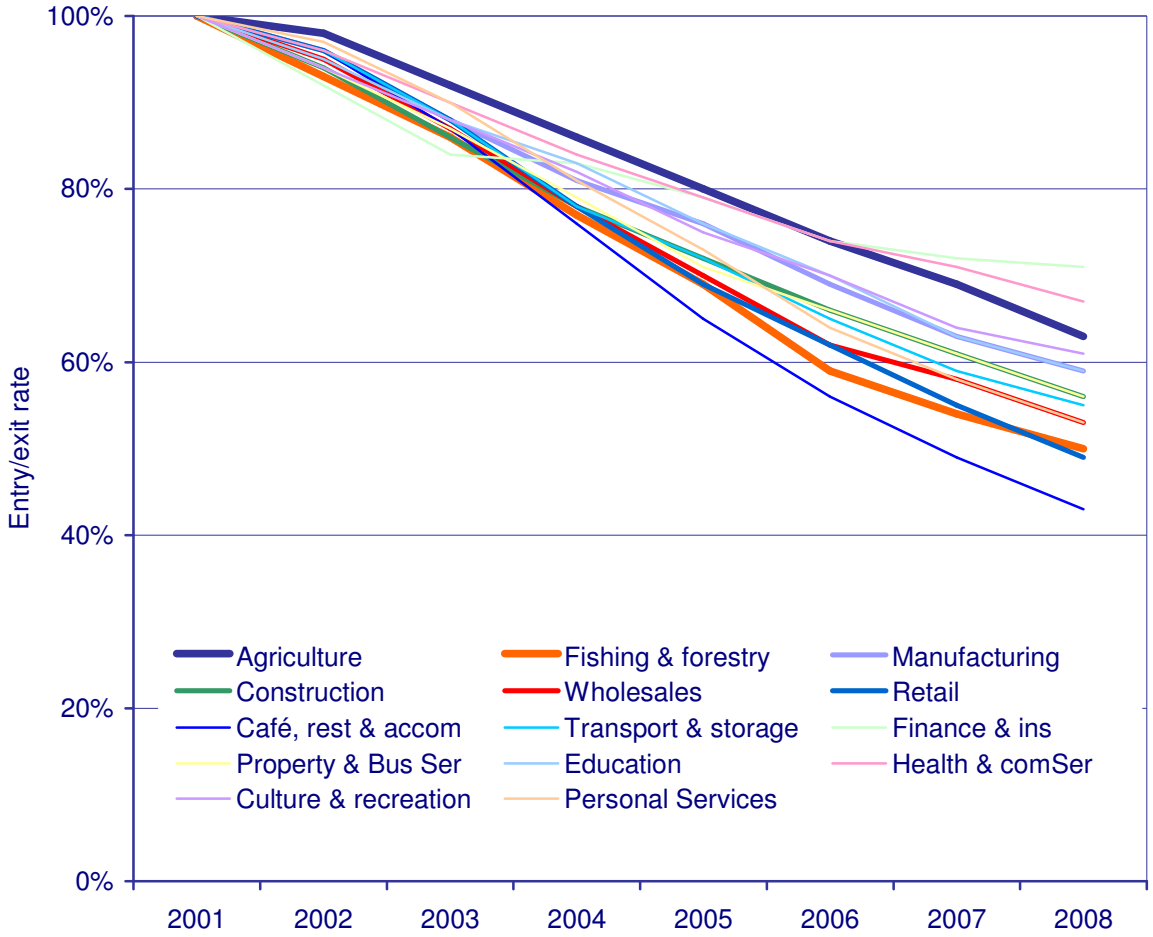
which reflects the lower rate of survival over the period. After seven years, only 56% of firms that entered in 2001 remained, compared to 63% of incumbents.

Figure 6 Firm survival rates of entrants and incumbents, 2001-2008



We can see how the survival of entering firms varies across industries by considering Figure 7. there is quite some variation even at this level of aggregation. Interestingly, the survival rate of entrants in 2001 is highest over the period in 'Finance and insurance' (at 71%), although the figures may be somewhat different if we extended the period of analysis. Survival is lowest in 'Cafés, restaurants and accommodation', at 43% over the seven year period.

Figure 7 Firm survival rates of 2001 birth cohort by industry, 2001-2008

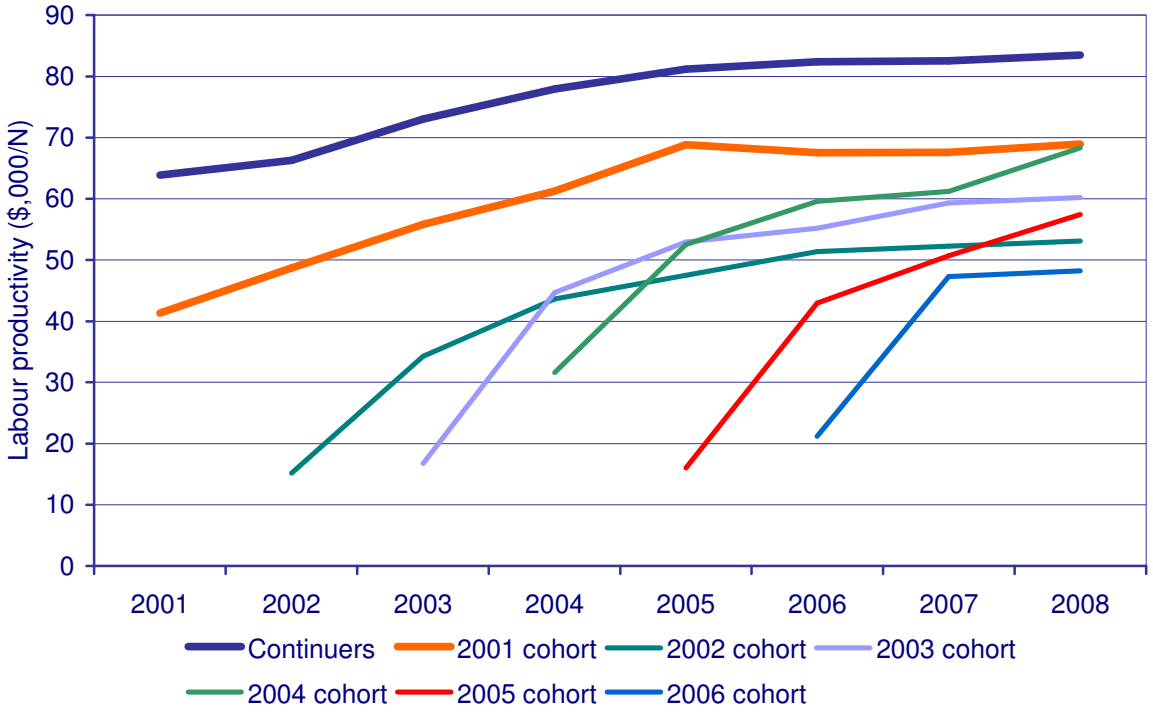


4.3.2. Entrant productivity performance

Another way to consider the experience of entrants is to consider their productivity performance. Earlier, we considered models such as Jovanovic (1976), where firms enter with below average productivity and through a process of learning-by-doing (or firm selection, or both), surviving firms increase to the industry average, or possibly above. Figure 8 portrays the labour productivity of six entry cohorts, compared with that of continuers (firms that were in existence for the whole period)[8].

[8] Because there are some extreme outliers that both introduce a lot of noise to the data and make certain firms potentially identifiable from the data, we exclude the top and bottom half a percentile of the value added distribution.

Figure 8 Entry cohort labour productivity relative to incumbents



- *Data trimmed to remove outliers in top and bottom 0.5%*

In Table 6 we consider the contribution of each of the cohorts to the economy in 2008. Instead of looking at the firm in their year of entry, we take a snapshot of the firms in the economy in 2008 and look at the experience of each of the cohorts. This shows the net effect of exits by firms in each of the cohorts and the growth in the firm subsequent to entry. The first column shows the total employment accumulated by firms in the entry cohort that have survived until 2008. This is a function of the balance between within-firm employment growth (shown in the second column) and firm failure. The total impact on industry employment appears to reach its maximum after about three years. Note that even after seven years entrants are still smaller on average than the pre-existing firms (3.41 versus 5.54). However, because of the continuing increase in productivity, the contribution of entering firms to overall value added continues to increase, although the pattern is fairly erratic.

Table 6 Performance and contribution of all entrant cohorts in 2008

Entrant cohort	Total jobs created	Firm size	Relative LP	Share in 2008	
				employment	VA
2001	68,300	3.41	83%	4.0%	3.7%
2002	77,600	3.84	106%	4.5%	5.4%
2003	67,800	2.89	72%	3.9%	3.2%
2004	79,000	2.97	82%	4.6%	4.2%
2005	82,200	2.89	69%	4.8%	3.7%
2006	90,200	2.96	58%	5.2%	3.4%
2007	83,400	2.56	47%	4.8%	2.5%
2008	37,200	1.21	-7%	2.2%	-0.2%
All entrant cohorts in 2008	585,700	2.76	68%	34.0%	25.9%
All firms excluding all entrant cohorts by year in 2008	1,136,600	5.54	100%	66.0%	74.1%
All firms in 2008	1,722,400	4.12	89%	100%	100%

- *Note: Firm size and relative LP are estimated for all year-born cohorts in 2008*

The ability of new entrants to achieve industry averages of firm size and labour productivity shows a great deal of variation by industry. Entrants to 'Farming, agricultural services and hunting' and 'Fishing and forestry' appear to be easily able to achieve the industry average over the 2001-8 period, although this is likely to be because firms tend to be small in these sectors. The figures for the other sectors are much closer to 50%. Firms have been able to achieve or even exceed the industry average level of productivity in the 'Fishing and forestry', 'Manufacturing' and 'Education' sectors.

Table 7 Performance of entrant cohort of 2001 in 2008 by industry

	All firms in 2008 excluding entrant cohorts		All entrant cohorts in 2008			
Industry	Firm size	LP	Firm size	Relative size	LP	Relative LP
Farm, agri services & hunting	2.36	69,598	2.22	94%	26,857	39%
Fishing and forestry	2.34	56,364	2.28	97%	80,222	142%
Quarrying and mining	14.62	c	8.19	56%	c	c
Manufacturing	13.06	90,067	6.12	47%	100,426	112%
Construction	4.16	79,240	2.06	49%	50,606	64%
Whole sales	9.27	150,000	3.31	36%	117,361	78%
Retail trade	8.42	41,229	3.36	40%	28,696	70%
Cafe, restaurants and accom	10.41	32,317	5.27	51%	22,500	70%
Transport and storage	9.21	180,800	2.38	26%	111,856	62%
Communication services	16.81	129,741	1.99	12%	46,182	36%
Finance and insurance	11.65	79,805	3.91	34%	28,679	36%
Property and business services	3.45	90,379	1.86	54%	67,580	75%
Education	7.46	41,875	4.75	64%	42,447	101%
Health and community services	6.78	48,463	4.18	62%	38,630	80%
Cultural and recreational services	4.52	75,481	2.14	47%	66,119	88%
Personal and other services	3.61	40,207	2.20	61%	35,882	89%
Overall	5.54	83,190	2.76	50%	56,139	67%

Table 8 Contribution of all entrant cohorts in 2008 to employment and VA, by industry

Industry	Jobs created	Share in 2008 total labour	Share in 2008 total VA
Farm, agricultural services & hunting	52,500	33.0%	15.9%
Fishing and forestry	4,500	34.1%	42.1%
Quarrying and mining	860	25.3%	c
Manufacturing	70,500	26.6%	28.8%
Construction	66,000	39.2%	29.0%
Whole sales	28,800	24.2%	20.0%
Retail trade	80,500	31.0%	23.8%
Cafe, restaurants and accommodation	52,000	51.4%	42.4%
Transport and storage	19,400	23.7%	16.2%
Communication services	5,500	19.2%	7.8%
Finance and insurance	15,900	27.9%	12.2%
Property and business services	113,200	39.8%	33.1%
Education	9,400	49.7%	49.8%
Health and community services	36,500	39.8%	34.5%
Cultural and recreational services	13,400	39.2%	36.0%
Personal and other services	17,000	47.0%	43.9%
Overall	585,800	34.0%	25.7%

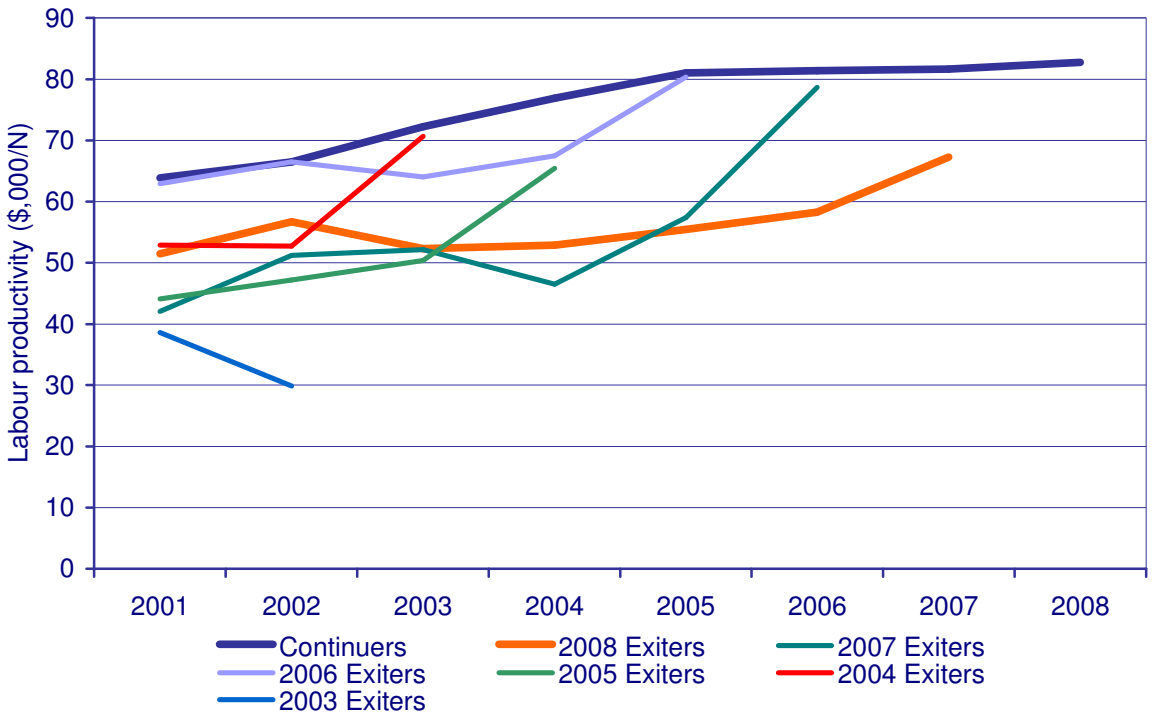
4.3.3. For whom the bell tolls – exiter performance

Figure 9 is the analogue to Figure 8 for exiting firms. It compares the average productivity of cohorts of firms exiting in each year to that of the cohort of firms that continue for the whole period.

The exiting cohorts are on average less productive than the continuers. It is interesting to note, however, that many of the cohorts experience a 'pick-up' in their productivity in their final years. There are a number of potential explanations for this. It may be the case that firms become more efficient as they seek to escape their fate. Another potential explanation is that, as firms wind down, they focus on 'fire sales' – i.e. receiving income from sales of output, whilst running down labour inputs or intermediate consumption. This is another case of where the assumption that the sale of output and the purchase of the inputs to produce that particular output occur in the same period. If there is a substantive proportion of production and sales spanning time periods, this may create problems. In periods of expanding output (e.g. when a firm enters an industry) productivity will be understated. In periods of

decline (e.g. when firms cease) productivity will be overstated. We will not spend anymore time investigating the patterns in exiting firms productivity until we have investigated this issue in more detail.

Figure 9 Entry cohort labour productivity relative to incumbents



- *Data trimmed to remove outliers in top and bottom 0.5%*

Firms certainly employ fewer people. Table 9 compares exiting firms with the remainder of firms in both their final year and the previous year. The first three columns provide this comparison for firms in their final year and firms that continued into the following year. Exiting firms are considerably smaller (in terms of their labour input) in their final year; their labour input is one-eight of that of their continuing peers. As we have noted above, a disproportionate amount of entering and exiting firms are working proprietor only firms. It is possible, therefore, that the data in the first column of the table are a function of our assumption that working proprietors provide one-half of a unit of labour (i.e. firms on average exit halfway through the year). Therefore in the final three columns we use the previous year's labour input of firms exiting or otherwise in each year. This certainly raises the average size of exiting firms (it also slightly reduces the size of continuing firms). Nevertheless, it remains that exiting

firms are smaller than their continuing brethren, with a labour input, on average, around half.

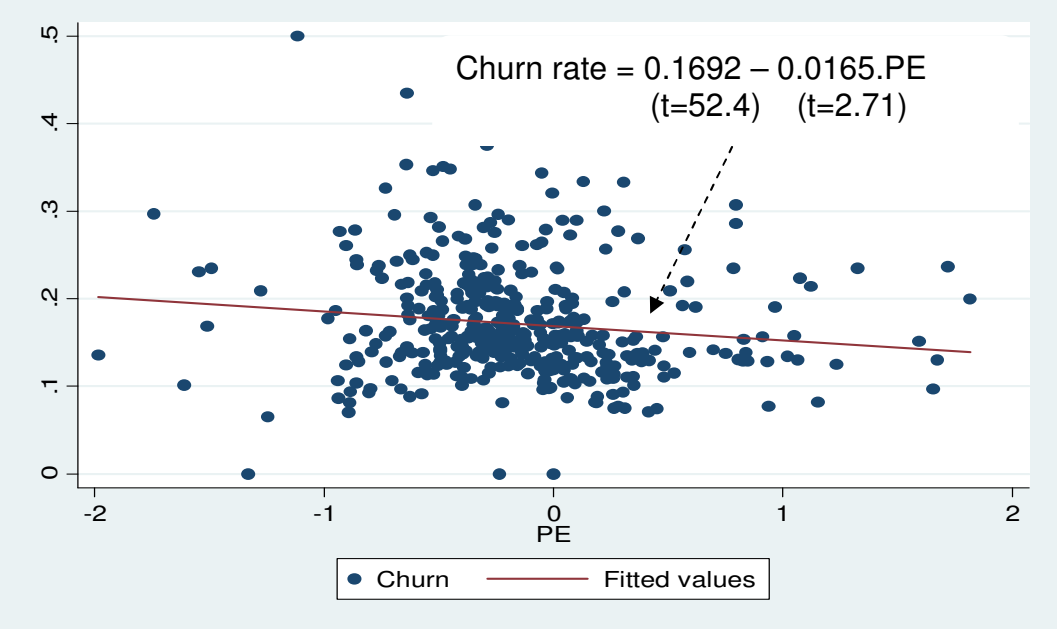
Table 9 Labour input of exiting firms in their final and penultimate year

Year	*Using final year*			*Using penultimate year*		
	Exit cohort only	Continuing firms	All firms	Exit cohort only	Continuing firms	All firms
2001	0.79	4.15	3.95	3.01	3.96	3.96
2002	0.61	4.18	3.94	2.27	3.94	3.89
2003	0.59	4.19	3.95	2.11	3.94	3.87
2004	0.50	4.23	3.96	1.77	3.96	3.86
2005	0.52	4.27	3.98	1.81	4.02	3.89
2006	0.47	4.32	4.03	1.69	4.08	3.95
2007	0.50	4.37	4.04	1.90	4.14	3.99
2008	0.52	4.50	4.12	1.73	4.24	4.05
Overall	0.55	4.28	4.00	1.98	4.04	3.93

4.4. Entry, exit and competition

This study has been motivated by an interest in patterns of firm entry and exit as part of the broader landscape of the competitive environment. Therefore, in this section we briefly examine the relationship between competition and firm entry and exit at the four-digit ANZSIC industry level. Profit elasticity is preferred to other measures based on concentration or market sums of markets because it is designed to account for the impact of competition on selection and reallocation (for a fuller explanation of this measure, see Devine *et al.* 2011). Broadly speaking, more competitive industries tend to have relatively more firm turnover (Figure 10). As seen in the figure, there is a positive correlation between industries' churn rates and their levels of competition as measured by profit elasticity. However, this may be a relatively weak correlation, due to the apparently high dispersion of results among industries.

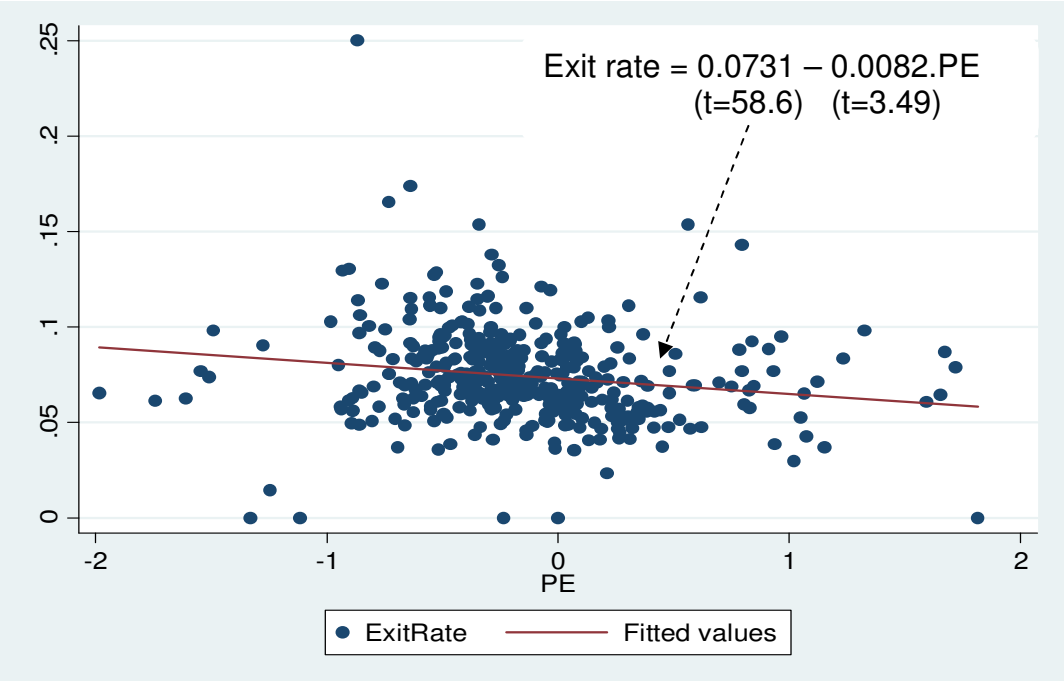
Figure 10 Relationship between Churn rate and Profit elasticity



- *Note: some extreme outliers are removed.*

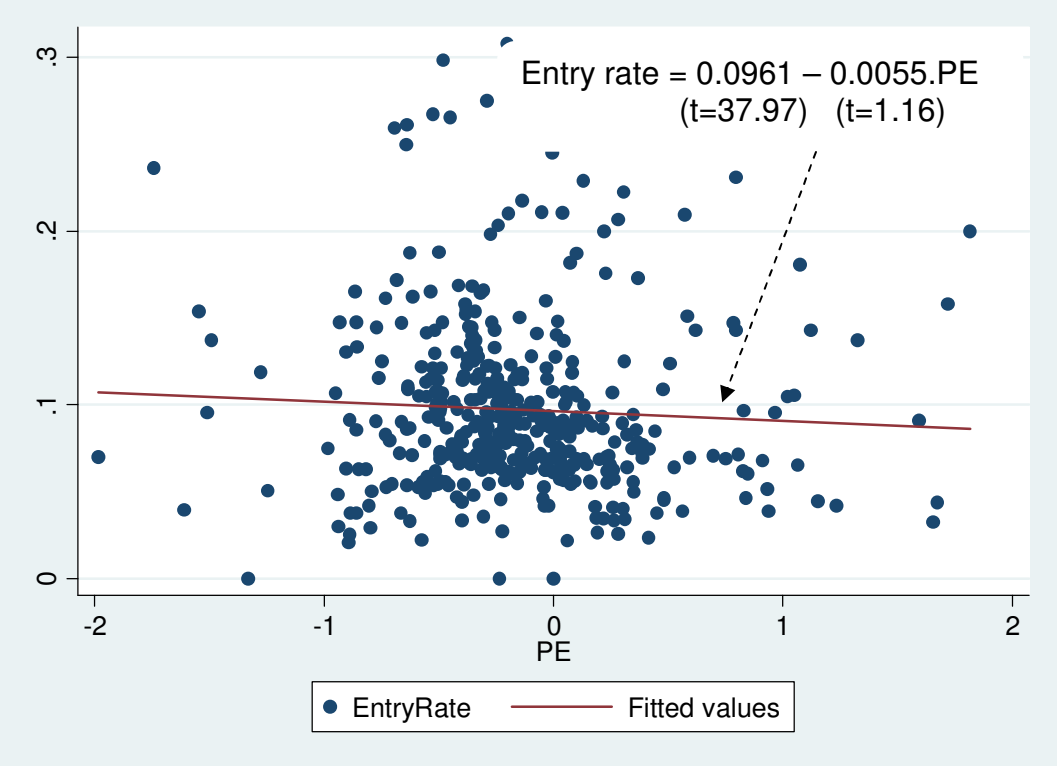
There is also a statistically significant, but weak relationship between exit rates and competition at the 4-digit industry level (Figure 11), but not entry rates (Figure 12).

Figure 11 Relationship between Exit rate and Profit elasticity



- *Note: some extreme outliers are removed*

Figure 12 Relationship between Entry rate and Profit elasticity



- *Note: some extreme outliers are removed*

Clearly, there is not a simple relationship between differences in firm entry and exit in industries and competition. There are many other factors influencing this relationship. This relationship might be better investigated using changes in these variables and, moreover, a source of exogenous variation in one of the variables.

5. Conclusions

In this paper we have considered the entry and exit of firms in New Zealand industries. We find that entry and exit are not unusual events, but rather commonplace phenomena in New Zealand, as they are in other capitalist economies. They appear to be a function of the overall business cycle, with firm entry falling and firm exit increasing in response to the global financial crisis. Because the economy is subject to such dynamics over the whole cycle, that changes in overall numbers of firms in this period were the result of relatively minor changes in entry and exit rates.

There is considerable variation in rates of firm entry and exit across industries. This is suggestive of considerable variation in the causes of firm entry and exit. One must be wary of reading too much into comparisons until we understand better their source.

We find that entering firms are smaller and less productive than incumbent firms. They are also less likely to survive than incumbents. However, those that do survive, experience an improvement in post entry labour productivity.

We find that exiting firms are less productive than incumbents for some time prior to their exit. However, they do experience a 'pick up' in productivity in their final years. There are a number of potential explanations for this. One thing that is certain is that they are certainly much smaller, in terms of labour input, than continuing firms in their final year. They also have employment around half the size of continuing firms in their penultimate year.

There are some signs of a weak relationship between firm churn in an industry and competition. However, this relationship is not causal and appears to be swamped by other differences between industries.

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Appendix A1. Data Appendix

A1.1 The Longitudinal Business Frame

The Longitudinal Business Frame (LBF) contains data from two main sources: Statistics New Zealand's Business Frame (BF), and payroll tax records drawn from New Zealand's taxation system. Of these, the BF is the predominant source, as it covers all businesses that are registered with Inland Revenue and meet the criteria for economic significance. This means that employing businesses on the LBF that are economically significant exist in both data sources. The unreported economy is outside the scope of the LBF.

A business is included in the BF (is economically significant) if it meets at least one of the following conditions:

- the business has annual Goods and Services Tax (GST) turnover of greater than $30,000
- the business has paid employees
- the business is part of an enterprise group
- the business is part of a GST group
- the business has more than $40,000 income reported on tax form IR10
- the business has a positive annual GST turnover and has a geographic unit classified to agriculture or forestry.

Data on a small number of businesses on the LBF comes directly from taxation records, as the businesses are not found on the BF. Instead, the data is sourced from the Employer Monthly Schedule (EMS) data. The EMS payroll return is filed monthly by employing enterprises and covers all payers and recipients of income that is taxed at source, other than interest and dividends. Enterprises that are out of scope of the BF and non-employing (not filing EMS) are not included on the LBF.

Attributes such as the industry, size or region of businesses on the BF are transferred to the LBF, while businesses that are sourced from outside the frame are updated with coded or imputed attributes. Businesses on the BF are structured according to a three-level statistical model comprising the enterprise unit, the kind-of activity unit, and the geographic unit (business location) in accordance with the

International Standard Industrial Classification of all Economic Activities, Third Revision (ISIC rev 3; see Figure 1 below). The LBF focuses mainly on geographic units, but also records information about the enterprises that the geographic units belong to, as well as the group top enterprise, if there is one.'

The LBF is larger than both of its constituent parts, the Business Frame and the population of employers in LEED.

One of the weaknesses of the LBF is that it has limited information on industry for enterprises that are found only in the payroll data. Because of this, small enterprises found in the Business Frame and not in the payroll data may have industry codes that are updated once every three years from a questionnaire, if at all. This suggests that our analysis will under-report small firms that shift industries.

The main weakness for our purposes, however, relates to the maintenance of longitudinal links. The repair process that has been undertaken to ensure better longitudinal links is done at the plant-level (in SNZ parlance: GEO or Geographic unit). This created a permanent business number (PBN). Whereas, the enterprise number that is used to identify firms can change over time, the PBN is intended to pick up true creation of new firms in the economic sense – what is called 'establishment' in the System of National Accounts 1993.

In this paper we utilise the method developed by Fabling (2011) to repair broken firm identifiers. This method uses plant identifiers repaired by Statistics New Zealand to identify firms that appear to exit because they change enterprise identifier for reasons other than ceasing as an economic entity. Whilst this method only uses data within the LBD, it does allow identification and fixing of the majority of the candidate breaks it identifies[9].

A1.2 LBD Variables used for productivity measurement

Annual Enterprise Survey (AES)

The Annual Enterprise Survey (AES) is Statistics New Zealand's primary data source for the production of National Accounts, providing the benchmark for estimating value

[9] These candidate breaks are defined as distinct enterprises that passes an employing plant to another enterprise. Candidate breaks are not repaired if the source enterprise continued to employ afterwards or the target enterprise employed prior to the plant moving (i.e. excluding sales of parts of firms), there are multiple sources or targets in a single time period (a month).

added. The survey covers all large firms, with a stratified sample for smaller firms and has industry specific questions in order to accurately measure aggregated GDP.

IR10

IR10s are essentially a set of company accounts composed of profit and loss statements and a balance sheet Included is information on sales (and other income) and purchase, as well as detailed breakdown of expenditure including depreciation, R&D costs and salaries and wages. Balance sheet items include fixed assets (vehicle; plant and machinery; furniture and fittings; land and buildings; and other), liabilities (current and term) and shareholders' funds.

Business Activity Indicator (BAI)

The Business Activity Indicator (BAI) is derived from GST data including sales and purchases collected by the Inland Revenue Department (IRD). Statistics New Zealand creates the BAI by temporally apportioning the GST data down to a monthly frequency, apportioning returns across GST group members, and applying limited imputation where a single return is missing.

Linked Employer-Employee Data (LEED)

Linked Employer-Employee Data (LEED) is constructed by Statistics New Zealand from IRD Pay-As-You-Earn (PAYE) returns for employees. LEED variables are aggregated to the firms level for confidentiality reasons. It is generally assumed by researchers that missing employment data implies zero employees on the grounds that personal income tax non-compliance is negligible in the population of firms that comply with mandatory GST. Variables available include counts of employers (on an annual firm level basis) and employees (on a monthly plant level basis). Summary characteristics are available by gender, and age-band breakdowns, tenure distributions of employees and summary measures of wage distribution within the firm.

Employees

Employment is measured using an average of twelve monthly PAYE employee counts in the year. These monthly employee counts are taken as at 15th of the month.

This figure excludes working proprietors and is known as Rolling Mean Employment (RME).

Working proprietors

The working proprietor count is the number of self-employed persons who were paid taxable income during the tax year (at any time). In LEED, a working proprietor is assumed to be a person who (i) operates his or her own economic enterprise or engages independently in a profession or trade, and (ii) receives income from self-employment from which tax is deducted.

From tax data, there are five ways that people can earn self-employment income from a firm:

- As a sole trader working for themselves (using the IR3 individual income tax form [this is used for individuals who earn income that is not taxed at source]);
- Paid withholding payments either by a firm they own, or as an independent contractor (identified through the IR348 employer monthly schedule);
- Paid a PAYE tax-deducted salary by a firm they own (IR348);
- Paid a partnership income by a partnership they own (IR20 annual partnership tax form [this reports the distribution of income earned by partnerships to their partners] or the IR7 partnership income tax return);
- Paid a shareholder salary by a company they own (IR4S annual company tax return [this reports the distribution of income from companies to shareholders for work performed (known as shareholder-salaries)]).

Note that it is impossible to determine whether the self-employment income involves labour input. For example, shareholder salaries can be paid to owner-shareholders who were not actively involved in running the business. Thus there is no way of telling what labour input was supplied, although the income figures do provide some relevant information (a very small payment is unlikely to reflect a full-year, full-time labour input).